Title

Colonialism, Cuisine, and Culture Contact: An Analysis of Provincial Foodways of the Wari Empire (A.D. 600 – 1000)

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Colonialism, Cuisine, and Culture Contact: An Analysis of Provincial Foodways of the Wari Empire (A.D. 600 – 1000)

A dissertation submitted in partial satisfaction of the
requirements for the degree Doctor of Philosophy
in Anthropology

by

Matthew Eric Biwer

Committee in charge:
Professor Amber M. VanDerwarker, Chair
Professor Donna J. Nash
Professor Katharina J. Schreiber
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March 2019

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March 2019

Colonization, Cuisine, and Culture Contact: An Analysis of Provincial Foodways of the Wari Empire (A.D. 600- 1000)

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Matthew Eric Biwer

This dissertation is dedicated to my parents, Pat and Dee, who always supported my interests, and to my partner Korine, who never let me give up.

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There are many people to thank for their support and guidance throughout my graduate studies. First and foremost, I must acknowledge my committee chair, Amber VanDerwarker, who provided me with seemingly unending advice, direction, time, and encouragement in all of the stages of my research. I could not have asked for a better mentor, colleague, and friend to guide me through this process. I am a better scholar because of her efforts. Next, I would like to thank Donna Nash who taught me archaeological field methods, Andean archaeology, and grounded me both theoretically and methodologically. Her expertise and pragmatic attitude has fundamentally shaped me as an archaeologist since my first day in Peru and I am extremely grateful that she invited me to work with her in Moquegua. Greg Wilson provided thoughtful insight and conversation on all things theoretical which had a profound impact on my view of the discipline. I am grateful to call him my colleague and friend. Finally, I would like to thank Katharina Schreiber who provided me with instruction in Andean prehistory and countless stories from past fieldwork. My research benefitted greatly from her immense knowledge of Andean prehistory.

This research could not have been accomplished without the generous support of the Wenner-Gren Foundation (Dissertation Fieldwork Grant #9225) and the National Science Foundation (Dissertation Improvement Grant #1634065). This research also benefitted from a UC Santa Barbara Graduate Division Humanities and Social Sciences Research Grant and several research stipends from the UCSB Department of Anthropology. The Ministry of Culture of Peru granted access to museum collections and allowed the export of materials from Peru to the United States for analysis.

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I have had the pleasure to work alongside a number of graduate students in the UCSB Integrated Subsistence Laboratory, including Dana Bardolph, Kristin Hoppa, Mallory Melton, and Sarah Noe. I also benefitted greatly from conversations with my graduate student colleagues at UCSB, including Christina Friberg, Alicia Gorman, Jessica Kaplan, Sarah Kerchusky, Weston McCool, Craig Smith, and Jessika Smith. Two undergraduate lab assistants, Victoria Newhall and Matt Medeiros, aided in the sorting and counting of plant remains from Quilcapampa. I would also like to thank my colleagues Aleksa Alaica, Sara

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2018	UCSB GSA Excellence in Teaching Award Nomination
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Publications

Peer-Reviewed Journal Articles

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In Review	Comida y contacto cultural: Resultados preliminares del Proyecto de Investigación Paleobotánica Wari en Moquegua, *Actas del IV Congreso Nacional de Arqueología*, Ministerio de Cultura, Lima.

Biwer, Matthew E., and, Amber M. VanDerwarker

2015	Plant Subsistence at Myer-Dickson during the Woodland and Mississippian Periods. *Illinois Archaeology* 27:832-117.

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2016 New World Paleoethnobotany in the New Millennium (2000-2013). *Journal of Archaeological Research* 24(2):125-177.

Biwer, Matthew E., and Amber M. VanDerwarker

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Peer-Reviewed Edited Volume Chapters

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In Review Foodways and Culture Contact at Yahuay Alta, A Huaracane Site in the Moquegua Valley, Peru. In *Food and Culture in the Andes,* edited by Katherine L. Chiou and Christine Hastorf. University of Alabama Press.

Book Reviews

2014 Review of *The Never-Ending Feast,* by Kaori O'Conner. *Food and History* 12(2):202-204.

Encyclopedia Entries

2018 Beverages. In *The SAS Encyclopedia of Archaeological Sciences,* edited by Sandra L. Lopez Varela. Wiley-Blackwell.

Conference Presentations

2018 Drinking Together: The Role of Foodways in the Wari and Huaracane Colonial Encounter in the Moquegua Valley, Peru. Presented at the 83rd Annual Meeting of the Society of American Archaeology, Washington D.C. (Matthew E. Biwer)

2018 Recent Paleoethnobotanical Investigations at Cerro Baúl, Upper Moquegua Valley, Peru. Poster Presented at the 59th Annual Meeting of the Institute of Andean Studies, Berkeley. (Matthew E. Biwer)

2017 Preliminary Analysis of Middle Horizon Paleoethnobotanical Remains from Quilcapampa La Antigua, Arequipa, Peru. Poster Session on Andean Archaeology, 62nd Annual Meeting of the Society for American Archaeology, Vancouver. (Matthew E. Biwer)

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2012	An Analysis of Late Woodland Paleoethnobotanical Remains from the Myer Dickson site in the Central Illinois River Valley. Presented at the 69th Annual Southeastern Archaeology Meeting, Baton Rouge. (Matthew E. Biwer)
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2012	Chicha and Wari: A Macrobotanical Analysis of Features from Cerro Baúl in the Moquegua Valley, Peru. Presented at the 77th Annual Meeting of the Society for American Archaeology, Memphis. (Matthew E. Biwer)

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In Prep	Paleoethnobotanical Investigations at Quilcapampa, A Wari Colony in Arequipa, Peru. (**Matthew E. Biwer**). To be submitted to University of Florida Press as part of an edited volume.
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Technical Reports

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2018 **Matthew Biwer** and VanDerwarker, Amber. Analysis of Plant Remains from the 31BN976 Site. Submitted to TRC Garrow & Associates. 10pp.

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Teaching Experience

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Winter 2018 Associate Lecturer, Prehistoric Food Production (upper division course)
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Pedagogical Training

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Archaeological Fieldwork Experience

Field Supervisor, Excavations at the Las Peñas site in the Upper Moquegua Valley, Peru.
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Field Assistant, UCSB/NPS Archaeological Survey of Santa Rosa Island.
July 2013

Duties: Conducted field survey of Santa Rose Island. Duties included walking transects, recording locations of mortar and house depressions, filing paperwork with National Park Service

Field Supervisor, Excavations of Middle Horizon/Late Intermediate Period sites in the Upper Moquegua Valley, Peru.
June – August 2012

Duties: Field Excavation Supervisor, generating unit reports, cataloging artifacts, submitting excavated materials to Ministerio del Cultura de Peru, field school TA instructing field school students and grading performance, and project logistical needs

Field Supervisor, Excavations of Mesolithic archaeological sites in Bad Buchau, Germany.
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Field Supervisor, Excavations at the Middle Horizon Wari site of Cerro Mejia in the Upper Moquegua Valley, Peru.
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Field School Student, Gravina, Italy, San Felice Archaeological Site,
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Paleoethnobotanical Specialist, Proyecto Investigación Arqueología de Quilcapampa La Antigua.
June 2016 – Present
Duties: Served as the primary authority on plant remains recovered from Quilcapampa in the Siguas Valley, Peru, created project soil sampling protocol, identified plant remains in the field and laboratory, created report of plant remains recovered from the site.

Paleoethnobotanical Consultant for TCR Garrow Associates, Inc. based in Chapel Hill, North Carolina, of McCoy Bridge project, North Carolina. Report on file.
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Duties: Sorting Archaeobotanical Materials, Identifying Recovered Plant Remains

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Paleoethnobotanical Laboratory Supervisor, UCSB Integrative Subsistence Laboratory
September 2009 – Present
Duties: Instructed and supervised students in archaeological methods and plant identification, managed intern schedule, ordered lab supplies, contributed to day-to-day operations of the lab.

Paleoethnobotanical Specialist, Upper Moquegua Valley Archaeological Project, Moquegua, Peru, June 2009 – 2012
Duties: Served as the primary authority on plant remains recovered from archaeological sites in the Upper Moquegua Valley, identified plant remains in the field and laboratory, created report of plant remains recovered from the site, instructed field school students in archaeological and archaeobotanical methods.

Paleoethnobotanical Specialist, Cerro Mejia Archaeological Project, Moquegua, Peru, June – August 2009
Duties: Served as the primary authority on plant remains recovered from Cerro Mejia, identified plant remains in the field and in the laboratory, created preliminary reports of plant remains recovered from the sites, instructed field school students in archaeological and archaeobotanical methods.

Professional Workshops Attended

Starch Grain and Phytolith Recovery, Processing, and Identification Workshop, Led by Dr. Ruth Dickau, November 2, 2017

> Description: Instructed in basic methods of recovery and identification of starch grains and phytoliths recovered from archaeological sites

Comparative Borderlands in Anthropology and History, Short Seminar Comparative Borderlands in Anthropology and History, June 7 – 8, 2013.

> Description: Participated in a 3-day seminar at the School of Advanced Research presenting original research and discussing theoretical issues related to borderlands and issues of culture contact in anthropology and history.

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> Description: Instructed in basic methods of recovery and identification of wood remains recovered from archaeological sites

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Outreach Program Volunteer, Anthropology Graduate Student Association (2009 – present)

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ABSTRACT

Colonization, Cuisine, and Culture Contact: An Analysis of Provincial Foodways of the Wari Empire (A.D. 600 – 1000)

by

Matthew Eric Biwer

In this dissertation I explore the complexities of culture contact and colonialism through the lens of daily foodways to evaluate cultural interaction and entanglements between disparate cultural groups. Focusing on provincial sites of the Middle Horizon (A.D. 600 – 1000) Wari Empire in the south-central Peruvian Andes, I incorporate macrobotanical and microbotanical remains to investigate not only how food was a medium through which Wari colonists and indigenous groups negotiated the colonial encounter on the Wari frontier, but also use food to interpret the nature of the contact. Plant presence, processing and discard activities, architectural features, and artifacts associated with household structures form the basis of analysis for characterizing site foodways. This examination of plant-based food activities informed my interpretation of Wari provincial cuisine and serves as a means to evaluate how cultural negotiations were experienced by both colonizer and indigenous groups on the frontier.

A qualitative comparison of spatial patterns of archaeobotanical remains from three provincial Wari sites, including Cerro Baúl in the Moquegua Valley, Quilcapampa in the Siguas Valley, and Hatun Cotuyoc in the Lucre Basin, serves as the foundation for developing provincial Wari cuisine. Similarities and differences in the patterning of plant remains and associations between plant types, site architecture, artifacts, and space, were identified at these provincial Wari sites. Although environmental factors, interregional trade, and local colonial entanglements likely limited the production and distribution of certain plants, I argue the identified foodways shared between the sites represent a collective Wari provincial cuisine. This provincial cuisine could have produced and maintained a cohesive Wari identity on the borderlands and frontiers of the empire.

The Wari pattern of plant use at Cerro Baúl was compared to those of the local indigenous Huaracane at the site of Yahuay Alta in the Moquegua Valley to determine if foodways may have served as a medium of culture contact. The plant data suggest that upon Wari incursion into the Moquegua Valley the Wari and Huaracane communities shared food traditions. Specifically, at Yahuay Alta (Huaracane site) I recovered large quantities of molle drupes *(Schinus molle*), a plant I assert is a primary element of Wari provincial foodways. I argue that during this period of Wari colonization and culture contact, the Huaracane adopted the Wari practice of brewing *chicha de molle*. Interestingly, the identified pattern of molle use at Yahuay Alta differs from the Wari sites, suggesting the indigenous Huaracane adopted the Wari practice of brewing *chicha de molle* but did so on their own terms by integrating the practice into an existing set of social, economic, and political organizations.

The approach to culture contact and colonialism employed in this dissertation departs from previous studies by considering quotidian foodways as a salient element of cultural interaction in the past. From a regional perspective this research characterizes provincial foodways in the Wari Empire using the remains of daily household and public meals to further develop research of provincial identity and food production.

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CHAPTER I

CULTURE CONTACT, COLONIALISM, AND CUISINE ON THE BORDERLANDS OF THE WARI EMPIRE: AN INTRODUCTION

Food is one of the most essential components necessary for human survival. We eat and drink to nourish ourselves and to maintain basic bodily functions. But food is so much more than just fuel – it is loaded with meanings, rules, and values. What people eat and the ways they do it are often culturally specific, varying from one ethnic group to another. A person's thoughts and practices surrounding food, or their cuisine, structures when, how, where, and what they eat, and these habits follow them throughout their life. But what happens when a community leaves the area most familiar to them (home) and encounters an ethnic group with dissimilar cultural practices? In other words, how can food be a means of cultural interaction and entanglement?

In this dissertation, I investigate how foodways, including the production, processing, consumption, and discard of food, alongside social, economic, and political contexts within which food is deployed, can be used as a lens to characterize culture contact and colonial entanglement in the past. This project considers these issues within the context of the Middle Horizon (A.D. 600-1000) era of the south-central Peruvian Andes in the provinces of the Wari Empire. As one of the first examples of an empire in the Americas, predating the Inca Empire by around 400 years, the Wari Empire has been the subject of intense archaeological research for over 40 years. Once Wari colonists left their Ayacucho homeland, they interacted with an assortment of ethnic groups with which they had never before had contact. The resulting colonial entanglements are essential for characterizations of both the nature of Wari colonization and identity.

Wari Colonialism, Culture Contact, and Cuisine

The Middle Horizon was a significant period in Andean prehistory. For the first time, large territories of what are now Peru, Bolivia, and Chile were linked together in interregional exchange. These spheres of interaction were dominated by two polities: the Wari Empire based in Ayacucho, Peru and the Tiwanaku State based near the shores of Lake Titicaca, Bolivia. The relationship between these two polities and the local indigenous groups with which they interfaced has been the subject of debate among scholars (e.g., Isbell and McEwan 1991:5-10; Jennings 2010; Janusek 2008:8; Schreiber 1992; Tung 2012).

Wari represents the first example of an empire in South America. Located in the Ayacucho Valley, its capital city of Huari began to rapidly urbanize around A.D. 550, developing into a major metropolitan center soon after. Huari was likely the most densely populated prehistoric city in Peru with a size of approximately 15 km^2 and an estimated population of up to 70,000 residents at its height (Isbell et al. 1991:24; Isbell 2001:106-107). There, the monumental complexes of Cheqo Wasi and Vegachayoq (Isbell 2001:117), create a ritual core that, alongside feasting, luxury goods, ancestor worship, and trophy head taking (e.g., Cook 2001; Ochotoma and Romero Barrera 2002; Tung 2008, 2012), legitimized growing class distinctions within the valley.

Wari colonists began to leave Ayacucho around A.D. 600, establishing colonial footholds ranging from most of the Peruvian central and southern highlands to the Pacific coast. Direct evidence of Wari colonial presence has been recovered as far north as Cajamarca (J. Topic 1991; T. Topic 1991), as far east as the Cusco area at Pikillaqta (McEwan 1991, 1996, 2005), Huaro (Glowacki 2002; Skidmore 2014), and Vilcabamba (Isbell 2016), west to the Nasca region (Edwards and Schreiber 2014; Schreiber 1999), and south to the Moquegua Valley at the site of Cerro Baúl (Moseley et al 2005; Williams 2001) (Figure 2.1). Further, Wari pottery, textiles, and other forms of material culture were distributed over much of Peru (see Isbell 2010; Menzel 1964; Schreiber 2012), indicating Wari material culture extends well beyond the provincial administrative sites. Interregional exchange increased during this period, with precious metals, obsidian, textiles, chrysocolla (blue-green stone commonly mistaken for turquoise), and *Spondylus* sp. shells travelling further distances than ever before (see Burger et al 2000; Lau 2010; Shady Solis 1988), providing evidence for Wari provincial installations and/or movement of Wari material culture hundreds of kilometers from the site of Huari in Ayacucho. Wari colonists constructed, administered, and/or negotiated the colonial program throughout the Peruvian Andes until approximately A.D. 1000 when Wari sites were abandoned.

During the Middle Horizon, Wari agents colonized and administered newly acquired territories from administrative centers and secondary sites, though the nature of interactions between colonists and indigenous groups varied greatly (e.g., Belisle 2015, 2019; Belisle and Covey 2010; Coleman Goldstein 2010; Covey et al. 2013; Edwards 2013; Green and Goldstein 2010; Jennings 2010; Nash and Williams 2009; Schreiber 1992, 2005; Tung 2012; Williams and Nash 2002). Many frameworks for Wari expansion and administration incorporate (at some level) what Schreiber (1992:267) refers to as the *mosaic of control*. This model identifies variable methods of social, economic, political, and ritual control that Wari colonists used to colonize different regions of Peru. The result is an empire that tailored its methods of expansion and subjugation of indigenous groups to the local conditions of colonization, resulting in varied experiences from valley to valley.

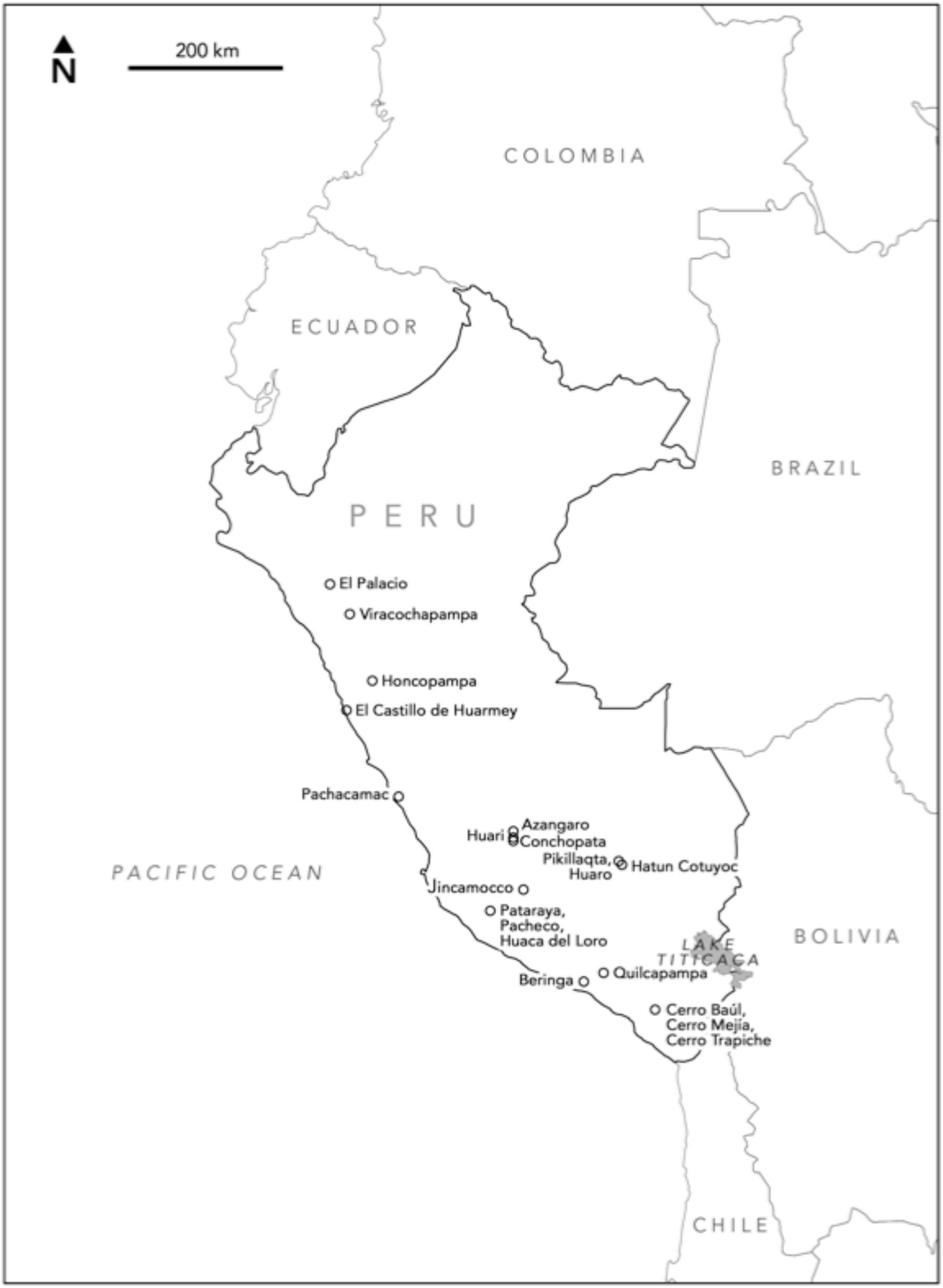

Figure 2.1 Map of Peru Indicating Wari Sites or Locations of Interaction Mentioned in this Dissertation

For example, Wari constructed the massive site of Pikillaqta to the east of modern-day Cusco. This site resulted in considerable investment on the part of Wari colonists, measuring approximately 1680 x 1120 m^2 (McEwan 1996, 2005). What is interesting is that considering the level of Wari investment in Cusco, Bélisle and Covey (2010; see also Covey et al. 2013) argue relatively little appears to have changed in terms of local settlement patterns, material culture, or food production. In contrast to the colonial experience in Cusco, Conlee (2010:98) notes that the local response to Wari colonization in the Nasca region appears to be mixed with settlement abandonment in the north, population aggregation in the south, emulation of Wari style at some settlements, and direct incorporation of local communities into the Wari sphere in other parts of the Nasca Valley. In Nasca, analyses of ceramic and mortuary remains indicate that Wari created new opportunities for local people, and that new categories of local elites who subscribed to (Conlee 2010:109; Schreiber 2005) or possibly rejected (Kerchusky 2018) Wari ideology emerged as a result of access to Wari material culture and ideology.

Further, Wari colonists had little impact on local food production in Nasca (Kellner and Schoeninger 2008) and the nearby Majes Valley (Tung and Knudson 2017), as local people continued to consume the same foods as they did prior to Wari incursion. Adding further diversity to the broad range of colonial experiences, Wari colonists in the Moquegua and Sondondo Valleys constructed large systems of agricultural canals and terraces that did not previously exist in the regions (see Schreiber 1992; Williams 2001), representing substantial investment in local agricultural production while investing seemingly little in other areas such as the Cotahuasi Valley in Arequipa (see Jennings and Yépez 2015).

Similarly, Tung (2012) has shown that the social contexts of violence differed throughout the Wari Empire. In the Majes Valley, violence was a part of everyday occurrence; one in three adults exhibit cranial trauma, and both men and women were affected, suggesting Wari imperial policies destabilized some hinterland regions more than others (Tung 2012:205). Indeed, there is little evidence for military conquest or violence in Moquegua where Wari agents constructed an administrative site on top of a ritually-charged mesa, Cerro Baúl. This variable set of policies signifies the flexibility of Wari colonial strategies and the multiplicity of entanglements that occurred as the Empire spread. It is clear that violence was not used as a method of colonialism in all parts of the Wari Empire, but was flexibly used (or was a product of Wari expansion).

The nature of Wari political organization, degree of power, and relationships with other societies has been debated since the civilization was first identified. The central disagreement revolves around if Wari was an empire (e.g., Isbell and McEwan 1991; Isbell and Schreiber 1978; Schreiber 1992; Tung 2012; Williams 2001; Nash and Williams 2005) or an interregional interaction sphere responsible for facilitating trade and the movement of ideas (e.g., Jennings 2006; Shady Solis 1988; Topic and Topic 2001). While the preponderance of evidence points to Wari as an empire, this does not mean that Wari colonists behaved uniformly throughout the Empire, nor administered the same forms and/or intensities of power at every colonial locale. Nor does it mean that every manifestation of Wari material culture signals imperialism.

Empires are known to exhibit variable levels of social, economic, and political power in the regions in which they expand, and that military coercion can vary based on tactics and need. Although early depictions focused on Wari imperialism emanating from the core (Huari), the aforementioned studies illustrate the need to investigate Wari colonial strategies as they were experienced and shaped by both imperial and local agents, which resulted in a great deal of variation. These approaches have reoriented archaeological investigations of Wari towards a focus on local agency and conditions (e.g., Jennings 2010; Schreiber 1992, 2005), producing additional questions concerning the unique circumstances of the colonial encounter and how cultural entanglements were manifested and experienced within and between Wari colonies: How did colonists and indigenous groups experience and negotiate colonial situations at these provincial centers and surrounding areas? How can we evaluate multidirectional exchanges between colonists and indigenous groups? How can food inform on the internal differences present amongst colonists?

I argue the variations of the Wari footprint highlighted above are best described within a flexible imperial model that emphasizes the complex entanglements between intrusive Wari colonists and local indigenous groups. Reorienting the line of questioning in this way allows archaeologists to investigate the local entanglements that occurred within the Wari Empire without the need to place the local conditions within a strict imperialist model of expansion, conquest, and resource extraction. In what follows, I detail what is currently known of Wari foodways and highlight the utility of investigating foodways as a lens for interpreting Wari identity and colonial entanglement.

Research on Wari foodways, including not only the types of taxa used by Wari peoples but also the manner and methods of food production, processing, and discard, has grown tremendously over the past decade but remains underdeveloped in several key ways. Most prior research has focused on presence/absence of food residues at Wari sites, noting the presence of maize (*Zea mays*), quinoa (*Chenopodium quinoa*), common bean (*Phaseolus vulgaris*), and molle (*Schinus molle*). These plants likely occupied prominent roles in Wari foodways in the Ayacucho homeland, and would have accompanied Wari colonists when they traveled to new provincial locales (see Anders 1986; Edwards and Schreiber 2014; Finucane 2007, 2009; Finucane et al. 2006; Goldstein et al. 2009; Moseley et al. 2005; Nash 2012a; Sayre et al. 2012; Tung 2007:260; Turner et al. 2018; Valdez 2006, 2012). For example, in the Sondondo Valley, Schreiber found that Wari colonists constructed a large number of terraces specifically aimed at maize production (1992:161). Maize was also an important part of the diet of Wari colonists in Cusco (Turner et al. 2018), Nasca (Kellner and Schoeninger 2008:239; Edwards 2010:51), and Moquegua (Biwer 2012; Biwer and Nash 2017; Goldstein et al. 2009:144; Whitehead and Biwer 2012). In Moquegua, residents of Cerros Baúl and Mejía are known to have grown or collected maize, quinoa, common bean, peanut *(Arachis hypogaea*), cactus fruit (*Echinopsis* sp.), and ají pepper (*Capsicum* sp.) (Biwer 2012; Biwer and Nash 2017; Whitehead and Biwer 2012; Goldstein et al. 2009; Moseley et al. 2005; Nash 2011, 2012a). Additionally, Wari ceramic iconography often includes images of these plants (see Bergh 2012; Menzel 1964), presumably highlighting their importance to Wari diet and worldviews.

In one critical study of Wari botancial data, Goldstein and colleagues (2009) assess the spatial distribution of molle drupes, argued to be the residue of *chicha de molle* brewing, at the site of Cerro Baúl, one of the sites included in this dissertation. The authors argue that molle was associated with both the Wari elite and state-sponsored feasting (Goldstein et al. 2009; see also Moseley et al. 2005; Nash and deFrance 2019). Goldstein and colleagues (2009:160) suggest that the production and consumption of *chicha de molle* was a key element of both Wari political economy and their display of identity and power (see also Moseley et al. 2005; Nash 2011, 2012a; Nash and deFrance 2019; Sayre et al. 2012).

Complementing the work of Goldstein and colleagues, Sayre et al. (2012), in their comparison of the remains of *molle* from the Wari sites of Conchopata and Cerro Baúl, argue that molle fruits are found in similar contexts at both sites suggesting molle had an important prescribed role in a shared Wari cuisine, regardless of regional locale.

In another investigation of Wari foodways, Sayre and Whitehead (2017) test spatial patterns of plant-related activities between domestic and ritual architectural space at Conchopata. Sayre and Whitehead found quinoa to be the densest and most ubiquitous plant recovered, followed by molle, maize, and parenchymal tissue (e.g., potato [*Solanum tuberosum*]) (Sayre and Whitehead 2017:Table 6.1). The authors argue that the evidence points to a connection between ritual contexts and molle *chicha* production at Conchopata, citing that "the brewing and cooking was likely done in small domestic rooms and spaces close to ritual areas" and then brought to larger communal spaces for consumption (Sayre and Whitehead 2017:138). They interpret these patterns as evidence for a preference for brewing in ritual areas and use of food plants in domestic areas (Sayre and Whitehead 2017:139). Although the exclusive connection between Wari and *chicha de molle* is debated (e.g., Jennings and Valdez 2018) (see Chapters IV and V), these archaeobotanical studies are critical for laying the foundation for emerging research on Wari foodways and political economy.

It is currently unclear what elements and activities composed Wari cuisine, though as As I have previously mentioned, however, there are tantalizing clues that have been reported. While the suite of plants mentioned above are by no means unique to Wari contexts in the Andes (but are present in a number of archaeological sites throughout the Andes), the specific relationships between the food, location of recovery, material culture, and architectural space are what make up cuisine (e.g., Goody 1982; Hastorf 2017; Weismantel 1988 [see Chapter II]) and are certainly observable archaeologically. Although the botanical component of Wari cuisine is woefully understudied, there are sufficient data to begin to compare and contextualize provincial Wari domestic foodways.

Martha Anders (1986:615) documents the presence of maize, common bean, lima bean, squash, and a type of mallow (*Sida* spp.) at the site Wari site of Azangaro in Ayacucho. Green and Goldstein (2010; see also Green 2015), reporting on their excavations from the co-occupied Wari-indigenous site of Cerro Trapiche located in the middle Moquegua Valley, also note the presence of bottle gourd (*Lagenaria* sp.), maize, molle, squash, and peanut. Cotton (*Gossypium barbadense*), lucuma (*Pouteria lucuma*), maize, molle, and quinoa are noted as present at the Wari site of Pataraya in the Nasca region (Edwards and Schreiber 2014:223). Tiffiny Tung (2007:260) reports the recovery of maize and molle from the Wari site of Beringa in the Majes Valley, as well as peanuts, pacay (*Inga feuillei*), yuca (*Manihot esculenta*), lucuma, sweet potato (*Ipomoea batatas*), squash (*Cucurbita* sp.), common bean, and coca (*Erythroxylum coca*) leaves. It evident, however, that studies of Wari foodways are mostly limited to lists of taxa presence. More intensive studies with quantitative treatment of the plant data, including *spatial analyses* (e.g., Goldstein et al. 2009; Sayre and Whitehead 2017) are necessary if we hope to contextualize one of the most important aspects of Wari identity (i.e., food) and how foodways formed a significant part of culture contact during the Middle Horizon.

There is provocative evidence that the Wari practice of brewing *chicha de molle* not only accompanied Wari colonists as they spread throughout the Peruvian Andes but that some indigenous groups adopted this brewing practice upon contact with Wari colonists (see

Chapter V). Costion (2009, 2013) reports large amounts of *Schinus molle* seeds at the site of Yahuay Alta, an indigenous site included in this dissertation that was occupied before and during the Middle Horizon by Huaracane peoples in the Moquegua Valley. Interestingly, Costion notes molle is absent in pre-Middle Horizon contexts (e.g., pre-Wari) at Yahuay Alta, appearing only during the Middle Horizon coeval with Wari presence in Moquegua (see also Green and Goldstein 2010). The appearance of molle fruits in Huaracane contexts only after Wari incursion suggests some degree of interaction occurred between the two groups, perhaps as a result of exchange of foodways. Intriguingly, there is an absence of material culture with Wari iconography at Yahuay Alta leading to further questions: why would the Huaracane adopt Wari *chicha de molle* brewing practices but no other aspects of Wari culture? How were these new practices integrated into the Huaracane community at Yahuay Alta? How should we interpret the presence of large amounts of molle drupes at Yahuay Alta alongside a lack of other Wari-affiliated material?

Foodways, as a form of consumable culture, were likely an important part of Wari identity. Archaeologists have created typologies of Wari ceramics, arguing whether some styles conform to Wari canon or if they represent some form of local hybrid (e.g., Castillo et al. 2012; Cook and Glowacki 2003; Isbell 2001, 2008; Knobloch 2001; Menzel 1964). Architecture, including D-shaped temples and patio groups, is also recognized as a key form of shared Wari identity (Isbell and McEwan 1991; McEwan 1991, 1996, 1998; McEwan and Williams 2012; Nash and Williams 2005). Mortuary data provide evidence that Wari style boot tombs are a common shared component in both colonial and heartland contexts (Isbell 2004; Tung 2012; Valdez et al. 2002). Obsidian lithics have also been hypothesized as a form of Wari identity as they are a common element in ritual offerings (Nash and deFrance

2018; Tung 2007:261; Vining 2005). Little attention, however, has been paid to the role of foodways in the creation and maintenance of social processes within the Wari Empire. It is time for archaeologists to more critically consider how foodways may have been a part of shared Wari ethnic identity, how foodways data may speak to the nature of Wari colonialism, and how cuisine served as a medium for cultural interactions between Wari colonists and local peoples.

Dissertation Goals

I use paleoethnobotanical data to investigate the role daily household foodways played in processes of culture contact and colonialism in the Wari context. Considering archaeobotanical data, I investigate the possible collective elements of foodways between provincial Wari sites that made up a shared cusine. The plant-based portion of Wari cuisine would not only have served to identify and distinguish Wari colonists from local indigenous groups but could also have functioned as a means for inter-cultural interaction and negotiation of social, economic, and political relationships. I also recognize the agency of local indigenous groups to negotiate the colonial entanglement. Indeed, the local indigenous communities that Wari colonists encountered did not necessarily accept the newfound order constructed by the empire but instead could have influenced, rejected, or modified Wari policies.

The data analyzed in this dissertation derive from four archaeological projects conducted in three valleys in south-central Peru: 1) the 2001-2007 excavations at the Wari site of Cerro Baúl, directed by Dr. Mike Moseley, Dr. Donna J. Nash, and Dr. Patrick Ryan Williams, 2) the 2006 excavations of Yahuay Alta, directed by Dr. Kirk Costion, 3) the 2015-

2016 excavations at Quilcapampa La Antigua under the Proyecto de Investigacion Arqueologica Quilcapampa La Antigua (PIAQ), directed by Dr. Justin Jennings, Willey Yépez Álvarez, and Dr. Stefanie Bautista, and 4) the 2010 Hatun Cotyuoc Archaeological Project, directed by Dr. Maeve Skidmore. In total, I analyzed macrobotanical residues recovered from 307 soil samples recovered from these four sites. In addition, I incorporate data from 20 microbotanical samples extracted from ceramics and lithics from Cerro Baúl, Quilcapampa, and Yahuay Alta. Using these data I assess food production and processing strategies at the three Wari sites to triangulate provincial cuisine. I then relate these patterns to those at Yahuay Alta, occupied before and during Wari incursion in the Moquegua Valley, to investigate the role of food in the Wari colonial presence in Moqueuga and how local populations responded and shaped the colonial encounter.

The goals of this dissertation are threefold. First, I attempt to characterize provincial Wari identity through the lens of plant food remains. As food represents an axis along which identity is constructed and maintained, foodways provide a lens to critically examine culture contact and colonial entanglement. Recent research on foodways in the Wari Empire has emphasized the relationship between cuisine and political economy, most notably the connection between Wari and *chicha de molle*, a fermented beverage made from the drupes of the *Schinus molle* tree (Goldstein and Coleman 2004). *Chicha de molle* is argued to have been an integral component of Wari identity (see Cook and Glowacki 2002; Goldstein 2009; Goldstein et al. 2009; Sayre et al. 2012; Sayre and Whitehead 2017). Molle fruit has been recovered from the Wari sites of Conchopata in the imperial heartland of Ayacucho and the provincial sites of Beringa, Cerro Baúl, Cerro Mejía, Cerro Trapiche, and Pataraya, suggesting the fruit represents a part of Wari cuisine (Biwer and Nash 2017; Edwards

2010:53; Green and Goldstein 2010; Goldstein et al. 2009; Sayre et al. 2012; Sayre and Whitehead 2017; Tung 2007; Valdez 2012).

Unfortunately, research on Wari foodways and identity has been largely limited to investigations of *chicha*, identity, and political economy, often at the expense of other plants. Further consideration must be given to plants that represent other aspects of Wari foodways. For example, maize has been suggested to have been a staple for Wari populations (Finucane 2006, 2009; Finucane et al. 2009; Schreiber 1992; Turner et al. 2018), yet we know little of its use contexts at Wari sites. Furthermore, while *chicha* is certainly an important element of Wari foodways, and is considered in this dissertation, it is critical to ask what other plant foods, both gathered and cultivated, are present at Wari sites and how might these remains build a more comprehensive picture of Wari foodways?

Second, attention must be given to multiple social groups as a structuring element of Wari identity. The literature focused on Wari use of *chicha* has created an initial point from which to investigate differences in socioeconomic status between households and describe the use of the beverage by elites (see Brewster-Wray 1983; Cook and Glowacki 2003; Goldstein et al. 2009; Jennings and Valdez 2018; Nash 2009; Sayre and Whitehead 2017; Valdez 2006, 2012). Studies of Wari archaeobotanical remains have focused principally on elites and feasting events (but see Sayre and Whitehead 2017 for a discussion of both ritual and domestic contexts related to *chicha de molle*), yet we lack a comprehensive picture of what constituted daily cuisine for provincial Wari as well as what lower socioeconomic groups may have eaten. Further, *chicha de molle* was likely an important part of foodways for multiple socioeconomic statuses, yet it is only one aspect of Wari cuisine. Thus, one goal of this dissertation is to investigate food use in the daily lives of Wari colonists using household-level data. Which plants made up the daily foodways of different social strata at Wari provincial sites? How can these data be used to interpret the lives of these people in terms of food production and processing activities, trade, and participation in Wari political economy?

Third, I integrate studies of local indigenous populations into investigations of Wari colonialism. A number of disparate ethnic groups were contacted and/or incorporated into the Wari Empire (to varying degrees) as it expanded, providing ample need to examine not only how food may have been used as a medium of interaction between Wari colonists and indigenous groups but also how foodways may be used to elucidate the nature of the contact. By comparing what foods Wari peoples were producing, gathering, and trading in the heartland to the colonies, a more complete characterization of Wari cuisine can be made. In addition, acknowledging the active role that indigenous peoples played in the expansion of the Wari Empire allows for the consideration of how locals shaped the colonial experience. Following recent literature critiquing archaeological investigations of culture contact and colonialism (e.g., Cusick 1998c; Deagan 1998, 2001; Dietler 2010; Gosden 2004; Lightfoot and Martinez 1995; Silliman 2001, 2005, 2012, 2015; Stein 2002; Voss 2005, 2008), I investigate colonial experiences from the ground-up to inquire how both foreign and indigenous agents impacted the colonial entanglement and how the characteristics of the frontier influenced the colonial experience for both imperial agents and local peoples.

A consideration of borderland and frontier theories is essential to investigate Wari expansion and culture contact with local indigenous communities. On the frontiers of empire the authority of colonial administrators may be diminished to the point where boundaries blur, power relations become fluid, and imperial agents are not (always) in a position to create and/or enforce wide sweeping changes that affect the lives of local peoples. Thus, the relations between colonizer and indigenous local groups on frontiers and borderlands serve as a starting point for framing my case study of Wari-Huaracane culture contact in Moquegua. Previous research has yielded little consensus regarding the nature of interaction between Wari and Huaracane peoples on the Moquegua frontier. This lacuna is largely due to the absence of evidence for exchange of material culture between the respective communities, absence of inter-group conflict, the continuity in local Huaracane settlement patterns and mortuary traditions (see Costion 2009; Green and Costion 2018; Green and Goldstein 2010; Goldstein 2000; Owen 2005:50-51; Sandness 1992). Despite this lack of obvious modes of interaction, there is only one site, Cerro Trapiche, where Wari and Huaracane appear to have cohabitated (Green and Goldstein 2010). At Cerro Trapiche, Wari ceramics were found comingled and in close proximity to Huaracane wares in domestic contexts indicating the groups likely cohabitated the site. The nature of this interaction continues to be explored (e.g., Green and Costion 2018). Beyond this example, however, we have little indication of the nature of Wari colonial interactions with Huaracane communities on the Moquegua frontier.

Dissertation Outline

In the following chapters, I expand on the issues and themes highlighted above. Chapter II provides a broad theoretical background relevant to my investigation of colonialism, culture contact, and entanglement. I introduce paleoethnobotanical approaches to the study of foodways situated within a social archaeology. I conclude this chapter with a review of the current literature pertaining to Wari colonialism, interaction with local indigenous groups, and what we know about the cuisine of the Wari Empire. Chapter III provides background on the ecology and culture histories of the three valleys included in this dissertation. This chapter sets the stage for an evaluation of how new environments and interactions with diverse ethnic groups may have influenced Wari colonists upon arrival in their new territories.

In Chapter IV I provide a summary of the plant data recovered from the four sites. I also provide a background on paleoethnobotanical methods, the effect of taphonomic processes and sampling in paleoethnobotanical analysis, quantitative methods in archaeobotany, and the collection and sorting protocols employed in this research. I present a more in-depth quantitative analysis of spatial patterns of plant remains at both Cerro Baúl and Quilcapampa in Chapter V. I then provide a qualitative assessment of the patterns to identify similarities and differences between the respective botanic assemblages of the sites, which serves as the baseline for my characterization of Wari provincial cuisine. Chapter VI presents my comparison of Wari and Huaracane foodways on the Moquegua frontier. I evaluate the spatial patterns of plant foods and consider the ways in which food served as a medium for culture contact between Wari colonists and the Huaracane community at Yahuay Alta. In addition, I assess how foodways data can speak to the nature of the Wari-Huaracane colonial entanglement in the absence of evidence from material culture, architecture, mortuary practices, and settlement patterns. Finally, Chapter VII summarizes the results of my study and returns to the theoretical issues of colonialism, culture contact, and cuisine. I return to the core issues of how food is a valuable tool for assessing cultural interactions in the past and the importance of quotidian foodways in the study of identity. I conclude with my final thoughts on the role of paleoethnobotany in studies of culture contact and colonialism and future directions for the study of plant foodways in the contexts of colonial encounters.

CHAPTER II

MAKING SPACE AT THE TABLE: THEORIZING COLONIALISM, CULTURE CONTACT, FRONTIERS, AND FOODWAYS

Negotiating cultural differences is one of the fundamental challenges of human societies. How are identities and cultural practices formed and transformed by the movement of peoples, objects, and ideas between social and physical boundaries? Archaeology is well suited to studies of identity and interethnic cultural exchanges not only because of our deep time perspective compared to other social sciences, but also because it considers the inherently dynamic material and behavioral residues of cultural interaction. A number of questions are of interest to archaeologists concerning culture contact studies, such as cultural continuity and change, identity formation and transformation, enculturation, resistance, ethnogenesis, and other forms of power negotiations between disparate cultural groups.

The goal of this chapter is to theorize how foodways, specifically ancient plant data, can be used as a lens to assess the construction of identity among colonists of the Middle Horizon Wari Empire (A.D. 600-1000) and characterize culture contact between Wari colonists and indigenous ethnic groups such as the Huaracane in the Moquegua Valley, Peru. Here, I outline archaeological approaches to the study of ethnic interaction. I review my use of the term culture contact as a means for addressing the complex entanglements that occur when disparate cultural groups meet, specifically in colonial contexts. I then frame my case study within the context of borderlands and frontiers to illuminate the complexities of colonial interaction in a fluid and dynamic space. Archaeobotanical data collected from quotidian household foodways are considered as a means through which archaeologists may not only ascertain prehistoric cuisine but also how food may be used to speak to issues of culture contact between imperial colonists and indigenous peoples on the frontier.

Theorizing Colonization and Culture Contact

Cusick (1998b:4) defines culture contact as a "predisposition for groups to interact with 'outsiders' – a necessity created through human diversity, settlement pattern, and desire for exchange – and want to control that interaction" and that "the need to mediate relations with 'different' peoples, as well as to establish, maintain, and control territorial boundaries, creates contexts in which 'culture contact' is inevitable." Studies of culture contact encompass a framework for the comparative analysis of intercultural interactions, encounters and exchanges that are highly variable in terms of local histories and structures (Silliman 2005:58). These scenarios can range from short-term meetings to extensive periods of prolonged, direct contact extending back into the ancient past (see Barth 1969; Bardolph 2014; Cusick 1998c, 2000; Deagan 1998, 2001, 2004; Gosden 2004; Lightfoot and Martinez 1995; Lightfoot et al. 1998; Lyons and Papadopoulos 2002; Silliman 2005, 2009; Stein 2002, 2005) that may or may not have resulted in lasting changes in material culture or practices (e.g., Baitzel 2018).

I use the term culture contact as an analytical device for examining encounters between diverse groups of people which resulted in *cultural entanglements* (*sensu* Alexander 1998:485; Bardolph 2014; Dietler 2010; Jordan 2009; Silliman 2005; Stockhammer 2012; Thomas 1991). My use of the term culture contact encompasses a spectrum of possible interactions ranging from indirect cultural interaction through intermediaries, to contact and sharing of cultural ideas, practices, and materials, to full-on domination and resistance scenarios. Current archaeological research on these processes are grounded in practice theory and domestic routines (Bourdieu 1977, 1984; Giddens 1984) focusing on how identities are constructed through material culture and use of space (e.g., Barth 1969; Comaroff and Comaroff 1997). From this view, culture contact scenarios are not simply antagonistic processes of acculturation or assimilation of one group over another but are complex multidirectional cultural relations where entirely new or compound identities may be formed (Cusick 1998c, 2000; Deagan 1998; Dietler 2010; Gosden 2004; Lyons and Papadopoulos 2002; Silliman 2005, 2009; Stein 2005; Van Gijseghem 2006; Wilcox 2009). In other words, culture contact is a process where both the colonizer and indigenous group are active participants in the negotiation of cultural exchanges.

Colonial encounters form part of the broader experience of culture contact. Stein (2002, 2005) makes a useful distinction between colonialism and colonization. *Colonization* is the process of creating "implanted settlement(s) established by one society in either uninhabited territory or the territory of another society" (Stein 2002:30), which produces a system of social interaction along three nodes: 1) the colonies themselves; 2) the indigenous groups impacted by the colonies; and 3) the colonial homeland (Stein 2005:25). *Colonialism,* in contrast, fundamentally involves relationships of intercultural domination (Stein 2002; see also Silliman 2005). Colonies are settlements of foreigners who are socially and spatially distinct from local communities and are established for the long-term residence of the foreign population (Beaule 2017:4; Stein 2002:30). Under this broad definition, colonialism could represent the establishment of trade outposts in Anatolia by Uruk city-states (e.g., Stein 2002) where the foreign agents did not dominate the indigenous society, to the establishment of imperial outposts by attempting to expand their dominion, such as the Inca (e.g., D'Altroy 2002).

An important point to make, however, is that colonists do not necessarily control the cultural encounter. Power relations in many culture contact scenarios are often ambiguous (see Dietler 2010:60; Jordan 2009; Parker and Rodseth 2005). This perspective acknowledges the multiple imperial and local agendas at play in cultural encounters, recognizes both foreign and indigenous groups as participants in the cultural exchange through sharing and negotiating new forms of identity, behaviors, and material culture, and engages with material remains from both colonial and local sites to: (1) evaluate cultural interaction between different groups, and (2) examine how local groups helped shape the colonial encounter (see Burger and Mendieta 2002; Card 2013; Liebmann 2008; Lightfoot et al. 1998; van Dommelen 2002:124; Schreiber 2005; Silliman 2005, 2010, 2012; Stein 2005; Stockhammer 2012; Wells 2005).

Studies of culture contact have not gone uncritiqued. In his assessment of treatment of the phrase culture contact in North American archaeology, Silliman (2005:58) encapsulates what he views as the three main problems with the term: 1) culture contact studies tend to emphasize the encounter (point of contact), a short-term event instead of the long-term process of negotiation and entanglement; 2) culture contact studies tend to downplay the colonial power, inequality, domination, and oppressive relations; and 3) culture contact studies in archaeology, whether purposefully or inadvertently, often use predefined cultural traits (i.e. colonial vs. indigenous) to identity the ways and amount of change within the static groups rather than considering innovation and negotiation creating a dynamic interplay. Instead, Silliman prefers to use the term colonialism because it "forces the recognition that [these entanglements] are actually part of much larger networks, open to negotiation, and in fact all transformed in those intersections" (2005:62). He argues that colonialism involves unequal relations of power, labor and economic hierarchy, attacks on indigenous cultural practices and beliefs, and often times racism that directly affected the survival of indigenous people (Silliman 2005:62).

Silliman's dissatisfaction with the phrase culture contact also stems from the fact that there is little in the way of a toolkit to distinguish the diversity of contact scenarios. Cusick (1998a:137-139), citing Spicer (1962:520), uses the terms *directed* and *nondirected* contact to categorize the range of interactions in these encounters. *Directed contact* "involves interaction … between members of two different societies and effective control of some type and degree by members of one society over the members of the other" whereas *nondirected* contact refers to "interaction between members of the different societies … but there is no control of one society's members by the other" (Spicer 1962:520). For Silliman (2005:62), the term colonialism better encapsulates the process of contact and links archaeological data to broader historical and anthropological studies because of the links to differential power struggles and violence.

The utility of the framework of culture contact is its ability to contend with the broad scope of scenarios and exchanges that occurred in the past. As Gosden notes: "what differentiates colonialism from other aspects of contact are issues of *power* (2004:5, emphasis added; see also Bardolph 2014:71-72; Silliman 2005:62). Indeed, colonialism as defined above emphasizes violence and/or power imbalances in the cultural encounter (Cusick 1998a; Gosden 2004). While Silliman (2005) makes many good points about issues with culture contact studies specifically in North America, I argue that the term colonialism does not fully encapsulate the range of interactions that could have occurred between colonists and indigenous groups in *every* colonial encounter between Andean groups. Similarly, archaeologists cannot *a priori* assume a culture contact scenario includes an imbalance of power. The emphasis on differential power relations, conflict, and resistance, are only a few examples of the wide range of cultural entanglements. Thus, I use culture contact as a heuristic device to determine the nature of the contact because it is more inclusive in terms of the range of interactions and contact situations that could have occurred in the past, including colonialism.

A pressing issue in culture contact studies for archaeologists working in periods before written records is a practical one: how do we operationalize these complex interactions? How do we track diachronic cultural change? How much change is enough to say when a particular cultural object, idea, or practice is sufficiently altered enough to be considered hybridized or transformed? There has been an ongoing reevaluation of the role of objects, which, just like people, present themselves adaptably (e.g., Lyons and Papadopoulus 2002; Stockhammer 2012; Thomas 1991). The traditional approach in archaeology has been to assign a rigid binary local vs. non-local designation to artifacts and practices, which unnecessarily discourages multiscaler and diachronic approaches (Silliman 2009:213-214). This type of opposition continues the focus on dominant/subjugated forms of colonialism and fails to allow for new and novel forms of cultural exchange from a postcolonial perspective.

Drawing on more recent research and critiques (Baitzel 2018; Bardolph 2014; Gosden 2004; Lyons and Papadopoulos 2002; Silliman 2005, 2009; Stein 2005; van Dommelen 2005, 2006; Voss 2008), my use of culture contact considers the ability of local indigenous people to fashion a way to remain *native* in transformed and conflicted circumstances while simultaneously contending with new ideas, cultural practices, violence, and/or material culture (Barth 1969). I contend we must shift the focus of inquiry to the individuals living through new colonial worlds who sometimes resist, but never passively acculturate. People selectively adopt and filter objects, ideas, and traditions through their unique local perspectives (see Bardolph 2014; Jordan 2009; Silliman 2009; Stein 2005; Voss 2005, 2008). This perspective reinforces the need to utilize multiple lines of evidence to elucidate the specific nature and histories of cross-cultural relationships and exchanges.

Theorizing Frontiers and Borderlands

Within the last two decades, frontiers and borderlands have increasingly come to be viewed as zones of innovation and recombination consisting of ethnically diverse communities in a region beyond the organizational control of the core, providing an excellent lens for examining the processes of consumption, appropriation, and rejection of cultural ideas, traits, and activities (e.g., Beaule 2017; Dietler 2010; Stein 2005; Lightfoot and Gonzales 2018; Lightfoot and Martinez 1995; Naum 2010; Parker and Rodseth 2005). Frontiers often have unclear boundaries, include the fluid transmission of cultural material and ideas, are often devoid of authority, and can be contested by multiple parties; negotiation of past political, economic, and social boundaries would have been up to both foreign and local agents (Beaule 2017; Parker and Rodseth 2005). The negotiation of colonial structures by indigenous groups is best understood as being articulated at the local level, making culture contact highly variable and localized to suit each unique circumstance.

Lightfoot and Martinez (1995:473; see also Beaule 2017; Parker and Rodseth 2005) consider frontiers as interaction zones where encounters and entanglements take place between two or more ethnic groups. Here, identities are multifaceted, negotiated, influenced by both people and objects around the individual (e.g., Bourdieu 1977; Giddens 1984; Hodder 2012), and expressed along social scales, including gender, age, class, ethnicity, race, and religion (Card 2013; Deagan 1998; Lightfoot et al. 1998; Meskell 2002; Voss 2008). Social identities are made up of similarities and differences that render certain social groups different from others, often resulting in boundaries. These boundaries may be physical or imagined, but are often manifested by differences in clothing, language, food choice, labor, style, race, ethnicity, cultural preferences, and/or a recognition of a perceived difference between two groups (e.g., Comaroff and Comaroff 1997).

A consideration of frontier theory within the context of culture contact and colonial encounters offers a nuanced perspective as the very nature of frontiers make them zones of negotiation where neither indigenous groups nor colonizers necessarily have power over the other. Jordan (2009) suggests that archaeologists must be cautious when determining the specific nature of power relations in culture contact scenarios, pointing out that not all intercultural exchanges (Pre- and Post-Columbian) can be characterized as colonialism without adequate analysis of the political, economic, and social structures present. In an attempt to circumvent these issues, Lightfoot and Martinez (1995:477) advocate for a multi-scalar approach towards studies of culture contact on frontiers. The authors suggest that archaeologists studying culture contact and frontiers should consider the microhistories, or the study of individuals and/or small groups at a local scale, of individuals and events over one or several generations as well as the long-term macrohistorical processes in order to identify ethnic identities in the archaeological record (Lightfoot and Martinez 1995:477-478). This type of multi-scaler approach, they argue, is important for addressing how agents respond to cultural encounters and cultural others and how new cultural structures are created, maintained, and transformed. On the other hand, the macrohistorical processes, such as the history of the encounter, are critical for characterizing the long-term effects of culture contact on all sides of the exchange and providing chronological resolution for the microhistories.

Foodways and Culture Contact in the Andes

Culture contact is not a new concept for archaeological studies of the Ancient Andes. Murra's (1975) vertical archipelago model posited that highland Andean polities established systems of dispersed settlements in distinct ecological and productive zones, ranging from the coast to the highlands, as a means of creating and maintaining access to vital resources. In this way the highland polities could diversify their resource base, which can explain the success of the high-altitude populations in the unpredictable and harsh altiplano environment. This movement of resources (and people) occurred in the context of culture contact whereby ethnic groups living at different elevations created and maintained these settlement systems resulting in economic exchange (e.g., Brush 1977). Although this model has been heavily critiqued and modified over time (see Goldstein 2015; Van Buren 1996), the conception of the vertical archipelago provides a foundation for explaining the interconnectedness of highland and coastal groups and the mobility of ethnic groups (and culture contact) in Andean prehistory. More recently, the social dimensions of these types of exchanges have become prominent within Andean archaeology (e.g., Goldstein 2000a, 2015; Stovel 2013). With a strong tradition of foundational research in agricultural production, environment, and objects associated with food production, processing, and consumption, the Andes is an ideal area to investigate the social dimensions of food.

The Social Dimensions of Archaeological Foodways

The study of foodways includes the cultural contexts and social practices associated with the production, processing, cooking, discard, and consumption of food (Douglas 1984:28; Hastorf 2016:14). As a fundamental component of social reproduction and solidarity (Hastorf 2012:69, 2016; Twiss 2007), food is one of the most enduring aspects of cultural identity, being relatively conservative and resistant to change (see Appadurai 1981; Dietler 2007:223; Goody 1982; Weismantel 1988). Archaeological studies of foodways have revealed food to be loaded with cultural meaning (e.g., Robb 2010; Twiss 2007) and a resilient marker of social identity, including ethnicity, gender, status, and religion (e.g., Atalay and Hastorf 2006; Bardolph 2014; Beck et al. 2016; Dietler 1996, 2007, 2010; Graff 2018; Gumerman 1997, 2002; Hastorf 1991, 2017; Hastorf and Johannessen 1993; Stein 2012; Thomas 1991; Twiss 2007; van der Veen 2003; Weismantel 1988; Wiessner and Schieffenhövel 1996). In other words, people do not just eat calories - they eat *food*, a form of material culture laden with cultural meaning and subject to variation, recombination, and culinary techniques.

In culture contact settings food is a lens through which we may evaluate and interpret episodes of entanglement (e.g., Bardolph 2014; Cutright 2015; Dietler 2007, 2010; Mintz 1985; Mintz and Du Bois 2002; Rodríguez-Alegría 2005; Scott 1996, 2000). Community identities may be defined, and social boundaries drawn, through food (Hastorf 2017:230-232; Smith 2006). Through dining etiquette, food preferences/taboos, and culinary equipment, foodways serve to reaffirm group identity and social structures (Goody 1982). Furthermore, food may simultaneously outline inclusionary and exclusionary principles expressed through daily practice (Atalay and Hastorf 2006; Douglas 1970, 1984; Goody 1982; Gumerman 1991, 1994, 1997, 2002; Hastorf and Johannessen 1993; Hastorf 2017:230-232; Potter and Ortman 2004; Weismantel 1988). For example, Gumerman (2002) shows that distinct socioeconomic groups at the site of Pacatnamu on the north coast Peru, including elites and non-elite fishers, consumed similar ingredients as part of their foodways, but in different amounts contingent on their socioeconomic status. Hastorf (1990) found a similar pattern where all members of Sausa society consumed maize, but Sausa elites consumed greater quantities of the grain and controlled the mode of production until Inka conquest after which maize was consumed in greater amounts of non-elites. Hastorf's case study highlights the ability for food to simultaneously delineate social status while changing over time as a result of social, economic, and political processes. Similarly, Stein (1998) used paleoethnobotanical and zooarchaeological remains to demonstrate the existence of an Uruk trade enclave in Anatolia where two autonomous communities existed alongside each other with distinct material culture. Stein found identified the separate communities through differences in food remains and discard patterns, which speaks directly to the utility of food in examining culture contact on borderlands. Maintaining membership in a community requires active participation in decisions of which, when, where, and how much food to prepare and consume (Hastorf 2017; Smith 2003). Thus, foodways are an essential cultural distinction to make within and between communities and are especially necessary in regions where multiple cultural groups live in close proximity to one another.

If foodways are among the most conservative aspects of ethnic and cultural identity and are resistant to change, how do we explain the adoption of foods (exotic or otherwise) by people in different parts of the world? As with other aspects of culture, foodways may be actively borrowed, exchanged, rejected, or repurposed within and between groups who come into contact with one another (e.g. Dietler 2007; Goody 1982; Mintz 1985). There are myriad examples introduced ingredients that became internalized and fundamental to local cuisines; tea (*Camellia sinensis*) in England, potatoes in Ireland, chili peppers in Thailand, and tomatoes (*Solanum lycopersicum*) in Italy are distinct examples of exotic foods that became fully accepted by their adoptive cultures.

Douglas (1984:28) argues that what forms cuisine is in fact not the individual ingredients but the patterning of a series of rules, choices, and flavors that structure meals. Similarly, Hastorf (2017:232) notes that it is not the relative contribution of individual taxa that makes a cuisine, but the *methods of food preparation* and *context* that defines cuisine. For example, Dietler (2007:224) notes that a sorghum-based starch called *kuon* is such a fundamentally traditional staple food among the Luo that a Luo will state that a meal has not been had unless *kuon* accompanies it. More recently, however, maize has become an acceptable substitute grain in this context. The nature of Luo meals has not changed; meat, vegetables, and fish are still served with *kuon*. Hence, as long as *kuon* is a component of the meal, it becomes acceptable to substitute the base ingredient. An Andean analog is *chicha*; maize, peanuts, quinoa, and other plants make up traditional *chicha,* but non-native wheat-based beers have become acceptable substitutes for traditional celebrations and labor exchange practices in many parts of the Andes. The addition or substitution of a single ingredient or change in patterned cuisine may be culturally tolerated yet the context and/or significance of the meal remains more rigid (see Chapter V).

Foreign and indigenous responses to policies, affiliations, and interactions are reflected in daily practices through sharing, adopting, or rejecting the daily foodways of groups that come into contact with one another (Bardolph 2014; Brumfiel 1991; Cutright 2015; Dietler 2007, 2010; Gosden 2004; Hastorf 1990, 2017; Klarich 2010; Liebmann and Murphy 2010; Lyons and Papadopoulus 2002; Stein 2005). For example, in her study of colonial entanglement at El Presidio de San Francisco, Voss (2005) uses food remains to show how early European colonists in California created a distinct "Californio" identity. Despite the early heterogeneity of ethnic backgrounds within the colony, by consolidating differences in material culture, foodways, and architecture amongst colonists at El Presidio de San Francisco, the military settlers simultaneously minimized social diversity amongst themselves and heightened differences between themselves and local indigenous groups (*ibid*). For example, the colonial residents appear to have prepared and consumed the same plant (beans, buckwheat [*Fagopyrum tataicum*], legumes, wheat (*Triticum* sp.), and animals (cow [*Bos torus*]) uniformly while concurrently avoiding foods associated with Native Americans, such as deer (*Odocoileus virginianus*), wild grass seeds, shellfish, and acorns (*Quercus* sp.). In this case, food was actively used to differentiate colonists and indigenous peoples as well as a means to construct a more cohesive colonial identity (Voss 2005:466). This approach highlights the complexities of multidirectional cultural exchange in colonial encounters and highlights food as a salient representation of identity that can be shared, rejected, and appropriated by culture groups.

It can be difficult, however, to determine where one cultural practice originated and was subsequently adopted. Indeed, "culture is not a fixed, static, homogeneous system of shared beliefs, rules, and traits, but rather sets of embodied categorical perceptions, analogical understanding, and values that structure ways of reasoning, solving problems, and acting on opportunities" (Dietler 2010:59). The original act of consumption by an individual or group is often closely intertwined with the broader social, economic, and political economy and carries with it a number of intended outcomes in the short-term: it may serve to bolster status, construct or reassert one's identity, or establish or maintain socioeconomic relationships. Over the long-term, however, these short-term acts create an array of unintended consequences that result in long-term processes of entanglement linking societies in new and transformative ways. Moreover, it is insufficient merely to distinguish between local and foreign goods in an archaeological context in order to study identity formation; it is inadequate to simply calculate the ratio of local to foreign objects to quantify the degree of acculturation of a particular community to a foreign culture (see Silliman 2009, 2015). While the consideration of the presence of foreign objects or practices may serve as an important preliminary point for investigations of culture contact, without consideration of local processes and histories over the short and long term, they tell us little more than that contact occurred. Such an approach is overly simplistic and fails to take into account the complex transformative effects of cultural appropriation and human agency.

Instead, we should strive to view entangled objects, behaviors, and ideas within a continuous process of selective appropriation and creative assimilation according to local cultural structures. Entanglement represents a creative process of long-term, gradual, and non-directed interaction whereby *both colonizer and local indigenous groups* are active participants in becoming "entangled" (see Dietler 2010; Hodder 2012; Silliman 2005, 2012, 2015; Stockhammer 2012, 2013; Thomas 1991). Stockhammer's (2012, 2013) distinction of two types of entanglement, including *relational entanglement* and *material entanglement*, is particularly useful in evaluating and characterizing the movement, adoption, rejection, and appropriation of objects and behaviors. *Relational entanglement* is the first stage reached when a foreign object/practice is appropriated and integrated into the local system and worldview (*ibid*). While the relationship with the object or practice has changed, the object/practice itself remains unchanged, revealing whether processes of appropriation have taken place. The creation of something new is only achieved after the second step, *material entanglement.* This stage recognizes that an "object is more than just a sum of the entities from which it originated and clearly not the result of local continuities" but combines the familiar local practice with the previously foreign (Stockhammer 2013:17; see also theoretical discussions of ethnogenesis [e.g., Voss 2008]). Stockhammer's (2013) distinction between relational and material entanglement draws our attention to the importance of the ways the entangled phenomena connect the formerly separated entities, as well as the roles that entangled objects/practices may have influenced shifts in world-view vis-à-vis daily practice (see also Deagan 2001, 2004; Dietler 2007, 2010; Jordan 2009; Silliman 2005, 2015; Thomas 1991; VanValkenburgh 2013). Consequently, the focus of our archaeological investigations has shifted toward examining the *particular* goods desired within and between communities and the ways in which they were integrated into existing social, economic, and political frameworks through cultural entanglement.

Household Foodways

Archaeological scholarship is increasingly focusing on food practices at the household level (see Atalay and Hastorf 2006; Gumerman 1997; Hastorf 1990, 2001; Klarich 2010; Pollock 2012) as a point where cultural norms, preferences, and ideologies are learned and reinforced (Hastorf 1991, 1999; Pearsall and Hastorf 2011). Foodways, including food preparation, flavorings used, number of meals in a day, the manner in which the dishes are served, and food preferences/taboos (see Weismantel 1988:87) are all intimately connected to ideological, political, and economic realities through culinary practice (Goody 1982; Hastorf 1991, 2017; Hastorf and Johannessen 1993; Smith 2006).

Household foodways are relevant to understanding culture contact and entanglement because while processes such as colonialism and imperial expansion often occur above the household level of organization, household decisions respond to these large-scale influences (e.g., Cutright 2015; D'Altroy and Hastorf 2001; Deagan 2004; Nash 2009; Robin 2003) and simultaneously bond and divide communities where members have different identities and competing agendas (Anderson 1991; Schortman and Urban 2014). For example, Deagan (2004) investigated Taino household gendered labor practices and foodways before and after contact with Europeans at the site of En Bas Saline, Haiti. There she found limited presence of European goods, and a general continuity of foodways along gender and political lines, suggesting a possible rejection or indifference to Spanish cultural elements. A focus on household foodways as a nexus of family and community identity is therefore essential to studies of foodways in colonial entanglements and borderlands.

In the following chapters, I provide context for three separate provincial regions of the Wari Empire, followed by a statistical analysis of plant remains from household contexts. I identify common taxa present at Wari sites as well as spatial patterns in Wari foodways that may be used to reconstruct cuisine. Further, if foodways are a salient aspect of Wari identity then Wari agents would have brought these traditions and practices with them as they moved to new regions and interacted with indigenous groups. Food then would serve as an excellent medium for addressing issues of culture contact in the absence of other (more “traditional”) forms of archaeological data.

CHAPTER III

ON THE EDGE OF EMPIRE: ANDEAN ECOLOGY AND THREE WARI PROVINCES

In this chapter I begin with a summary of the ecology of the Peruvian Andes followed by regional cultural backgrounds of the valleys encompassed in this dissertation, including the Moquegua, Siguas, and Cusco valleys. The purpose for this is twofold: (1) it serves to set the stage for a presentation of regional backgrounds relevant to this project; and (2) it highlights the ecological and geographical diversity of Peru. Wari agents must have witnessed immense ethnic and ecological diversity as they colonized new regions, all of which must be considered in a discussion of Wari colonialism and culture contact involving disparate ethnic groups. Encounters and prolonged interactions with cultural groups and environments unfamiliar to Wari colonists may have influenced, limited, or expanded the possibilities for food production in these areas. Ultimately, the issues outlined here focus on the spectrum of new interactions, both cultural and environmental, that took place in various locations as the Wari Empire spread.

Ecological Diversity of the Peruvian Andes

The Andean Cordillera, extending from Columbia south into Chile and Argentina, is the setting for one of the most diverse landscapes on Earth. Ecological changes in the Andes are drastic and usually associated with shifts in altitude as many different ecological zones are located in close proximity to one another. The result is a unique set of constraints placed on agriculture and animal husbandry, including temperature and moisture, creating varied potential for resource use, extraction, and production within and between valleys. With these altitudinally-defined environments being so close to one another, multiple zone use is the norm today (see Brush 1977; Murra 1975; Winterhalder and Thomas 1978; Pulgar Vidal 1996) and was likely the case in the past.

The Andes range is comprised of 8 distinct natural regions, including: the *chala, yunga, quechua, suni, puna, janca, selva alta,* and *selva baja* zones (Pulgar Vidal 1996). These environmental zones vary in terms of altitude and vary in relatively short distances, which can have a major effect on agricultural production and potential of a given area. Here, I review these environmental zones, as products from all areas have been available for exploitation or trade to the residents in my study areas.

The *chala* zone, ranging from 0-500 masl, is characterized as a coastal desert along the edge of the Pacific Ocean (Pulgar Vidal 1996:33). This region receives very little rainfall primarily due to two factors: 1) the Humboldt Current, an upwelling flow of cold water that intersects with warm tropical water to form the Equatorial Front that runs along the Pacific Coast of South America; and 2) the rain shadow cast by the Andes (Pulgar Vidal 1996:43; Sandweiss and Richardson 2008:95). The coastal desert environments become more extreme in the more southern latitudes of Peru. Nonetheless, above 200 masl, a dense and moist fog layer (garúa) blankets an area called the *lomas* allowing xerophytic plants to grow, which can be collected for food and fuel. While agriculture has been documented in this zone by around 2,400 B.C., and perhaps as early as 4,100 B.C. (Burger 1992; Dillehay et al. 2005; Quilter et al. 1991; Shady Solis et al. 2001), marine resources were key resources for past populations of the *chala* zone (Moseley 1975; Sandweiss et al 1998) and continue to be important today.

The *yunga* zone exists on the western slopes from 500 to 2,300 masl and on the eastern slopes overlooking the *selva* from 2,300 down to 1,000 masl (Pulgar Vidal 1996:62).

The western (maritime) *yunga,* characterized by deeply cut river valleys and *quebradas*, is made up of dry hillsides and mountain slopes where at lower elevations *lomas* plants grow during the winter months. However, the eastern *yunga* receives much more regular precipitation than its western counterpart and offers a variety of forest products. Typical vegetation of the *yunga* zone includes molle, cabuya/fique (*Furcraea andina*) agave (*Agave* sp.), and various cacti (e.g., *Haageocereus* sp., *Cereus* sp., *Echinocereus* sp.) (Pulgar Vidal 1996:66). Most indigenous Andean crop plants grow in the irrigated floors of valleys in the *yunga* and *chala* zones, such as lucuma, guayaba (*Psidium guayaba*), and cherimoya *(Annona cherimola*), as well as maize and palta (avocado) (*Persea Americana*) (Pulgar Vidal 1996:66-71).

Climbing higher in elevation is the *quechua* zone ranging from 2,300 to 3,500 masl. The *quechua* zone includes some of the most productive land in the Central Andes. It is also the location of the characteristic Andean systems of dense terracing used to increase the amount of arable land. Rainfall is seasonal and highly, and irrigation agriculture is possible, yet the elevation at which rain falls varies with latitude. Here, the average annual temperature ranges from 11 to 16 °C, but it can reach extremes as high as 29 ° C and as low as -4 ° C (Pulgar Vidal 1996:82). Many Andean crops, such as quinoa and potatoes, grow well here. Andean peoples have long taken advantage of the drier and cooler air in the upper reaches of this zone to make freeze dried products, such as *chuño* (made from potatoes) and *charqui* (made from dehydrated llama (*Lama glama*) and alpaca (*Vicugna pacos*) meat), both of which have a long shelf life and remain popular staples today.

Still higher is the *suni* or *jalca* zone, a cold and dry climate ranging from 3,500 to 4,000 masl. This zone is characterized by steeper terrain, narrow *quebradas* (ravines), and is more limited in terms of land available for agriculture than the *quechua* zone. Precipitation in this zone is about 800 mm annually (Pulgar Vidal 1996:99). There is a strong diurnal variation in the *Suni* zone, where the average temperature ranges from 7 to 10 °C, but can reach extremes of between 20 to 16 °C. Many native Andean crops grow here, including quinoa and cañihua (*Chenopodium pallidicaule*), haba bean (*Vicia faba*), and tubers such as mashua (*Tropaeolum tuberosum)*, oca (*Oxalis tuberosa*), and olluco (*Ollucus tuberosus*) (Pulgar Vidal 1996:104-109).

The highest permanently habitable zone in the Andes is the *puna,* ranging from 4,000 to 4,800 masl. This zone is a relatively flat grassland and includes the altiplano region of Southern Peru and Bolivia (around Lake Titicaca). The *puna* is home to a diverse range of economically useful plants, most notably ichu grass *(Stipa ichu*) and totora (*Scirpus* sp.) around lakes. The *puna* is a cold region with average temperatures ranging between 0 and 7 °C, though there is a strong diurnal variation similar to the *quechua* and *suni* zones (Pulgar Vidal 1996:115). Potatoes, quinoa, and cañihua are arguably the most important crops in this region. This zone is also home to the Andean camelids, including the wild guanaco (*Lama guanicoe*) and vicuña (*Vicugna vicugna*), as well as the llama and alpaca, the latter two being herded for their wool, dung, meat, marrow, and to carry small loads (Bonavia 2008).

The *janca* zone ranges from 4,800 masl to the highest Andean snowcapped peaks and glaciers (Pulgar Vidal 1996:143). Prehistoric peoples visited this area, but the low temperatures, lack of oxygen, and limited resources made permanent settlements untenable (Pulgar Vidal 1996:146). The snowcapped peaks and glaciers present in this zone are the sources of the rivers and runoff that supply the central Andes with water that travels downhill and drains into the Pacific Ocean, thus supporting agriculture. Yareta (*Azorella compacta*) is an economically important plant in this region and can be used as fuel (Pulgar Vidal 1996:147). Typical fauna in this zone include vizcacha (*Lagidium* sp.), condor (*Vultur gryphus*), and sometimes vicuña and alpaca (Pulgar Vidal 1996:148).

The *selva alta* (*rupa-rupa*) (400 – 1,000 masl) of the eastern slopes of the Andes is a wet, humid, and warm environment located in a well vegetated region. The terrain is characterized by broken valleys cut by *quebradas* where the average temperature ranges from 22 to 25 °C (Pulgar Vidal 1996:157). Herding and farming are both possible in this zone. Below the *selva alta* is the *selva baja* (*omegua*), or the Amazonian jungle. This hot and wet environment is home to a preponderance of species of flora and fauna outside the scope of this dissertation.

Cerro Baúl, Yahuay Alta, Quilcapampa, and Hatun Cotuyoc are located in similar ecological zones, though slight differences between the valleys could potentially limit the suite of plants available to local farmers at the sites. Nevertheless, as will be discussed in Chapter IV, site residents were not necessarily limited to the agricultural products of their respective zones. Indeed, it is well known that Andean populations frequently pass between ecological zones seasonally, or perhaps more frequently, to gain access to resources exclusively available in the other zones (Murra 1975). In addition, the Wari sites investigated here presumably had access to trade routes via roads connecting the empire (Schreiber 1991; Williams 2017), and thus would be able to mobilize non-local resources for the local residents.

With this in mind, I now turn to a discussion of the ecological setting of the valleys where the sites included in this project reside. I also provide a brief cultural history of the regions, noting long-term cultural changes and the background of research at the sites. There environmental differences between the sites in terms of latitude, which I discuss further below.

A Brief Description of the Environmental Settings, Site Backgrounds, and Regional Prehistories

The Moquegua Valley

The Moquegua Valley is located in the Department of Moquegua in southern Peru (Figure 3.2). Within the valley are a system of tributaries which form the Osmore Drainage, a system of four major tributaries fed by the snow-capped peaks of the Chuquiananta and Arundane mountains of the Western Andean Cordillera at over 5,100 masl. Eventually the various tributaries connect to form the Rio Moquegua, which subsequently drains into the Pacific Ocean.

The Moquegua Valley (also known as the Osmore Valley) has classically been divided into three ecological zones: the upper (3,900 – 1,600 masl), middle (1,600 – 1,000 masl), and lower (1,000 – 0 masl).[1] The upper Moquegua Valley is the most vertical section of the Valley. This segment of the drainage begins at the Western Andean Cordillera and extends towards the coast. As a result, farming in the upper valley requires extensive terracing to make it agriculturally productive. While the lower portions of the Upper Valley are extremely arid, passing near one of the driest deserts in the world, the highest elevations (~3,900 masl) receive approximately 150 mm of annual precipitation (Rice 1989:20). Within the areas of highest elevation, the cultivation of species is dependent on temperature. For example, at an altitude of 3,000 to 3,900 masl the average temperature is 10 °C and only an

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[1] I restrict my summary of ecological zones to the middle and upper portions of the valley as they are most relevant to the present discussion.

estimated 3 °C from 4,500 to 4,800 masl (Rice 1989:21). Only cold-resistant species, such as potatoes and quinoa, can be grown in the upper limits. However, the middle and lower portions of the upper Moquegua Valley were made productive due to a system of canals that brought runoff from the Western Andean Cordillera down to a system of terraces constructed during the Middle Horizon by Wari settlers (Williams 2002). This allowed for the production of a wider range of plants, such as maize, than naturally possible. The upper Moquegua Valley contained no large permanent settlements prior to the Middle Horizon and the arrival of Wari and Tiwanaku colonists (Owen 2005; Williams 2001, Williams and Nash 2002).

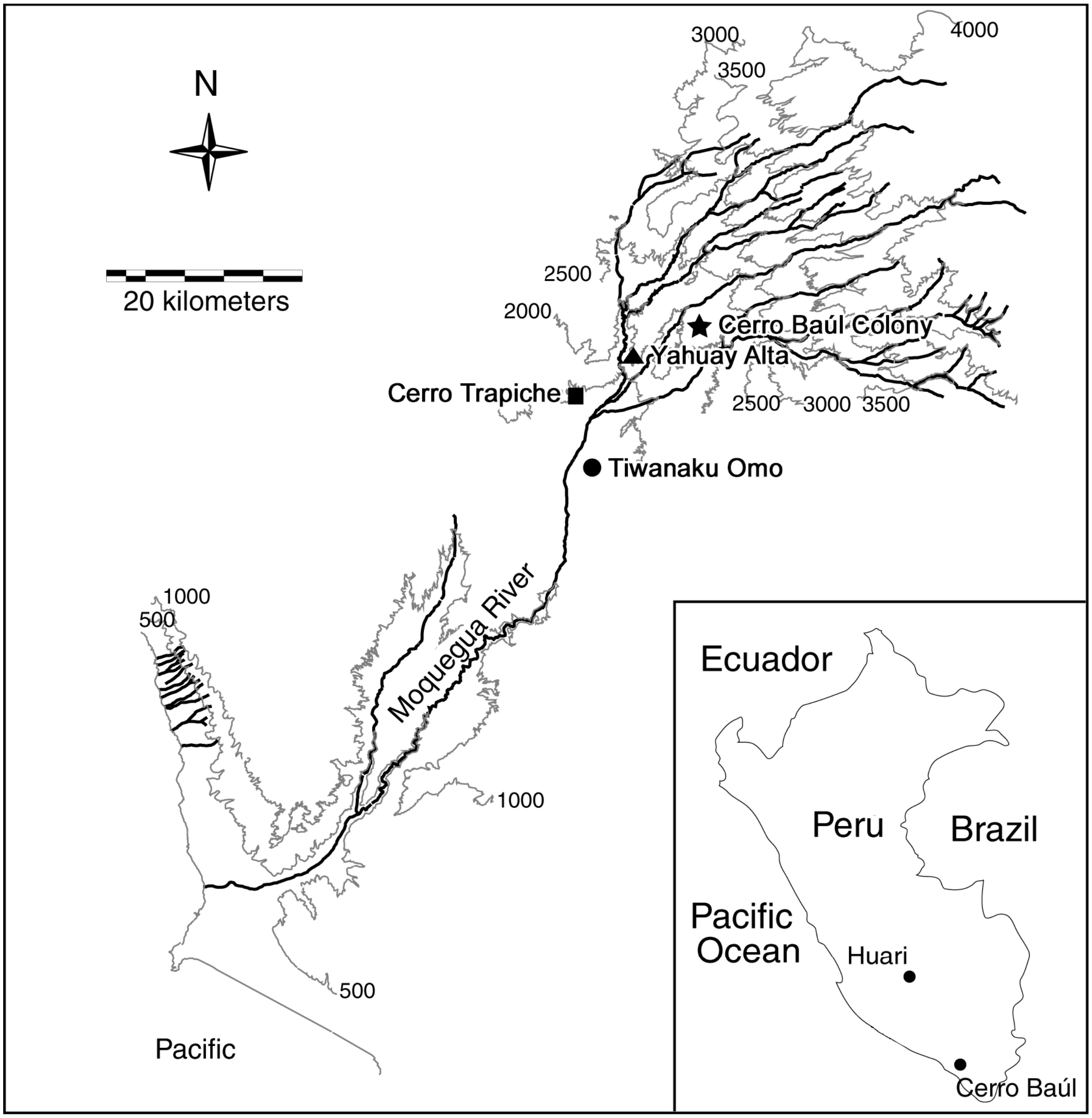

Figure 3.1 Map of Archaeological Sites in the Moquegua Valley Discussed in this Dissertation (adapted from Williams 2002:Figure 1)

The middle Moquegua Valley is a temperate desert oasis with perennial agricultural production permitted by seasonal floodplain agriculture and canal irrigation fed by the Rio Moquegua (Goldstein 2005; Owen 2005; Williams 2002). In comparison to the upper portions of the Moquegua Valley, the middle section is relatively flat and more easily watered using floodplain irrigation. Due to the extreme aridity of the middle valley, the natural vegetation is sparse with the highest concentrations of plants clustered near the riverbed of the Rio Moquegua. With irrigation, however, the cultivation of maize, peppers, and cotton is possible year-round (Goldstein 2005), although care must be taken due to the fluctuation in temperatures (Rice 1989:21). As a result of the agricultural potential of the middle Moquegua Valley, it has historically been the most heavily populated portion of the Moquegua Valley.

The Moquegua Valley was recurrently colonized and occupied from the Archaic period by high-altitude hunters and maritime fishers (Aldenderfer 1991, 1998; Sandweiss et al. 1989), through the Spanish colonial period (Rice 2011, 2013), to the present day. Preceramic coastal and highland settlement patterns and subsistence practices have been well-documented in Moquegua (e.g., Aldenderfer 1998; deFrance et al. 2001, 2009; Owen 2009; Sandweiss et al 1989). Indeed, the upper extent of the Moquegua Valley was home to highland hunter-gather communities by 4,500 B.P. and was incorporated into seasonal herding rounds with the introduction of llama pastoralism (Aldenderfer 1998; Bonavia 2008). Little is known, however, of the occupation of the middle Moquegua Valley during the Preceramic period (Aldenderfer 1998). This may be due to the heavy amount of recent development in the middle Moquegua Valley or the fact that the middle section of the Valley only became productive with the introduction of irrigation agriculture.

The Huaracane Tradition

The earliest known permanent settlements practicing agriculture and ceramic production in Moquegua belong to what is known as the Huaracane Tradition (see Costion 2009, 2012; Goldstein 2000, 2005). The Huaracane Tradition dates from 385 B.C. to A.D. 850 in Moquegua (Costion 2013; Goldstein 2000), making it a long-lived cultural group. Limited to the middle portion of the valley, there are numerous small Huaracane villages documented in the middle Moquegua Valley within close proximity to the Rio Moquegua (Goldstein 2000, 2005). The Huaracane practiced a mix of irrigated terrace agriculture and valley bottom floodplain agriculture coupled with foraging to supplement their diet (Goldstein 2000, 2003; Williams 1997). Interestingly, current evidence indicates C_4 plants (i.e. maize) played a relatively minor role in Huaracane diet (Sandness 1992). Instead, C_3 plants (~50%) and marine resources (23-50%) appear to have made a greater contribution to Huaracane diet (Sandness 1992:49). Prior to the Middle Horizon, the Huaracane Tradition was inherently local with limited economic and political interaction with communities along the south coast of Peru (see Goldstein 2000:356).

A defining characteristic of the Huaracane culture is its ceramic technology exhibiting a related suite of neckless and short-necked *ollas* (cooking pot) and fine serving bowls (Costion 2009, 2013; Feldman 1989; Goldstein 2000). Overall, the Huaracane ceramic tradition consists of three types: Huaracane Arena (*olla* with a paste with coarse sand temper), Huaracane Vegetal (*olla* with a paste with grassy fiber inclusions), and Huaracane Fino (well-fired, dense, serving bowls with orange or black slip) (Costion 2013; Goldstein 2000). The Huaracane Arena and Huaracane Vegetal types appear to have both coastal and highland influences, yet the Huaracane Fino is a distinctly local style with no correlates in the surrounding region (Goldstein 2000:341).

Huaracane habitation sites typically consisted of semicircular residential terraces without stone faces (Goldstein 2000:343). Huaracane sites often do not have defensible structures (e.g., walls) and typically do not have substantial public architecture (Goldstein 2000:343), though as I will discuss below the Huaracane site of Yahuay Alta provides a unique example of Huaracane public architecture (Costion 2009, 2013). Huaracane sites are found on most hilltops in the middle Moquegua Valley, are typically small (~.44 hectares), and are interpreted as having had "a generally low level of political and economic integration" (Goldstein 2000:343) due to the lack of a recognizable paramount village indicating the presence of a chiefly class. Instead, the villages appear to have been relatively autonomous, though an elite class was possibly established during the Middle Horizon (see Costion 2009, 2013; Green and Goldstein 2010; Goldstein 2000:344).

The Huaracane settlement of Yahuay Alta has both Formative Period and Middle Horizon occupations (see Costion 2013). The site is spread across a series of six narrow terraced ridges located high upon the southwestern slopes of Cerro Estuquiña, one of the mountains that separate the upper and middle valley sections of the Moquegua Valley. Yahuay Alta is unique among Huaracane settlements for several reasons. First, covering four hectares, it is larger than typical Huaracane settlements. Second, it is located on steep slopes 140 meters above the Rio Huaracane floodplain, making it much more defensible compared to other Huaracane settlements. Third, Yahuay Alta is the only known Huaracane site with documented Middle Horizon occupation.[2] Finally, and most important to the present study,

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[2] It is important to note that this is the only Huaracane site where extensive domestic excavations have taken place and for which radiocarbon dates have been published.

Yahuay Alta is the only known Huaracane settlement with large scale public architecture identifiable on its surface (Costion 2013) suggesting it may have been a special context worth defending.

Excavations at Yahuay Alta, led by Dr. Kirk Costion (2009, 2013), focused on the two westernmost ridges because the preservation of domestic architecture and surface artifact density were higher there, and because the public architecture was located in that sector (Figure 3.2). The residential occupation consists of five spatial sectors (totaling approximately 2.3 hectares) of house remains (e.g., walls, foundations) situated upon terraces. These sectors are delineated by steep sided *quebradas* and other natural topographic features. The residential terraces at Yahuay Alta are not uniform in shape or size; some are small and circular, and others are large and rectangular. Most terraces range between 10 m^2 and 25 m^2 in size, although a few are substantially larger (Costion 2013).

Yahuay Alta's public architecture consists of two elevated platforms (P1 & P2 in Figure 3.2) and a large platform mound-plaza complex in Sector B. None of the public architecture has been securely dated although Ground Penetrating Radar (GPR) evidence indicates these architectural features were constructed during a single event. The platform mound-plaza complex in Sector B is the largest known Huaracane public architectural complex. The platform mound is situated directly in front, and to the north of, a large artificially leveled open plaza. The mound is flanked on its west side by three small contiguous structures, one of which (Unit 7 in Figure 3.2) is included in my analysis.

As mentioned above, Yahuay Alta was occupied during both the late Formative Period and the early Middle Horizon. The late Formative Period occupation is represented by Units 1, 2, and 4 (Figure 3.2). These structures, all of which are interpreted as domestic, date between cal A.D. 79 and cal A.D. 323 at the 2-sigma range

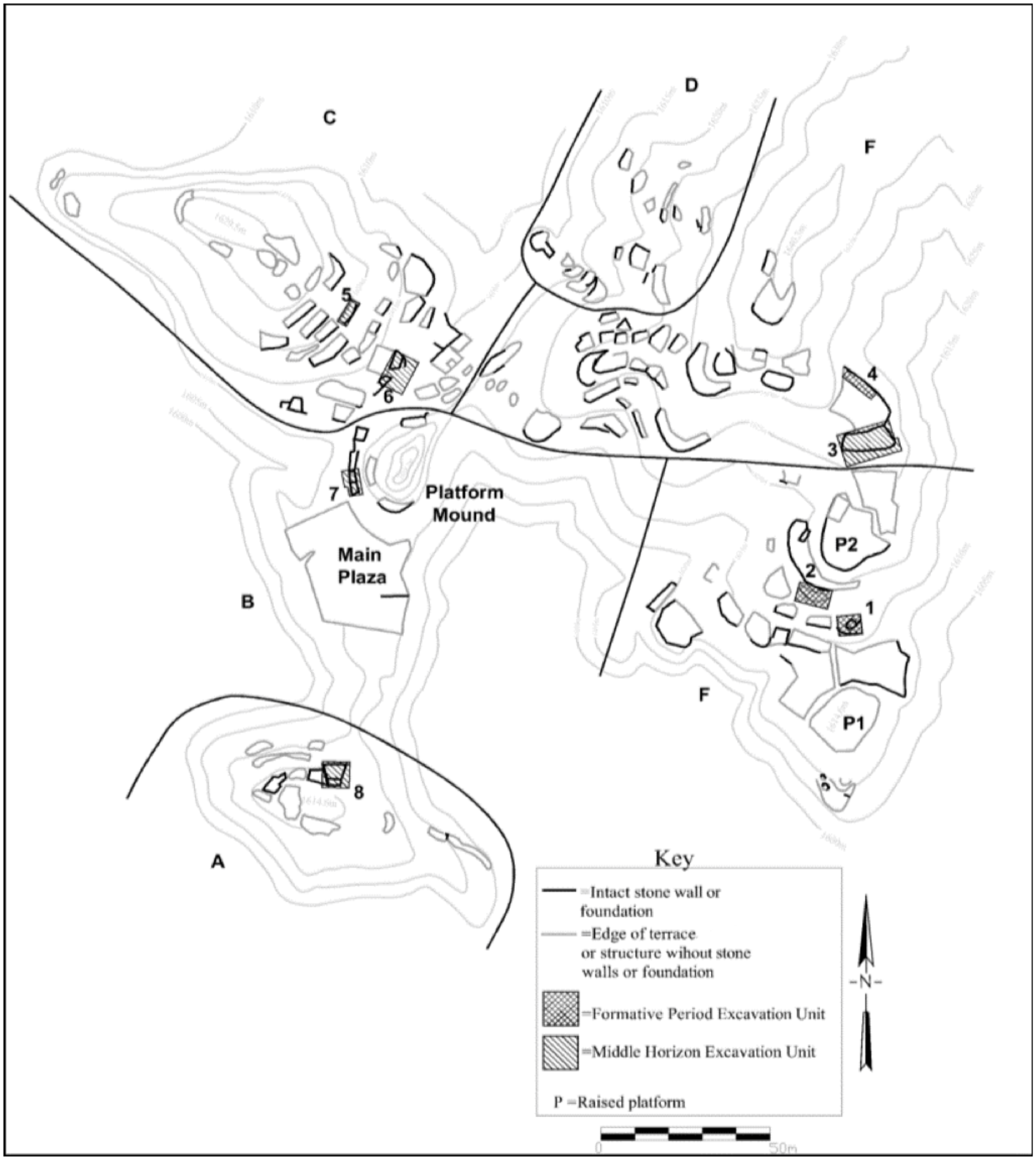

Figure 3.2 Map of Yahuay Alta Detailing Late Formative and Middle Horizon Structures (map courtesy of Kirk Costion)

(see Costion 2013:Table 1). According to Costion (2013), these units consisted of small circular or semi-circular structures and contained typical Huaracane artifact assemblages. The early Middle Horizon occupation is represented by Units 3, 5, 6, 7, and 8 (see Figure 3.2). In contrast to the Formative Period architecture, all Middle Horizon structures were rectangular. These contexts were associated with both typical Huaracane artifacts and some atypical artifacts, such as biotite-tempered ceramics and non-local obsidian (Costion 2009, 2013). These units date between cal A.D. 676 and cal A.D. 885 at the 2-sigma range (Costion 2013:Table1). Units 3, 5, 6 were all domestic structures, Unit 3 being the largest domestic structure at the site. Unit 8 was a domestic structure but was located directly adjacent to an artificially-leveled public space in the center of Sector A. Unit 7 is interpreted as a non-domestic context. Instead, it is part of the platform mound-plaza complex and, as I will discuss, was a location for the preparation of food and beverages for consumption during feasts that took place on or around the central mound.

The Middle Horizon and Wari in Moquegua

During the Middle Horizon, the Moquegua Valley witnessed the arrival of both Wari in the upper reaches of the Valley and Tiwanaku in the middle valley. The Tiwanaku colonists constructed Omo, a complex of plazas, temples, cemeteries, and households dating to the Middle Horizon (A.D. 550-1000) (see Goldstein 1993, 2005; Goldstein and Sitek 2018). While not the focus of this dissertation, the Tiwanaku communities undoubtedly had interactions with their Huaracane (e.g., Baitzel 2018; Goldstein 2000; 2005) and Wari (e.g., Nash 2015; Nash and deFrance 2019; Williams and Nash 2002) neighbors. The (likely) scenario of culture contact between Huaracane, Tiwanaku, and Wari communities should be the center of future investigations.

Located in the upper Moquegua Valley, the site of Cerro Baúl (~2,600 masl) represents the southernmost extent of the Wari Empire (Figure 3.3). Founded during the early Middle Horizon (circa A.D. 600), the site is positioned atop a sheer-sided defensible mesa. Cerro Baúl is a local *apu*, an important spiritual deity within the system of huacas of the Andes (see Williams and Nash 2006). Cerro Baúl is the administrative center of the colony (Moseley et al. 2005; Nash and Williams 2005; Williams 2001), with adjacent secondary sites at Cerro Mejía and Cerro Petroglifo (Nash 2002, 2012). Upon incursion, Wari colonists constructed a system of canals to feed agricultural terraces flanking the slopes of Cerro Mejía, Cerro Petroglifo, and Cerro Baúl (Williams 2001, 2002).

Figure 3.3 Map of the Summit of Cerro Baúl (map courtesy of Patrick Ryan Williams)

Excavations conducted at Cerro Baúl over the past 30 years have provided a detailed plan and interpretations of numerous site structures (e.g., deFrance 2014; Moseley et al. 1991; Moseley et al. 2005; Nash and Williams 2005, 2009; Nash 2011, 2012a, 2012b; Nash and deFrance 2019; Williams 2001). As discussed in Chapter II, one of the most common features attributed to Wari architectural style present at Cerro Baúl is the patio group. Patio groups are generally orthogonal structures that contain long, narrow, roofed chambers along the outer edge that surround an open interior patio (Isbell 2004, 2006, 2008; McEwan and Williams 2012:68; Nash 2017; Nash and deFrance 2019; Nash and Williams 2005, 2009; Schreiber 1992). Wari patio groups can be freestanding or a component of larger buildings and do not always have side chambers on all sides. Archaeologists often define these structures as elite residences (see Brewster-Wray 1990; Isbell et al. 1991; Nash 2010, 2012a, 2017; Nash and deFrance 2019), though evidence for the function of these patio groups ultimately consists of the artifacts recovered from within them (McEwan and Williams 2014:68); in some cases patio groups have provided evidence that they were used for other tasks, such as craft production or food-related activities (e.g., McEwan and Williams 2012:70) while others appear to be void of artifacts to guide functional interpretations (e.g., Anders 1986).

An excavated patio group is located in Sector B of Cerro Baúl. This compound, which includes Units 1 and 42, is part of a larger structure known as the Brewery (Moseley et al. 2005). This trapezoidal shaped patio group has a number of rectangular and L-shaped interior rooms (Figure 3.4). The subject of previous paleoethnobotanical analysis (see Goldstein et al. 2009), Unit 1 represents the main part of the brewery, a structure dedicated to

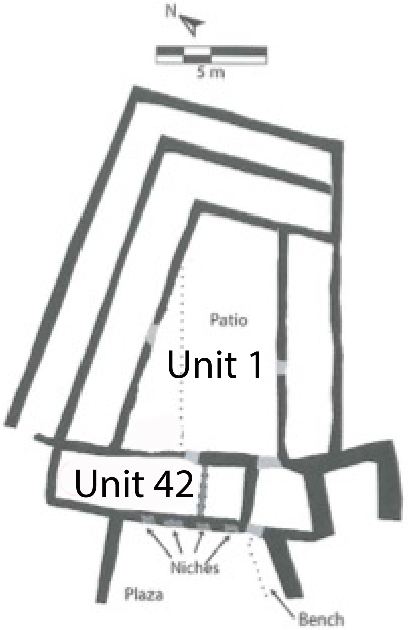

Figure 3.4 Cerro Baúl Units 1 and 42 (Nash 2012b:Figure 5.3 bottom)

the processing, boiling, and fermentation of *chicha*. Located on the western side of the brewery, Unit 42 A has been interpreted as an area where large amounts of food processing occurred based on the recovery of five large rhyolite grinding slabs and high densities of botanical remains recovered from the room (see Figure 3.5) (Nash 2012b:97, 2017:98).

Figure 3.5 Cerro Baúl Unit 42A (Photo Credit: Patrick Ryan Williams)

Unit 7 is a small structure located within Sector A in the northernmost portion of the site (see Figure 3.6). This unit is interpreted as a space for domestic activities and may be associated with the Unit 9 elite patio group. Excavations of Unit 7 F and G, both of which are included in this analysis, revealed a suite of domestic refuse, including ceramics, lithics, botanic material, faunal remains, and two *batánes* used for processing foods (deFrance 2014).

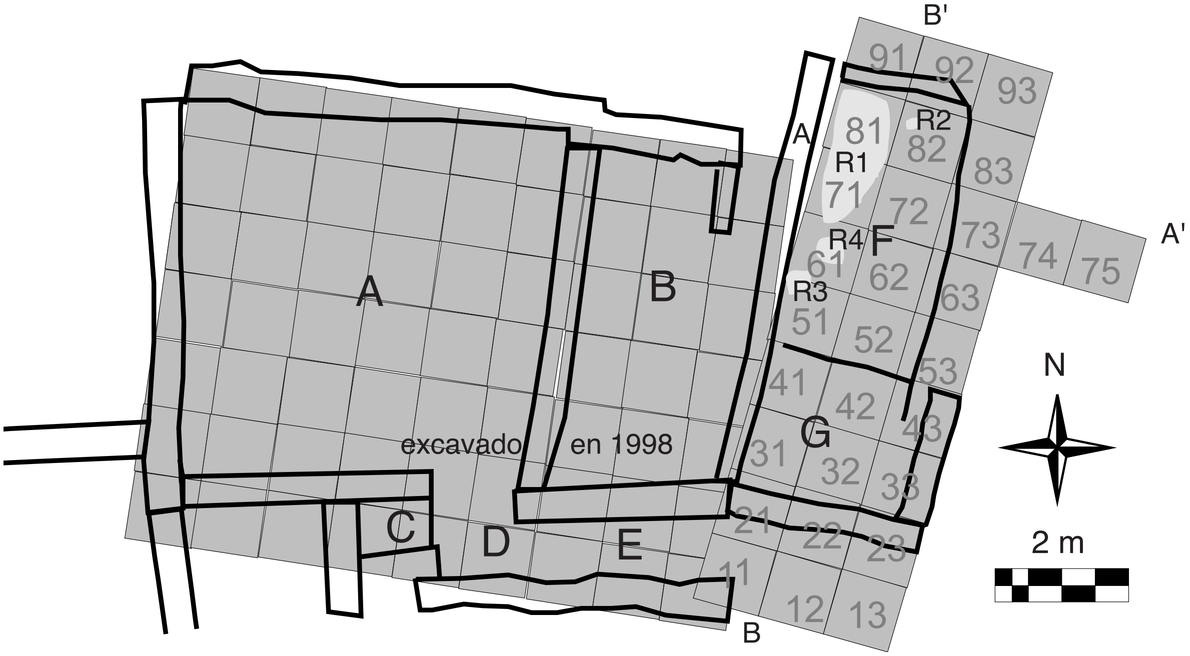

Figure 3.6 Cerro Baúl Unit 7 (Williams and Ruales 2002)

One of the architectural groups on which this analysis focuses is an elite compound on the summit of Cerro Baúl in Sector A. The patio group (Units 9 Rooms A-G) is at the center of a residential compound (which also includes Unit 25, Unit 40, and Unit 41) interpreted as an elite space and the location of political and religious ritual (Nash 2012a, 2017; Nash and deFrance 2019).[3] This 2,060 m^2 space includes an entrance court, ceramic workshop, garden, and space for crafting and cooking (Nash 2017:98). The walls were plastered in white and orange, the floors paved with stone, and the quality of the masonry is

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[3] Unit 25 is not included in the present analysis because it was found to have some later dates and intrusive Inka era offerings and other uncertain contexts

some of the finest at the site (Nash 2017:98). Both the patio group (Unit 9 Rooms A-G) and the entrance court (Unit 25) were the setting for provincial politics and/or feasting (Nash and deFrance 2019); the initial entrance court may be interpreted as a semi-public space while the interior patio (Unit 9 Rooms A-G), by comparison, was a more exclusive space for elite visitors reserved for both political and domestic activities (Nash 2017:98). A diverse set of faunal remains, including marine fish, cuy (*Cavia porcellus*), deer, and various birds were recovered from this space (deFrance 2014:Table 3.2). In addition, Unit 41 Rooms A-C have been interpreted as a mixed-use domestic space likely used for food processing, craft production, and other domestic tasks (Nash and deFrance 2019) while 41 E is likely also associated with lithic (Fortin 2015:201) and ceramic (Nash 2012a:5) production.

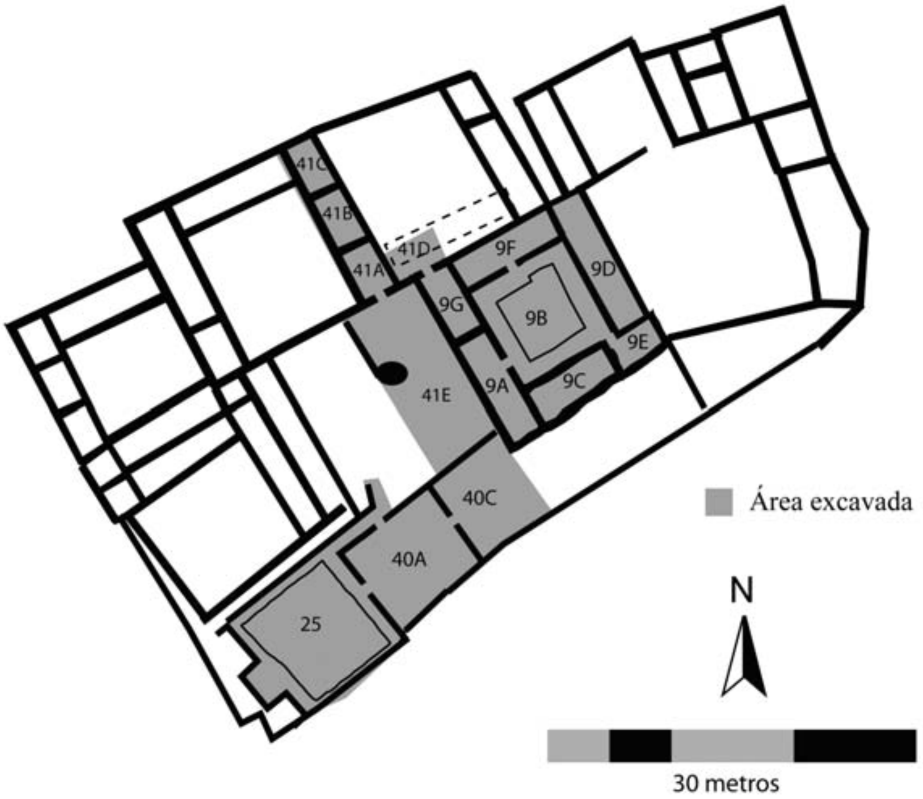

Figure 3.7 Cerro Baúl Elite Compound Consisting of Units 9, 25, 40, and 41 (Nash 2012b:Figure 3)

Unit 24 is a small patio group in Sector A and is adjacent to the elite patio group compound (Figure 3.8). Room A is interpreted as a domestic space based on the accumulation of refuse, including botanical material, bone, ash (possible hearth cleaning), lithics, and domestic undecorated pottery (Williams and Ruales 2004:21-24) and may be connected to Unit 24 Room B (Nash and deFrance 2019). Room B is a patio where large amounts of domestic refuse were found. A concentration of *manos*, *batánes*, and pigments (Rasgo 4) was found on the eastern side of the patio (Williams and Ruales 2004:25). Additionally, a hearth (Rasgo 5) was found in the center of the patio. Finally, Room C is interpreted as a domestic space possibly related to food preparation, based on the presence of a formal hearth in the center of the room (Rasgo 5). Overall, this compound is suggested to have functioned both as a domestic space as well as a potential ceramics workshop, possibly for non-elite peoples (Williams and Ruales 2004:30-31).

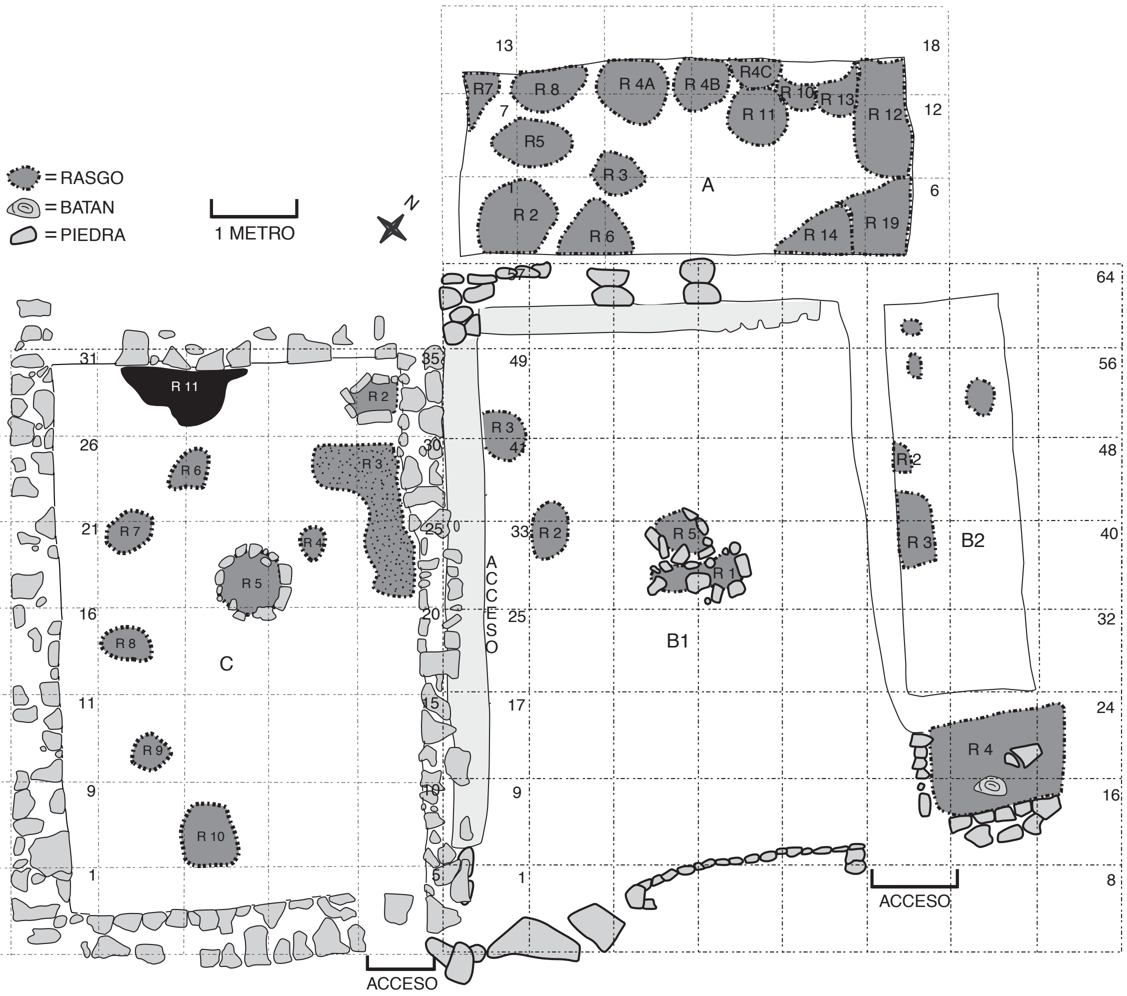

Figure 3.8 Cerro Baúl Unit 24 (Williams and Ruales 2004)

Finally, Unit 26 at Cerro Baúl is located in Sector C directly adjacent to the westernmost D-Shaped temple structure on Cerro Baúl (Williams and Nash 2006; Williams and Ruales 2004; Williams et al. 2008). The structure consists of a central patio (Unit 26 A) flanked by three adjacent rooms, two to the east (Unit 26 Rooms A2 and A3) and one to the west (Unit 26 Room A1) with associated rooms to the north and west (Figure 3.9). Based on its proximity to the D-Shaped temple, this structure is interpreted as a possible location for food storage or a locale for preparation for ritual activities; lithics, decorated and undecorated ceramics, charred plant remains, a camelid offering, marine fish, and a hearth were recovered from this unit (deFrance 2014; Williams and Ruales 2005). One of the few burials recovered from the summit of Cerro Baúl was also encountered in this unit (Goldstein et al. 2009:155, Williams and Ruales 2005). It is unclear at this stage, however, if this room was indeed used as a staging area for ritual activities or for some other set of practices.

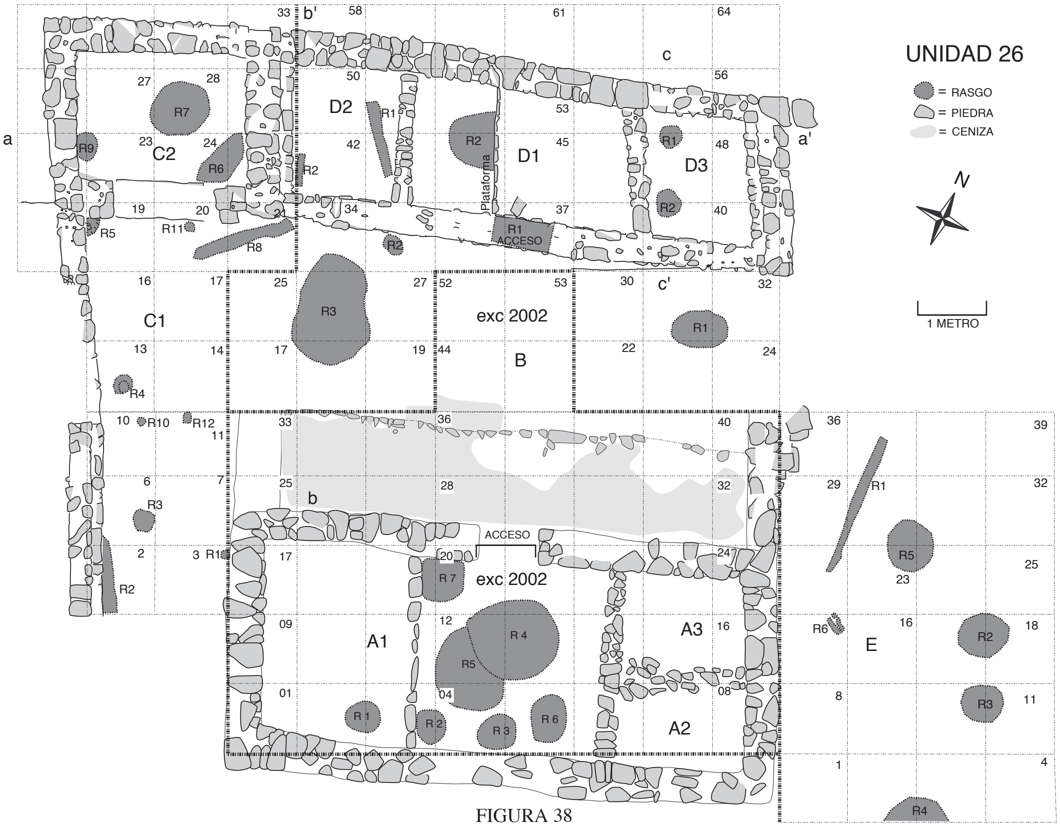

Figure 3.9 Cerro Baúl Unit 26 (Williams and Ruales 2005)

New AMS Dates from Cerro Baúl

14 new AMS dates from the site of Cerro Baúl were generated for this dissertation. The other sites included in this dissertation already had sufficient AMS dates from household contexts so that no additional dates were required. Carbonized annual plant seeds from

maize, bean, and molle were selected for dating to avoid issues of old wood effects (see Schiffer 1986). All of the carbonized plant remains submitted for AMS dating were recovered from dry-sieved soil samples and submitted to the Keck-Carbon Cycle AMS facility at the University of California, Irvine (UCIAMS) in 2018 (Table 3.1). I calibrated the dates using OxCal version 4.3.2 using the SHCal13 atmospheric curve (Hogg et al. 2013) (Table 3.2) and display the calibrated results graphically (Figure 3.10).

Table 3.1 Uncalibrated AMS dates from Cerro Baúl (report provided by UCIAMS)

UCIAMS #	Specimen #	Unidad	Capa	Cuad	Rasgo	Context	Sample Type	Fraction Modern	D14C (‰)	14C age (BP)
200806	CB02-09-1299	9G	C	146		Feature on top of Floor	Carbon - Molle Seed	0.8596 ± .0020	-140.3 ± 2.0	1215 ± 20
203036	CB02-09-1271	9F1	C	218		Household Floor	Carbon - Molle Seed	0.8546 ± .0015	-145.4 ± 1.5	1260 ± 15
203037	CB02-24-2513	24B	D	15		Household Patio	Carbon - Molle Seed	0.8536 ± .0015	-146.4 ± 1.5	1270 ± 15
200805	CB01-2864	9A	B2	67	5	Activity Floor	Carbon - Maize Kernel	0.8546 ± .0020	-145.3 ± 2.0	1260 ± 20
200808	CB02-24-2463	24C	D1	33	11	Floor/Roof Fall	Carbon - Molle Seed	0.8553 ± .0020	-144.6 ± 2.0	1255 ± 20
200809	CB07-41-1146	41A	D	43	4	Garbage fill	Carbon - Maize Kernel	0.8549 ± .0020	-145.1 ± 2.0	1260 ± 20
200811	CB07-41-1595	41C	B4	181	2	Activity Floor	Carbon - Maize Kernel	0.8546 ± .0021	-145.4 ± 2.1	1260 ± 20
200807	CB02-24-24.01	24A	E1	15	4B	Midden	Carbon - Maize Kernel	0.8536 ± .0021	-146.3 ± 2.1	1270 ± 20
201651	CB02-26-1493	26A1	I	19-20	7	Activity Floor	Carbon - Molle Seed	0.8534 ± .0015	-146.6 ± 1.5	1275 ± 15
201653	CB07-42-1723	42A	D	41	8	Household Patio	Carbon - Bean	0.8532 ± .0015	-146.8 ± 1.5	1275 ± 15
201652	CB02-26-1491	26A1	I	12	5	Activity Floor	Carbon - Maize Cupule	0.8522 ± .0015	-147.7 ± 1.5	1285 ± 15
200810	CB07-41-1141	41B	D2	112	18	Hearth	Carbon - Maize Kernel	0.85163 ± .0021	-148.3 ± 2.1	1290 ± 20
201650	CB01-2450	7G	D	51		Feature on top of Floor	Carbon - Maize Kernel	0.8513 ± .0015	-148.7 ± 1.5	1295 ± 15
201649	CB02-09-1299	9G	C	146		Feature on top of Floor	Carbon - Molle Seed	0.8468 ± .0016	-153.2 ± 1.6	1335 ± 20

Table 3.2 Calibrated AMS Dates from Cerro Baúl

UCIAMS #	Sample Number	Calibrated 2σ Range	%	1σ	Median
200806	CB02-09-1299	A.D. 773-965	95.4	53	878
203036	CB02-09-1271	A.D.770-880	95.4	34	823
203037	CB02-24-2513	A.D. 765-883	95.4	37	821
200805	CB01-2864	A.D. 767-884	95.4	38	822
200808	CB02-24-2463	A.D. 770-883	95.4	37	824
200809	CB07-41-1146	A.D. 767-884	95.4	38	822
200811	CB07-41-1595	A.D. 767-884	95.4	38	822
200807	CB02-24-24.01	A.D. 691-883	95.4	43	818
201651	CB02-26-1493	A.D. 691-880	95.4	41	819
201653	CB07-42-1723	A.D. 691-880	95.4	41	819
201652	CB02-26-1491	A.D. 687-873	95.4	52	805
200810	CB07-41-1141	A.D. 683-874	95.4	56	778
201650	CB01-2450	A.D. 682-858	95.5	54	749
201649	CB02-09-1299	A.D. 677-769	95.4	29	725

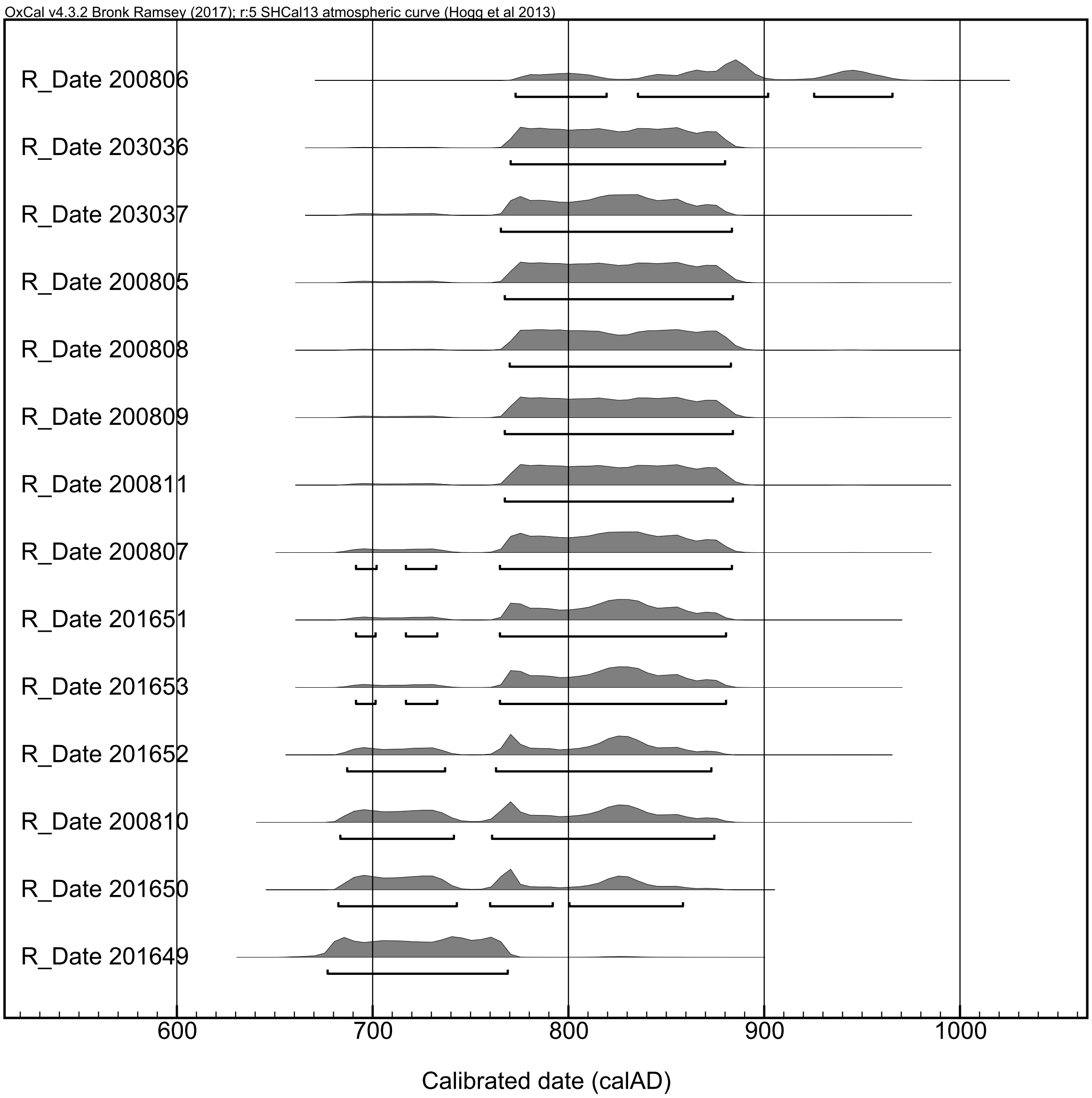

Figure 3.10 Calibrated AMS Dates from Cerro Baúl

The newly dated materials agree with previously reported AMS dates from Cerro Baúl (see Moseley et al. 1991; Moseley et al. 2005; Williams 2001) clustering around the mid Middle Horizon ranging from A.D. 760 – 880. Wari colonists are known to have arrived and constructed the original structures on the summit of Cerro Baúl by A.D. 600 (Moseley et al. 1991; Moseley et al. 2005; Williams 2001), and then reorganized and rebuilt many structures around A.D. 900 (Moseley et al. 2005) before the site was abandoned around A.D.

1,000. These new dates provide further clarity on the development of the site and are critical for refining site formation and episodes of reconstruction. Based on prior literature, these dates possibly represent the refurbishing activities on the buildings. The considerable overlap of dates indicates the contexts considered here overlap temporally, thus making them directly comparable.

Evidence for Wari-Huaracane Interaction in Moquegua

Attempts to characterize Wari and Huaracane cultural interaction have led to much speculation in terms of the nature of their contact (e.g., Nash 2015; Owen and Goldstein 2001; Williams 2001, 2002). Signs of cohabitation by Wari and Huaracane peoples is evidenced from excavations at Cerro Trapiche (Green and Goldstein 2010) in the middle Moquegua Valley. The presence of a Wari patio group, sloped terraces, Wari-style masonry, and Wari ceramic sherds alongside Huaracane-style ceramics (from surface collections and excavations) at Cerro Trapiche (Green and Goldstein 2010) provide convincing evidence that both Wari and Huaracane peoples lived together at least at one locale in the valley (see also Goldstein 2000; Owen 2005). Further, Cerro Trapiche dates between the mid-seventh and mid-tenth centuries A.D. (Green and Goldstein 2010:27), coinciding with the Wari occupation at Cerro Baúl and the abandonment of Yahuay Alta. Based on these findings, Green and Goldstein (2010:32) argue for an “integrative relationship between Wari and local people in the middle Moquegua Valley” and that local populations were active participants in a cross-cultural dialogue.

Another line of evidence for cultural interaction between Wari and Huaracane communities is the trade of raw materials. Using XRF analysis of obsidian from Yahuay

Alta, Costion (2009:Table 6.14) found that obsidian from Wari-controlled Alca and Quispisisa sources dominates the assemblage, while obsidian from the Chivay source in the Colca Valley, long used by Titicaca groups (see Burger et al. 2000), represents only a small portion of the overall assemblage (Costion 2009:Table 6.14). Thus, Huaracane peoples appear more closely connected to Wari trade networks than those of Tiwanaku and had access, either directly through Wari or their intermediaries, to Wari-controlled raw materials.

Outside of these examples, little evidence exists in terms of ceramics, mortuary practices, settlement patterns, or other artifact classes that may provide clues into the nature of social, economic, or political relationships in the Moquegua Valley during the Middle Horizon. Indeed, few Wari ceramics have been recovered from Huaracane sites, Wari colonists did not impact local settlement patterns, and Huaracane ceramic sherds are rare at Cerro Baúl (Costion 2009; Costion and Green 2018; Green and Costion 2018; Green and Goldstein 2010; Goldstein 2000; Owen 2005:50-51). How then, are we to investigate the ways in which Wari colonists interacted with their indigenous neighbors on the frontier? In Chapter VI, I consider foodways as a lens through which we may investigate complex cultural entanglements, such as those witnessed in Moquegua during the Middle Horizon.

The Siguas Valley

The Siguas Valley is located in the Department of Arequipa, in southern Peru. The Siguas Valley is characterized as a subtropical desert (0-1,700 masl) and Montane Low Desert (1,700-2,300 masl). The valley is divided into two sectors: high and low. The high sector is characterized by slopes used for cultivated terraces and irrigation canals. The low sector, defined by the union of the Siguas and Vitor rivers, comprises of flood-prone and non-flood-prone terraces with better quality soil, increased water availability, and superior temperatures for agriculture as compared to the high sector.

Arequipa was populated early on during the Archaic Period (>8,000-2,000 B.C.), yet little is known of this era due to rising sea levels between 18,000 and 5,000 years ago which submerged many of the early archaeological sites (see Sandweiss et al 1998). The earliest evidence for human occupation in the region dates to the Terminal Pleistocene (~13,000 – 11,000 B.C.) (Sandweiss and Rademaker 2013), such as Quebrada Juaguay on the coast (Sandweiss et al. 1998) and sites in the highlands (Rademaker et al. 2014). It is not until the around 3,000 B.C. that we see the first evidence for sedentism and small-scale agriculture. For example, evidence of maize, potato, chili pepper, and yuca were recovered from the highland site of Waynuna in Cotahuasi Valley in Arequipa which dates to approximately 2,000-1,600 B.C. (Perry 2007), suggesting the transition to sedentism had occurred by this period.

By the beginning of the Early Intermediate Period (EIP) (200 B.C. – A.D. 600), the available archaeological evidence suggests local communities in Arequipa were small, exhibited little evidence of social stratification or political centralization, and were positioned in relatively isolated highland and coastal locales (Wernke 2011), though only one EIP site in the region, Huacapay, has been excavated (see Disselhoff 1969). It was during this period (A.D. 1-750) that Nasca culture proliferated throughout southern Peru (see van Gijseghem 2006; Silverman and Proulx 2002; Valdez 2009a). Nasca material culture spread widely throughout much of the south coast and regional connections between Nasca and Arequipa appear to have strengthened during this time, notably among those in the northern parts of Arequipa during the latter half of the EIP (~A.D. 500) (see Conlee 2014; Scaffidi 2018;

Silverman and Proulx 2002; Tung 2012; Valdez 2009a, 2009b). In addition, the trade of obsidian from two obsidian sources (Alca and Quispisisa) connected some Arequipeñan communities with outlying regions (see Burger et al. 2000). These widespread cultural exchanges and interaction networks appear to not have extended to all communities in Arequipa, as by the end of the EIP most interregional cultural and economic interactions appear to have ceased, possibly linked to increased violence in the Nasca region (Scaffidi 2018; Tung 2012; Valdez 2009a). Violence and warfare were rampant by the late EIP in many parts of Nasca (Edwards and Schreiber 2014; Silverman and Proulx 2002:228-237; Verano 1995), likely as a result of environmental stresses (Isla and Reindel 2007; Schreiber and Rojas 2003), which led to political fragmentation. These events roughly coincided with the beginning of the MH and are possibly linked to the increased isolation felt by Arequipeñan communities during the late EIP until the arrival of Wari during the Middle Horizon (Jennings et al. 2015; Jennings and Yépez Álvarez 2016).

Throughout much of southern Peru, the Middle Horizon was a period of widespread cultural interaction and change. Wari colonists settled in the nearby Nasca Drainage by the seventh century A.D., possibly influencing or exacerbating increasing trends of drought, warfare, and population nucleation mentioned above (see Beresford-Jones 2011; Conlee 2010; Conlee and Schreiber 2006; Kellner and Schoeninger 2008; Scaffidi 2018; Owen 2010; Schreiber and Lancho 2003; Silverman and Proulx 2002; Tung 2007, 2012). By the seventh century A.D., Wari influence was felt in many parts of Arequipa. Evidence in the Majes Valley from the local sites of Beringa and La Real provide evidence of Wari-style ceramics (Owen 2010; Tung 2007), though no Wari architecture is present in the valley during this time.

Wari influence in Arequipa likely peaked during the eighth and ninth centuries. In the highlands, the site of Número Ocho in the Chuquibamba Valley, yielded evidence of Wari-style architecture and ceramics (Coleman Goldstein 2010). It is currently debated if the site of Achachiwa, which provides evidence of architecture and ceramics vaguely-derived from Wari styles (Wernke 2003), was a Wari administrative center or not (see Schreiber 1992:104). In addition, there is another Wari site, Quilcapampa La Antigua (detailed below), located in the *yungas* zone. The site of Sonay, previously interpreted as a possible Wari center along the coastal portion of the Majes Valley (Malpass 2001), has recently been reinterpreted as a late Middle Horizon and early Late Intermediate Period site (Owen 2010:66), raising questions as to its connection to Wari and the persistence of Wari style in the region. Wari presence in Arequipa ended during the early eleventh century with the collapse of the Empire.

Quilcapampa: A Wari community in the Siguas Valley

Quilcapampa is a Wari site in the Siguas Valley, Arequipa, Peru. Established during the ninth century A.D., the site was founded some 200 years after initial documented expansions of Wari agents from Ayacucho (Jennings et al. 2018). The residents of Quilcapampa arrived and constructed their community around A.D. 800 only to abandon it a couple of generations later around A.D. 850, making the site a peculiarly short-lived occupation (*ibid*). The site is set upon a *pampa* overlooking the Rio Siguas at an elevation of 1600 masl and is divided into seven sectors (A-G). An ancient trail, crossing horizontally from one side of the valley to the other, bisects the site on the northern and southern sides of the plaza, denoting the importance of the place relative to regional trade networks that were active for millennia (*ibid*). Excavations conducted during the 2015 and 2016 field seasons revealed a number of well-preserved Middle Horizon domestic contexts from Sector A, which is the focus of this section (Figure 3.11). Although the analyses of materials from the contexts are ongoing, I offer preliminary descriptions of the units included in this dissertation based on excavation reports.

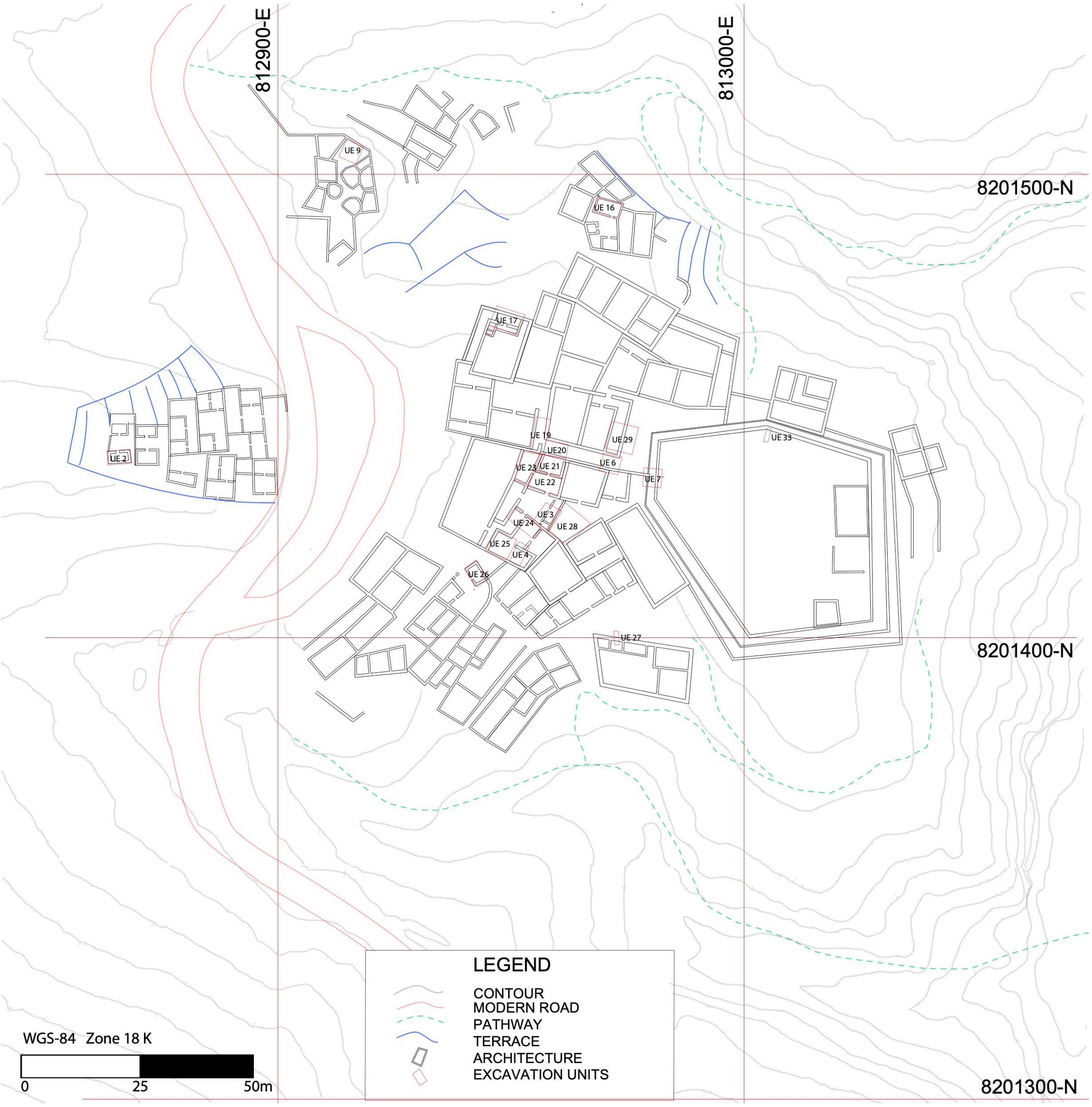

Figure 3.11 Map of Quilcapampa La Antigua Sector A (map courtesy of Justin Jennings and Giles Morrow)

Unit 17 is located on the northern end of Sector A (Figure 3.12). The unit is one of several rooms that flank a courtyard. Based on doorway presence, Units 17 and 19 are likely part of an architectural group that is separate from the other analyzed units. A short wall surrounding two *batánes* was recovered with from the southwest outer wall of the unit. This small wall and associated *batánes* are a grinding surface likely used to process food and other organics. Organic remains, including maize, pacay, ají, and potatoes, as well as a mesh bag with sharpened needles/weaving implements, were found in direct association with the *batánes*. The associated artifacts suggest that the unit functioned as a domestic space.

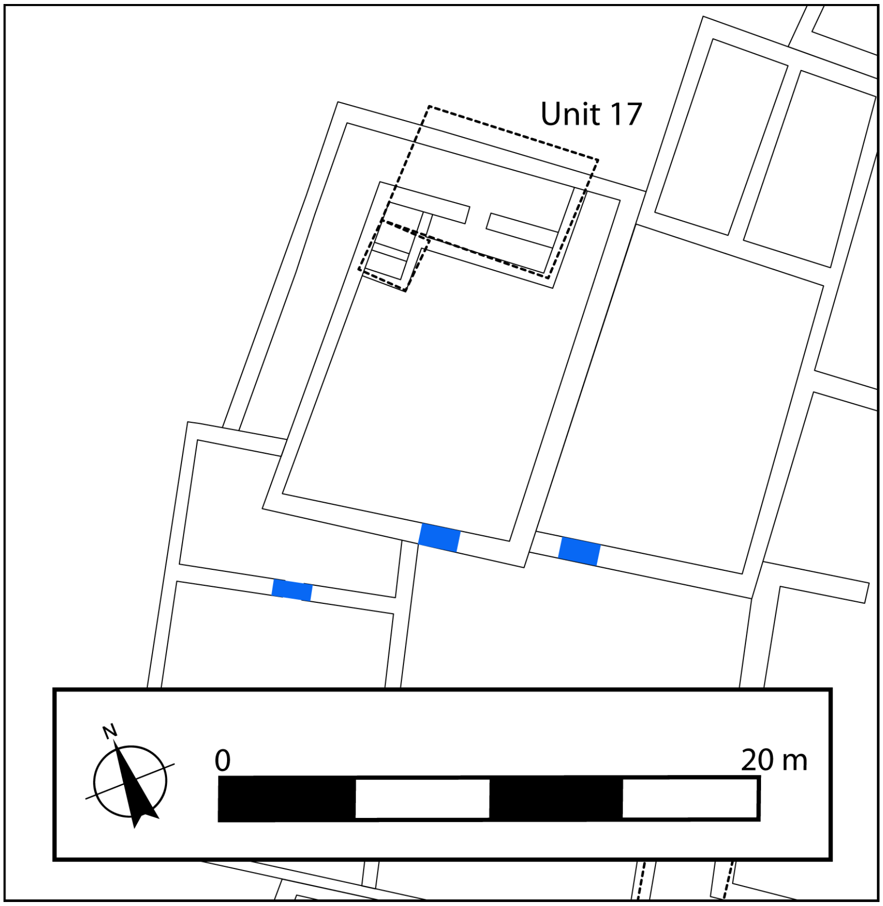

Figure 3.12 Quilcapampa Unit 17

Unit 19 represents a walkway connecting two courtyards at the site (Figure 3.13). During excavations, a clean floor with some evidence of domestic activities, including animal remains, utilitarian ceramics, lithics, and ash/carbonized wood and other plant remains, were uncovered. Unit 19 connects to Unit 20 but does not have access to Units 23 or 21. Unit 20 is located directly adjacent to the southeast of Unit 19 and represents a corridor (Figure 3.13). Similar to Unit 19, Unit 20 lacks evidence of large amounts of ceramics, lithics, animal remains, and shell. There was, however, a large amount of botanical remains recovered from the occupation floor. It is possible this hallway was not only used to move throughout the site but also served as a location to dump cooking and/or processing refuse.

Units 21, 22, 23, 24, and 25 are likely connected as part of the same architectural space. Excavation of Unit 21 (Figure 3.13) revealed a room with a well-made floor and walls. The presence of fineware ceramics, and large amounts of botanical remains, animal bone, ash, three *placas pintadas* (painted flat rocks/river cobbles) within the finely constructed room, suggests this domestic room may have been occupied by high-status residents of Quilcapampa.

Unit 22 (Figure 3.13) likely served as both a domestic space as well as a connecting room to other domestic rooms. Two floors were identified in this unit; one higher levelled white floor and a second lower split-level floor connected by a staircase built along the northern wall. Two hearths, carbonized and desiccated botanical remains, numerous lithic materials, painted cobbles, and other cultural materials representing household refuse were recovered from this activity surface. In addition, two small, face-necked jars were ritually smashed and interred on the earlier floor in this room.

Located to the west of Units 21 and 22, Unit 23 likely served as a food preparation context (Figure 3.13). A large grinding stone was recovered against the western wall and a hearth was on the eastern side of the room. The presence of domestic pottery, lithics, and

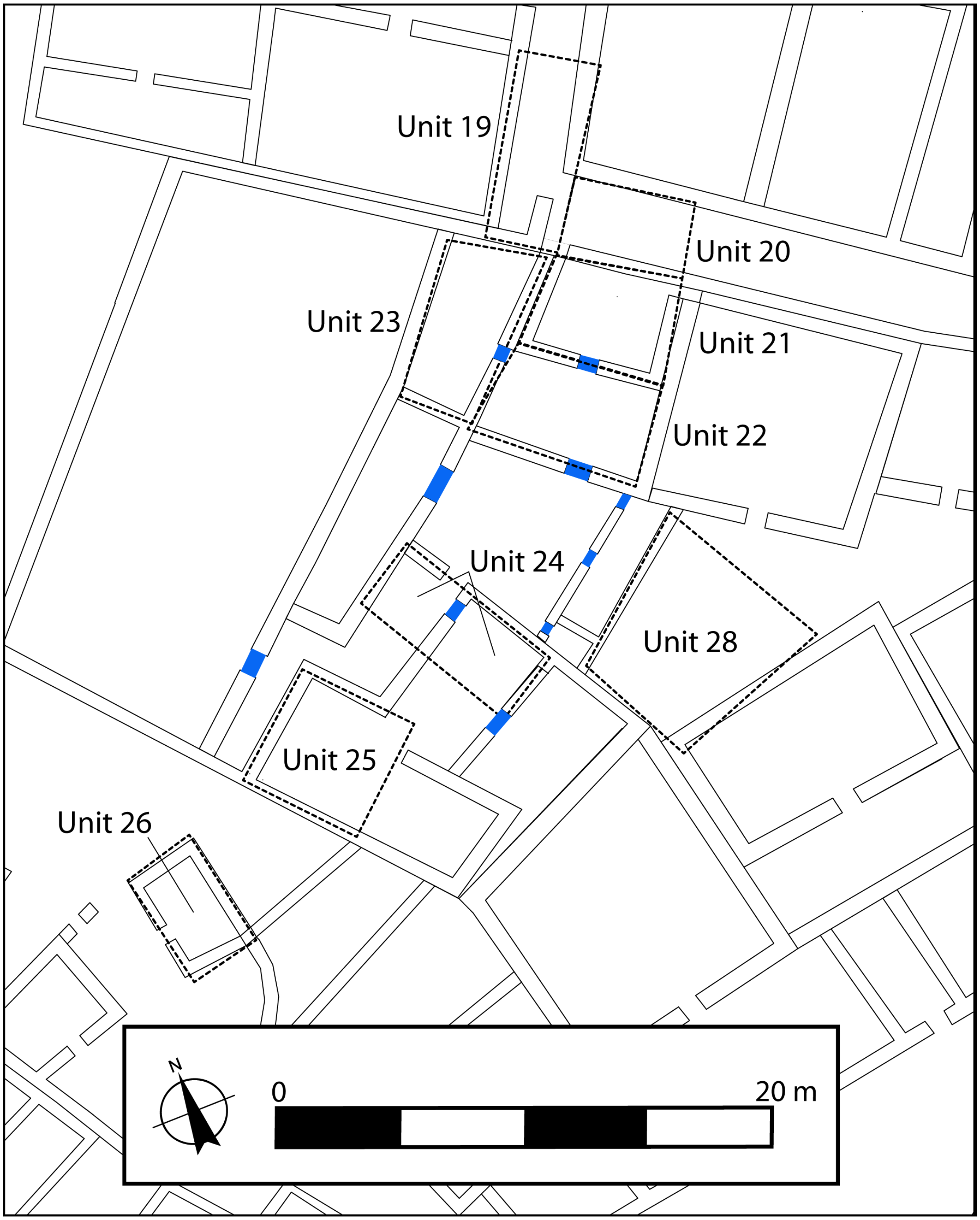

Figure 3.13 Quilcapampa La Antigua Units 19, 20, 21, 22, 23, 24, 25, 26, and 28

large amounts of plant remains suggest a number of domestic activities took place here, possibly representing a kitchen. In addition, several *placas pintadas* were also recovered from this unit, possibly placed as offerings.

Excavation of Unit 24 revealed two separate architectural spaces, one on the northern side and one on the southern side, with a doorway connecting the spaces (Figure 3.13). The presence of these doorways, which lead to side rooms, implies this unit served as a patio connecting side rooms through a central location; it is not currently believed that this room connected with the higher-status block of rooms (Units 21, 22, and 23), but rather served as an independent patio group. Unit 24 is unique, as a Wari-style face-necked ceramic vessel was recovered here, possibly indicating direct ties to the site of Huari in Ayacucho.

Unit 25 is located on the east-central portion of Sector A (Figure 3.13). The unit is divided by a short retaining wall that supports a platform within the structure that encompasses approximately two-thirds of the unit. Excavation of this structure revealed a large amount of botanic remains, *placas pintadas,* shell, lithics, animal bone, ceramics and large amounts of ash. Excavation notes report a hearth, ceramics that could be used to boil and/or ferment *chicha,* and large amounts of molle, supporting the interpretation that this structure functioned at least in part for food processing and/or brewing.

Unit 26 is located towards the center of Sector A but is possibly part of a separate architectural space than Units 21, 22, 23, 24, and 25. Excavations of Unit 26 uncovered little in terms of cultural material. Also absent was a prepared floor. It is currently unclear what the function of this room may have been but may represent a storage or domestic space that was cleaned prior to abandonment.

Unit 28 is a 7x7 m unit that is directly adjacent, but separate from, the connected architectural group that included Units 21, 22, 23, 23, and 25 (Figure 3.13). Unit 28 included a patio where a looter's pit was dug. Excavations in an undisturbed portion of the patio revealed two floors separated by fill consisting of larger amounts of molle and rocks.

Excavators identified a doorway in association with the lower floor, indicating the original entrance was much lower. In addition, there is evidence for a thick plaster on the walls of this unit, potentially indicating that the area held a special function at the site.

Unit 27 is located east of the large platform in Sector A in a patio group that appears to be separated from the rest of the units (Figure 3.14). While other rooms were excavated in their entirety, only a 3x1 m trench was placed in Unit 27 to characterize the function of the room. A floor was identified, as well as clay, mortar, and several *placas pintadas.* Based on the current evidence, the function of this room remains uncertain.

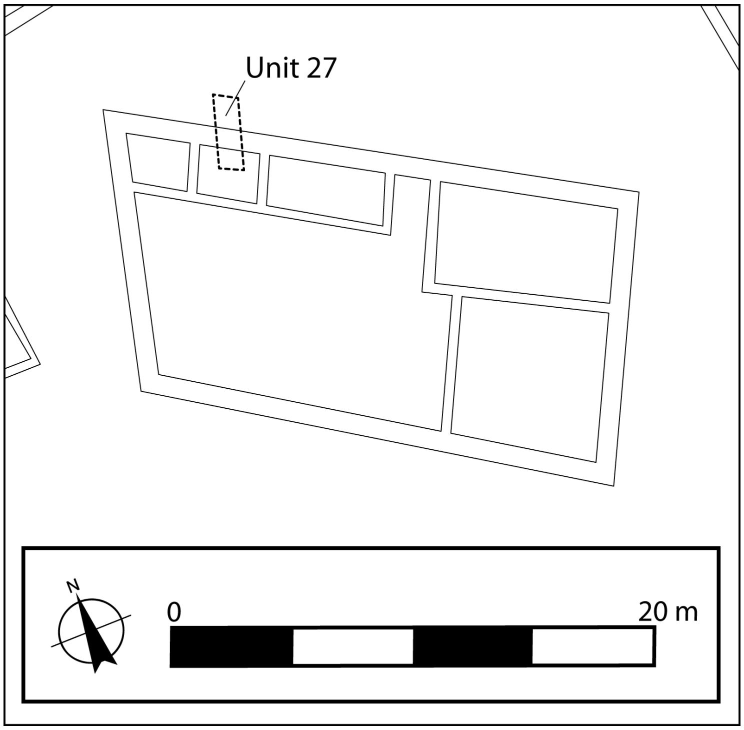

Figure 3.14 Quilcapampa La Antigua Unit 27

Evidence for Wari-Indigenous Interactions in Arequipa

Investigations into the extent of Wari presence in the Arequipa region are ongoing, but current evidence demonstrates that Wari influence spread to Arequipa by the seventh century A.D., possibly through existing trade routes between the Nasca and Majes region (Jennings and Yépez Álvarez 2016; Jennings et al. 2018; Williams 2017). Wari was unlikely, however, to have made a significant impact on Arequipan communities during this time. For example, in the Majes Valley the earliest radiocarbon dates of contexts with Wari-style ceramics come from local cemeteries (Scaffidi 2018; Tung 2007, 2012). Further, survey and excavation of the Majes Valley has not produced evidence of a Wari-style administrative site to govern the valley.

Instead, it appears that Wari-style materials made their way into the valley through exchange networks rather than by conquest and subjugation. The tempo and extent of Wari influence was variably experienced in this region. The Wari style was widely copied in many coastal valleys along the northern coast of Arequipa. Owen (2010:68-70), analyzing pottery recovered from the Majes Valley, refers to this pattern as "a *derived* pattern, in which people rarely or never saw corporate-style ceramics, used low-fidelity core folk finewares as their only finewares, and used local utilitarian wares." These locally-made pots were what Owen (2010:72-73) considers could be part of a "stepwise budding process" where Wari groups from the core establish a settlement in a new region, and after a period of growth and the development of a Wari ceramic folk tradition, members of these communities split off and spread to neighboring regions. Indeed, Wari sites are linked together through a system of roads on the south coast and south-central highlands stemming out from Ayacucho to Nasca, through the Department of Arequipa, to Moquegua (Williams 2017). These ceramics could have been incorporated into competitive feasting events where local elites used emulations of Wari ceramic style and iconography to compete for access to prestige goods and resources vis-à-vis Wari agents passing through the region.

Instead, Wari influence appears to have peaked during the eighth and ninth centuries (see Jennings et al. 2015). Recent excavations at Quilcapampa La Antigua provide evidence for Ayacucho-based Wari-style ceramics and architecture (Jennings et al 2018). The suggested lack Wari administration in Arequipa could be taken to suggest Wari presence may have been focused on creating trade relationships without the investment of conquest and administration in the region (Jennings et al. 2015). However, this apparent lack of Wari control in the region may not necessarily represent an *absence* of Wari authority but instead may reflect a number of options Wari colonists had in order to bring Arequipa under control. For example, local elites could have sufficiently cooperated with Wari agents, perhaps as a way to gain access to exotic prestige goods, necessitating minimal Wari infrastructural investment in the region. As previously stated, a number of Wari roads pass through Arequipa on the way to other parts of the Andes, such as Moquegua (Williams 2017). Sites such as Quilcapampa La Antigua could have been waystations along the roads that facilitated inter-regional exchange. Nevertheless, we cannot (and should not) expect Wari to have acted the same way in every region (*sensu* Schreiber 1992).

The Cusco Region

Although the Department of Cusco is a broad region encompassing an area of slightly less than 72,000 km^2, my focus here is on the Lucre Basin and the surrounding area in the central portion of the department. The area surrounding Cusco is a sub-tropical region located in the central highlands that overlaps three ecological zones, including the *puna, suni,* and *quechua* zones (see Chapter II). As such, the Cusco area today experiences two seasons: a cold and dry winter from May through August, and a mild and rainy summer from

September to April. Snow is rare, but hail and frost can be expected at higher elevations during the winter months. The *quechua* zone, located area between the Apurimac and Vilcanota rivers, is considered to be a breadbasket today and likely in the past to a limited extent.

The early peoples of Cusco moved into the region during the Archaic Period. Excavations at the Middle (7,000-5,000 B.C.) to Late Archaic (5,000-2,000 B.C.) site of Kasapata (Bauer et al. 2007) indicate the communities transitioned from temporary camps to permanent settlements over a period of a few thousand years. By the Early and Middle Formative Period (2,200 – 1,500 B.C. and ~1,500-500 B.C., respectively), the regional population became fully sedentary, adopted pottery, and began practicing agriculture (Bauer 2004; D'Altroy 2002:37), though most settlements during this time were located slightly upslope in less than prime maize-growing altitudes indicating agriculture may not have been the primary subsistence strategy. The Late Formative Period coincides with the emergence of social stratification in the valley and the expansion of trade networks to Lake Titicaca and elsewhere, through which early Cusqueños acquired obsidian and traded ideas, resources, and technology (e.g., Bauer et al. 2010; Burger at al. 2000; Davis 2010; Rowe 1956).

The Early Intermediate Period (EIP) (A.D. 200-600) in Cusco is marked by the appearance of Qotakalli pottery, a thin-walled slipped and pigmented style that represents a significant departure from previous ceramic traditions in the area (Bauer 2004; Covey et al. 2013). Studies of settlement patterns during the EIP suggest that there was a marked movement downslope towards the valley bottom, which has been used to suggest population growth and/or maize agriculture in the region (Bauer 2004:52). For example, Chepstow-Lusty (et al. 2004) notes a decrease in the amount of quinoa pollen present during the EIP from cores taken from Lake Maracocha northwest of Cusco, a pattern which may hint at major shifts in subsistence production. In addition, Bélisle (2011, 2015) notes that new serving vessel forms were adopted at Ak'awillay, suggestive of production and consumption of *chicha,* which also supports the maize hypothesis. Residential villages were small, usually less than 5 hectares in size (Covey 2006; Bélisle and Covey 2010), and no formal public architecture was present during this period. Nevertheless, the movement downslope resulted in clustered settlements on the western side of the Cusco Basin, representing the formation of a small, multi-village polity that is thought to have controlled much of the Cusco Basin during the EIP (Bauer 2004:54). Covey (et al. 2013:546), raising caution about such an interpretation, stresses that while the distribution of Qotakalli pottery is widespread in the Cusco region, other ceramic styles become more prevalent the further you get from Pikillaqta, which he takes to indicate that there was no single polity established control over the in Cusco Valley during the EIP.

The Middle Horizon and Wari in the Cusco Region

The Cusco region offers another example of the Wari colonial experience. In the Lucre Basin, located to the east of the Cusco Valley (Figure 3.15), Wari colonists constructed a massive site known as Pikillaqta (McEwan 1996, 2005), as well a smaller nearby site called Huaro (Glowacki 2002; Skidmore 2014). Occupied during A.D. 600-900, Pikillaqta was the largest of Wari imperial installations with a size of approximately 1680 x 1120 m^2 (McEwan 1996, 2005). Excavations revealed a system of large orthogonal architectural spaces, including long hallways, well-preserved plaster floors and staircases, multi-story buildings, large quantities of ceramic, bone, shell, worked stone, obsidian, and metal remains, as well as a sprawling system of agricultural terraces and canals surrounding the site (McEwan 1996, 2009).

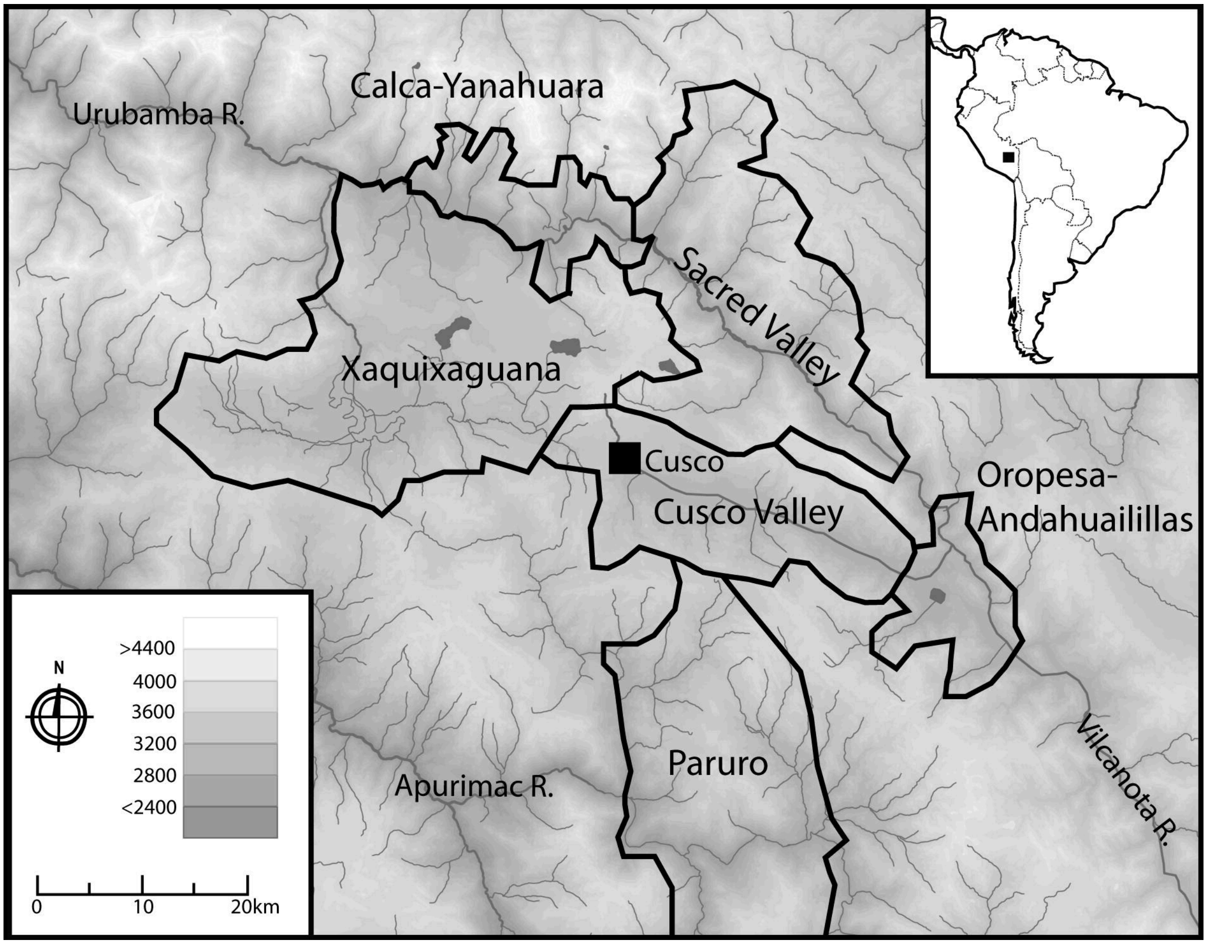

Figure 3.15 Map of the Cusco Region (Covey et al. 2013:Figure 3)

Evidence for Wari-Indigenous Interactions in the Cusco Region

McEwan (1996, 2005; see also Glowacki 2002; Glowacki and McEwan 2001) argues that the Wari presence constitutes direct control over the region. The bulk of the argument stems from the colonial installments of Pikillaqta and Huaro/Hatun Cotuyoc. The site of Pikillaqta conforms to Wari architectural canon and represents a considerable investment in terms of time, labor, and resources for the colonial regime. There are several varieties of Wari ceramics at the site and Instrumental Neutron Activation Analysis (INAA) indicates that some vessels were imported directly from Ayacucho while others were produced locally (Glowacki 2005:102), suggesting a direct metropole connection. McEwan (2005) argues the site likely served a ceremonial and administrative role for feasts and other ceremonies and rituals involving the mummies of both Wari and local ancestors as a means to honor and control local populations, though this hypothesis is debated.

Covey, Bélisle, and others (2015; see also Bélisle 2015, 2019; Bélisle and Covey 2010; Covey et al. 2013) take a different perspective on Wari presence in the region. Based on archaeological surveys of the Sacred Valley and the Xaquixaguana Plain, both of which are prime maize-growing locations northwest of the Lucre Basin, they contend little changed in terms of local indigenous lifeways upon the arrival of Wari (Bélisle 2015; Bélisle and Covey 2010; Covey et al. 2013). Ceramic evidence, they argue, points to limited presence of Wari influence in the region. For example, at the local village of Ak'awillay, Bélisle (2015) reports Wari and a local Wari-influenced pottery style, named Araway, to constitute only 1% of the ceramic assemblage (see also Covey et al. 2013). Indeed, the assemblage as a whole appears to be dominated by local style pottery. However, Bélisle (2015:Table 2) also notes that imported (which includes Qotakalli, Muyu Urqu, Araway, and Wari ceramics) to represent more than 15% of serving vessels in early Middle Horizon and houses and a public building.

Further discussion of the criteria of *local* vs. *imported* is required when using material culture to gauge culture contact or colonial influence on local populations (see Chapter II). The presence of locally produced Wari influenced serving vessels is interesting; perhaps Wari interfaced with local leaders through feasting and spectacles in order to gain influence over the local populations. In turn, local leaders could have placated their constituents and encouraged them to align themselves with Wari making the largescale investment into local communities unnecessary. There is some evidence of a similar situation in the Moquegua Valley at the site of Cerro Trapiche (Green and Goldstein 2010) where locals and Wari peoples cohabitated the site, used both local and Wari influenced pottery, and participated in Wari feasting events involving producing *chicha de molle.* Further, Bélisle (2019) notes that a public building was constructed at Ak'awillay the beginning of the Middle Horizon. Perhaps the construction of this public space, which was used for feasting involving the consumption of *chicha* and hallucinogenic substances (*ibid*) represents a similar situation to Yahuay Alta in Moquegua where local elites interacted with Wari colonists and gained access to resources in return for control over their constituents, possibly to support the Wari agenda in the area. Beyond Pikillaqta and Huaro/Hatun Cotuyoc, two other Wari sites have been noted in the region, including Batan Urqu (Covey 2006:73) and Raqchi (Sillar et al. 2013) which require further investigation to clarify the above patterns.

Hatun Cotuyoc: A Wari Site in Cusco

Hatun Cotuyoc is the residential sector of the Wari site of Huaro, located 13km south of Pikillaqta near the modern town from which it gets its name (Glowacki and McEwan 2001). Located at 3,170 masl, the site is a patchwork of large occupation zones characterized by a dispersed settlement sprawling over an estimated area of nine hectares. The site was first excavated by Glowacki and Zapata in 1997, and subsequently investigated by Skidmore in 2010. Excavations revealed a Middle Horizon Wari residential site (A.D. 700- 1000) with no prior occupation (Skidmore 2014). Rock mounds, present throughout the site, are believed to be the remnants of site architecture with occupation levels lying underneath

(Juengst and Skidmore 2016; Skidmore 2014:145). The settlement could also have operated as an administrative center as there is some evidence of ceremonial and public architecture in the central part of the site (Glowacki 2002:282-283), though it was apparently not planned according to a grid like Pikillaqta (Skidmore 2014:145). I do not provide a description of the excavation units of Hatun Cotuyoc here (see Chapters IV) (see Skidmore 2014 for a summary of excavated units and materials).[4]

Discussion

In this chapter I have laid brief ecological, historical, and cultural foundations from which to build a discussion of Wari provincial foodways within regions considered in this dissertation. What is clear is that while Wari was an empire, there are regions with an apparently overwhelming lack of Wari influence. Although the reconciliation of if Wari was/was not an empire is beyond the scope of this dissertation, there are many ways empires and other expansive polities can behave that do not constitute domination and wide sweeping change (see Chapter II). A focus on the local conditions (bottom-up) is of the utmost importance if we hope to investigate and characterize Wari colonialism and local entanglements, which certainly influenced the ways in which both Wari and local peoples interacted. Furthermore, the proposed *mosaic of control* (Schreiber 1992) whereby Wari agents utilized multiple strategies to expand and enforce their influence necessitates that archaeologists consider alternative models for identifying culture contact in the past. While Wari may not have reconfigured local settlement patterns, mandated sweeping changes in local labor or production strategies, or spurred the mass adoption of imported material culture

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[4] Botanical remains from Hatun Cotuyoc were not well preserved in general. Thus, the botanical data from the site is not included in analysis beyond a basic presentation of recovered and identified species.

in every valley they incurred, there are other ways in which we may investigate the nature of Wari influence and interaction with local indigenous communities. I propose foodways are one form of cultural interaction that is promising for considerations of culture contact and colonialism in the Wari Empire.

In the following chapter, I begin my presentation and discussion of Wari and indigenous foodways with an explanation of methods and a detailed analysis of archaeobotanical remains recovered from excavations of household contexts at Cerro Baúl, Yahuay Alta, Hatun Cotuyoc, and Quilcapampa. I frame my paleoethnobotanical investigation of Wari foodways around the ways in which Wari cuisine are both similar and different between the provincial sites. There are certainly a number of reasons that Wari foodways could be expected to be dissimilar between the provinces, including environment and the possibly multi-ethnic nature of the Wari Empire being of most direct concern. Nevertheless, if studies of Wari ceramics, architecture, political economy, power, burial practices, agriculture, and more are considered to be indicators of the Wari Empire, and thus Wari identity, then why not foodways?

CHAPTER IV

PUTTING FOOD ON THE TABLE: A QUANTATIVE ANALYSIS OF PROVINCIAL WARI AND INDIGENOUS HUARACANE FOODWAYS

This chapter presents the archaeobotanical data recovered from three provincial Wari archaeological sites in the south-central Andes and an Huaracane archaeological site in Moquegua. I begin with a discussion of methods, including procedures for field recovery, processing, and laboratory analysis of both macrobotanical and microbotanical remains. I then present data from the recovered and identified plant assemblages from the Wari sites Cerro Baúl, Quilcapampa, Hatun Cotuyoc, and the Huaracane site Yahuay Alta. Next, I describe the recovered plants and briefly discuss their histories of use in the Andes. Finally, I present basic results and explore patterns of plant use to reconstruct subsistence practices at the sites.

My analysis of Wari botanical assemblages suggests there may have been a characteristic assemblage of plants and related practices that made up provincial Wari cuisine. Environmental differences between the respective valleys, however, likely imposed restrictions on the types and varieties of foods available to Wari colonists. Likewise, there are some key similarities between terminal Huaracane and Wari food practices, namely the use of molle for producing *chicha*, yet the way in which Huaracane peoples incorporated *chicha de molle* into their foodways was a departure from the cultural practices of their Wari neighbors.

The following archaeobotanical analysis is derived from 307 soil samples collected from the aforementioned four sites in the Moquegua, Siguas, and Cusco Valleys. In addition, 20 ceramic sherds and groundstone tools (*manos* and *batánes*) were sampled for microbotanical residues from three of the study sites, the exception being Hatun Cotuyoc from which no samples were collected. These microbotanical data will be considered independently from the macrobotanical data; while they cannot be directly compared, they serve to illustrate the presence of taxa that are absent from the macrobotanical assemblage and suggest how the plants were used (e.g., cooked in a bowl, ground).

Field Recovery Methods

Cerro Baúl and Yahuay Alta

Soil samples from Cerro Baúl were collected during the 2001 to 2007 field seasons under the direction of Dr. Ryan Williams and Dr. Donna Nash. The Yahuay Alta soil samples were collected from excavations lead by Dr. Kirk Costion in 2006. Excavation protocol dictated that teams excavate by cultural stratigraphy, defining changes within an excavation layer (*capa*) by soil color, texture, or features, and creating a new level (*nivel*) if the excavator removed 10 cm of soil without encountering a new cultural layer. The samples selected for analysis come primarily from domestic contexts and include all excavated rooms (*recinto*) within a compound when possible. A 1x1 m grid was created within each unit (*unidad*) with every grid square (*cuad*) excavated separately for spatial control and all layers were excavated uniformly to uncover activity surfaces simultaneously. A 2 mm mesh screen was used on all excavated soil to ensure recovery of the smallest artifacts.

The soil samples from Cerro Baúl and Yahuay Alta were collected using a standardized system of blanket sampling (Pearsall 2000) where 1-2 liters of soil was systematically collected from each quadrant of every level of excavation. In addition, features (*rasgos*) at Cerro Baúl were collected in their entirety at Cerro Baúl and two liters of soil (where possible) was collected from features at Yahuay Alta. This systematic method of collection has yielded positive results for sites in the Upper Moquegua Valley (e.g., Biwer 2012; Biwer and Nash 2017; Goldstein et al. 2009; Whitehead and Biwer 2012) and allows for the direct comparison of the botanic assemblages from Cerro Baúl and Yahuay Alta. Once collected in the field, the excavators recorded sample provenience, weight, and soil volume, separated the sample contents into size levels using a geologic sieve set (2 mm, 1 mm, .425 mm), at which point they were individually bagged, given specimen numbers, and curated at the Museo Contisuyo in Moquegua.

The climate in the Moquegua Valley is extremely arid increasing the likelihood of recovering both carbonized and desiccated plant materials. While water flotation is standard for separating light and heavy fractions in many parts of the world (see Pearsall 2000:19), it was not utilized here because of the danger water poses to desiccated plant remains; introducing water to desiccated botanic remains can damage them. Instead, I elected to use a dry-sieve technique (Pearsall 2000:117) to allow maximum recovery of both carbonized and desiccated remains. I rough-sorted the samples selected for analysis in the Museo Contisuyo in 2016, removing all botanic remains from the samples, and exported them to the Integrative Subsistence Laboratory (ISL) at the University of California, Santa Barbara for identification and analysis in August 2017.

Quilcapampa

During the 2015 and 2016 fields seasons, the *Proyecto Arquelogíca de Quilcapampa la Antigua* (PIAQ), directed by Dr. Justin Jennings, Willy Yépez Álvarez, and Dr. Stefani Bautista, excavated Quilcapampa. Quilcapampa was excavated using the locus numbering system where a locus (event) number is assigned to everything discovered throughout excavation; a locus can be a change in soil, an artifact, an architectural feature. Using the number assigned to the event, archaeologists can later inspect the data and tell immediately where the numbered artifact or architectural feature is located in the general context of the excavation. Five liters of soil were collected from every locus that was excavated from the site. To ensure sample uniformity, the excavators collected the samples by scraping soil towards the middle of the locus and then scooping it into a collection bag.

As discussed in Chapter II, the hyper-arid conditions of the Siguas and Moquegua Valleys are comparable. As a result, large amounts of remarkably well-preserved botanic materials, including carbonized and desiccated plant remains, were recovered from Quilcapampa. For this reason, I used the dry-sieve technique to process the soil samples as well as to ensure comparability with the Moquegua samples. Samples selected for analysis were rough sorted in Peru to remove any plant remains, which were then exported to the ISL in 2017 for identification. All remaining samples were stored at the Ministerio del Cultura repository in Arequipa, Peru.

Hatun Cotuyoc

Hatun Cotuyoc was excavated by the Hatun Cotuyoc Archaeological Project, directed by Dr. Maeve Skidmore, in 2010 and 2011. Soil samples were taken in standardized 10 L amounts (or all soil possible if <10 L) for each natural and cultural stratigraphic level except topsoil (Skidmore 2014:158-159). As previously discussed in Chapter II, the Cusco area receives a larger amount of glacial runoff and precipitation than the Moquegua or Siguas Valleys. This weather pattern translates to more frequent exposure of carbonized plant remains to water, cycles of drying and hydrating, and overall damp conditions. As a result, carbonized botanical remains may not preserve as well in damp conditions as they do in desert environments while desiccated archaeobotanical materials are not likely to preserve at all. Consequently, the Hatun Cotuyoc samples were the only soil samples in this study subjected to water flotation (via the bucket method [see Pearsall 2000]). The soil samples were placed in a mesh bag in a barrel of water and agitated to separate the light and heavy fractions. Light carbonized and organic materials (seeds, leaves, sticks, etc.) float to the top and heavy materials (dense seeds, rocks, artifacts, etc.) sink to the bottom, whereby each fraction is collected, dried in the shade, and bagged for identification and analysis. These samples were stored in a field house for later analysis.

In general, carbonized plant remains were not abundant at Hatun Cotuyoc. 48 samples collected during the 2010-11 field seasons are included in the present analysis. I was able to analyze these samples in Cusco, Peru without exporting them to the ISL at the University of California, Santa Barbara.

Preservation and Recovery Biases in the Archaeological Record

Formation processes, or the ways in which an artifact or feature entered the archaeological record, are an important consideration in archaeobotanical analysis. In general, seeds may enter the archaeological record: 1) through gathering, cooking, or other processing activities; 2) by being incidentally brought to the site alongside a comestible and thrown away; 3) having been gathered for non-food purposes and discarded as waste; 4) as an inclusion in dung used for building material or fuel; 5) or blown in or accidentally brought back as a rider (see Hubbard 1976; Pearsall 1988). These scenarios provide cultural and environmental context for the entry of plants into the archaeological record. The mode in which a plant is collected, transported, processed, used, and discarded will influence its entry and abundance in the archaeological record (see Dennel 1976; Ford 1979; Miksicek 1987; Minnis 1981). These activities are patterned and reflect routine social practices (see Atalay and Hastorf 2006; Hastorf 2017; Yarnell 1982).

Further, we must also consider how the botanic remains were preserved, as preservation impacts the composition of the archaeobotanical record. Macrobotanical remains in exposed environments will decompose rapidly due to biological, chemical, and weathering processes. However, archaeological plant remains may be preserved at an archaeological site: 1) in an extremely dry environment; 2) in an extremely wet (anaerobic) environment; or 3) through carbonization (Pearsall 1988). Dry preservation (desiccation) occurs in areas where the continual absence of moisture inhibits the development and growth of bacteria, fungi, and other microorganisms that assist in decomposition. Recovering desiccated remains from archaeological excavations is rare, but when encountered they often provide a more complete inventory of plants than the carbonized assemblage.

In wet environments, water saturation (waterlogging) will create conditions that inhibit the growth of microorganisms and thus slow decomposition, resulting in remarkably well-preserved botanical remains; in extremely dry or wet environments, the favorable conditions for preservation often create unique challenges, such as the recovery of a preponderance of dense materials from a site. Last, preservation through carbonization, in which organic material is converted into an inorganic matter, is the most commonly encountered vector of plant preservation worldwide (e.g., Hastorf and Popper 1988; VanDerwarker and Peres 2010).

The type of plant that is recovered is also relevant to a discussion of preservation and formation processes of botanic remains in archaeological sites. Comestibles and other food-related items that have non-edible parts (e.g., maize cobs, nutshell) are often discarded into the fire as fuel (see Minnis 1981) or used as a tool. The discarded inedible portions may survive into the archaeological record depending on their density. For example, nutshell, which tends to be dense, has a higher likelihood of surviving the process of carbonization and thus being preserved in the archaeological record than a maize cob because maize cobs are more fragile than nutshell. Further, edible portions of plants that are often consumed whole (e.g., peanuts, beans, maize kernels) or raw (e.g., fruits), are less likely to enter into the archaeological record, though accidents do occur and are patterned (see Yarnell 1982; Johannessen 1984). In this situation, coprolites and microbotanical analysis may provide the only direct evidence of a consumable/consumed taxon.

In particular, tubers, roots, and other fleshy plants (e.g., fruits) are at an extreme disadvantage for archaeological recovery because they are eaten whole and/or are likely to decay after deposition. Further, if these plants are carbonized it is unlikely that they are identifiable as anything other than carbonized parenchymal tissue without the assistance of a scanning election microscope (SEM). As a result, tubers and roots are often underrepresented in macrobotanical assemblages even though they may have been subsistence staples at the site. Starch grains and phytoliths offer a more direct line of evidence of tubers or other fleshy plants at a site. Indeed, many microbotanical analyses have identified roots and tubers (on artifacts and in coprolites and soil [e.g., Haslam 2004; Piperno et al. 2000]) that are not typically represented in the macrobotanical assemblage.

Soil Sample Selection Criteria

Soil samples from the total aggregate assemblage were selected for analysis based on a number of selection criteria. The overarching goal was to include a variety activity spaces representing a spectrum of domestic activities from Wari and local indigenous sites. First, I selected soil samples from units that were likely to have included household spaces. Published materials from Cerro Baúl (Moseley et al. 2005; Nash 2011, 2015; Nash and Williams 2005, 2009; Williams 2001; Williams and Nash 2002, 2006), Hatun Cotuyoc (Skidmore 2015), and Yahuay Alta (Costion 2009, 2013), and excavation notes from Quilcapampa, were used to determine which excavated units would best suit these selection criteria. Next, I targeted specific contexts for analysis, including hearths, domestic middens, patios, courtyards, storage areas, and features associated with food processing and/or cooking activities (those features with associated *manos* and *batánes*). Within these contexts I further narrowed my selection to include only levels of direct human activities (i.e., floors) uncovered during excavations. Of these remaining contexts, an approximately 10% sample of the entire assemblage was selected for analysis.

Sorting Protocol

All samples from all four sites were sorted using standard procedures used by archaeobotanists working in the Andes (e.g., Bardolph 2017; Bruno 2008; Chiou 2017; Gumerman 1991; Goldstein et al. 2009; Hastorf 1990, 1993; Sayre 2010; Sayre and Whitehead 2017:126-127). Because soil samples from Hatun Cotuyoc were floated, they contained a light and heavy fraction component, while the samples from Cerro Baúl, Yahuay Alta, and Quilcapampa, were limited to a single fraction. All soil samples, including both dry sieved and floated, were size-sorted using a standard geological sieve set (2 mm, 1 mm, .71 mm screen sizes). I examined the samples and identified carbonized and desiccated plant remains using a stereoscopic microscope (Olympus Model SZ61, 10-40x magnification). Wood was weighed but not counted. All other plant material was both counted and weighed.[5] No wood identification was conducted under this project but remains a possibility for future investigation. In addition, wood, molle, and maize remains were collected solely from the 2 mm screen while other seeds were collected from all screen sizes.

Botanical materials were identified with reference to the paleoethnobotanical comparative collection at the University of California, Santa Barbara (UCSB) ISL, seed identification manuals (Martin and Barkley 1961), and published botanical survey reports and taxonomic guides on Peru (e.g., Arakaki and Echeverría 2003; Brack Egg 1999; Dillon et al 2011; Montesinos-Tubeé et al 2012; Weberbauer 1945), the latter of which allowed me to identify the range of taxa native to the study regions. Taxonomic identification, however, was not always possible — some plant specimens lacked diagnostic features altogether or were too highly fragmented. As a result, unidentified specimens were classified as "unidentified." If a seed was recovered, but a taxonomic identification could not be determined, the seed was labeled "unidentified seed." In other cases, probable identifications were made. For example, if a specimen closely resembled a maize cupule, but a clear taxonomic distinction was not possible (e.g., the specimen was highly fragmented), then the specimen was identified as a probable maize cupule and recorded as "maize cupule cf." Any plants labelled "cf." were included in the overall counts of

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[5] Weights for Yahuay Alta plant remains were not recorded

recovered botanic remains from the sites but were not included in further quantitative analysis.

Most Quilcapampa samples were too large (>500g) to be fully sorted. In this case, a subsample was created from the original soil sample using two large overlapping trays. This method requires the analyst to empty the entire soil sample over the middle of the trays and spread the contents evenly between each side. The first round of splitting creates a 50% subsample and a 25% subsample can be create by a subsequent split using the above method; this method of subsampling is an easy and reliable way to subsample in the field where access to a riffle splitter may not be reliable.

After the samples were split, I extrapolated counts using the following equation:

$$\text{Extrapolated Count } (X) = \frac{\text{weight } (N) * \text{taxon count } (b)}{\text{weight } (n)}$$

where (N) is the total sample weight, (n) is the subsample weight, (b) is the taxon count, and (X) is the variable for which to solve.

This project represents the first paleoethnobotanical analysis conducted for Quilcapampa and Hatun Cotuyoc. Plant analysis was been previously conducted on a different set of samples from Cerro Baúl (see Goldstein et al. 2009). Further, I re-examined the soil samples previously analyzed, but unpublished, by Goldstein and Muñoz (2008) from Yahuay Alta. This was done to confirm or revise previously made identifications and update the identified taxa list from the previous analysis.

Starch Grain Analysis Protocol

I used a standard protocol to extract starch grains and phytoliths from washed and unwashed artifacts (Piperno 2006:90; Perry 2001; Torrence and Barton 2006). To collect each sample, I used compressed air and a sterile toothbrush to gently remove any dust or sediment adhering to the surface of the artifact. Next, I applied distilled water (~30 ml) (*agua destilada para injectión*) and lightly brushed the artifact for 2 minutes, after which I collected the water and sediment in a sterile 50 ml centrifuge tube. Last, I applied additional distilled water (~30 ml) and cleaned the artifact using a sonicating toothbrush with a sterile brush head for 2 minutes to dislodge additional starch grains and phytoliths in crevices, after which the water was again collected in a centrifuge tube separate from the first sample; each artifact resulted in two microbotanical samples. I attached a sterile chemical wipe to the opening of the centrifuge tube and secured it with a metal tie to allow the water to evaporate in order to avoid issues of mold, as the samples needed to be stored for 2-3 months before processing and identification of microbotanical remains could be conducted.

In total, I sampled 20 ceramic sherds and groundstone fragments from Cerro Baúl, Yahuay Alta, and Quilcapampa; five groundstone artifacts (*manos* [groundstone] and *batánes* [stone grinding slab]) were sampled from Cerro Baúl, five *manos* from Yahuay Alta, and 10 ceramic sherds from Quilcapampa. These samples were collected in 2016 and shipped to Víctor Vásquez and Teresa Rosales at the Arequobios Laboratory in Trujillo, Peru for processing and identification. Vásquez and Rosales identified starch grains and phytoliths with reference to a modern comparative collection of edible plants, including: tubers, storage roots, cereals, beans, and native fruits of Andean origin (Vásquez and

Rosales Tham 2017). Starch grains were differentiated from contamination using diagnostic shape and surface characteristics, and then photographed for later identification. Vásquez and Rosales referred to published reference materials (Piperno 2006; Torrence and Barton 2006) and a comparative collection to make identifications of recovered starch grains and phytoliths to the genus and/or species level whenever possible.

Quantitative Methods

Quantitative methods in archaeobotany have developed significantly over the past several decades (see Hastorf and Popper 1988; Marston et al. 2014; VanDerwarker and Peres 2010; VanDerwarker et al. 2016). The most common method used by archaeobotanists for recording and quantifying plant remains are raw (absolute) counts and weights. Absolute counts and weights are unstandardized data and may reflect differential preservation, sampling, local environmental conditions, or other factors. These measures are a useful way to display original data as it was collected by the archaeobotanist and may be used by other researchers for comparative analysis. However, raw counts and weights are not appropriate for direct evaluation due to problems of comparability between plant taxa because they do not control for preservation biases and sampling error (see Miller 1988; Popper 1988).

One way to avoid the problems of absolute counts and weights is by using the ubiquity measure (Pearsall 2000:212-16; Popper 1988:60-64). This method of standardization calculates the percentage of samples in which a taxon is present relative to the total number of samples. The taxon is considered present whether there are 1 or 1,000 specimens, and the same frequency score is given no matter the count. For example, if maize is present in 6 of 10 samples, it receives a ubiquity score of 60%. This is an excellent means for dealing with differential preservation, as plants that may be overrepresented or underrepresented due to taphonomic processes have the same influence when present. Ubiquity is also useful for investigating spatial and temporal patterns of plant use within similar contexts, though the results may be less meaningful when comparing contexts of differential deposition or use.

Density is another useful standardizing measure that uses a constant variable, such as soil volume, to create a comparative ratio to assess the relative abundance of plants at the site (Miller 1988; Scarry 1986). To calculate density, the absolute count of plant taxa (numerator) is divided by the total soil volume collected from a sample, context, or site (denominator). Standardizing botanic data using density controls for differences in soil volume between samples and allows for the direct comparison of samples of unequal size. A basic assumption in using this measure is that the larger soil volume sampled, the greater likelihood that (rare) plant remains that will be recovered (Miller 1988:73).

Overall, ratios are useful tools that overcome some of the problems of absolute counts. However, it is important to note that ratios reveal only the *relative importance* of plants within depositional contexts, not the contribution of resources to ancient diet (see Scarry 1986). For example, the recovery of 100 nutshells and 10 maize kernels does not necessarily represent evidence that nuts were more important than maize to the diet of residents of a given site; preservation and sampling biases prohibit paleoethnobotanists from making definitive determinations on whether certain taxa were more common or important than others.

I use box plots as a means of summarizing and displaying paleoethnobotanical data (Scarry 1986; VanDerwarker 2006; VanDerwarker 2014:211). Box plots are a method of displaying and statistically comparing distributions of data in a meaningful way by summarizing distributions of data using several characteristics (see Cleveland 1994; Scarry 1986; VanDerwarker 2006:75; VanDerwarker et al. 2014:211). The narrowed area at the center of the box outlines the median of distribution (see Figure 4.1). Vertical lines (whiskers) extend outward on either side of the box and represent the distribution of data (tails). Adding notches to the box signifies the 95% confidence interval around the median. If the notches of any two boxplots do not overlap, then the medians of the distributions are significantly different at the .05 level (McGill et al. 1978; Scarry and Steponaitis 1997). Outliers within the distribution are noted as asterisks, and open circles signify far outliers.

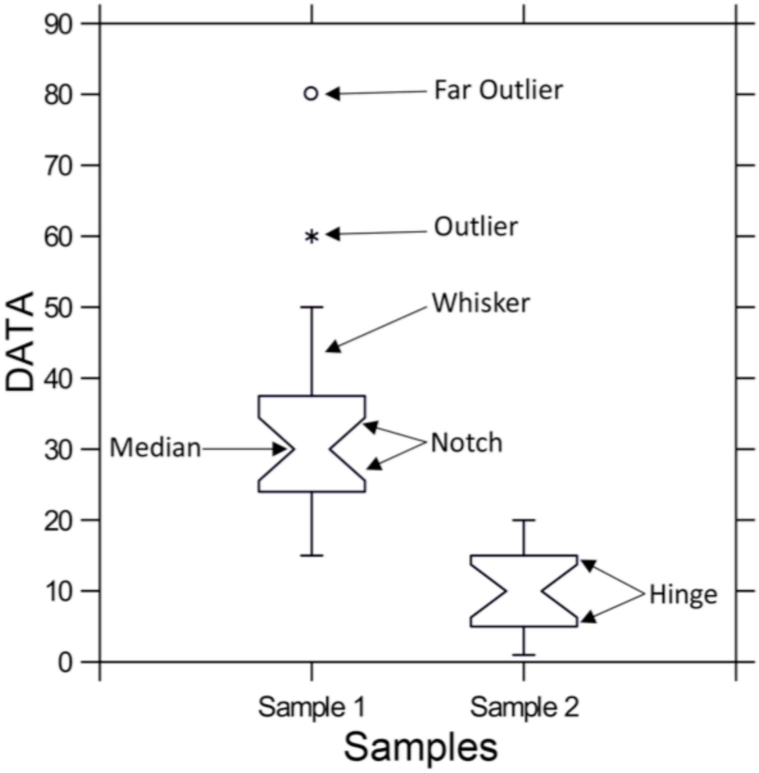

Figure 4.1 Box plot explanation

Calculating the diversity/richness is another way to analyze and interpret a botanic assemblage. One method used to calculate the richness of an assemblage is the Shannon-Weaver index (VanDerwarker 2006:77, 2010). Using raw counts, the Shannon-Weaver index calculates richness as an overall diversity index (H') and evenness (V'). Richness refers to the number of taxa in an assemblage and assumes larger assemblages will have more species represented; a higher H value indicates greater species diversity. Evenness (V') values range from 0 to 1, with a value of 1 indicating a perfectly even distribution of taxa, and lower values representing less even distributions. Diversity is useful for comparing temporal or spatial diversity.

Archaeobotanists and zooarchaeologists have found utility in assessing the diversity of botanic assemblages. For example, analyzing the Sandy site in Roanoke, Virginia, VanDerwarker and Stanyard (2009) found taxonomic diversity of faunal remains was low compared to other sites in the region. The authors found that the assemblage was not diverse, but instead dominated by white-tailed deer legs, indicating field butchering of the deer was emphasized at the site; a habitation site would be expected to have a more diverse assemblage than a special-use site. Further, the botanic assemblage was dominated by wild collected resources, notably bearsfoot (*Polymnia uvedalia*), a medicinal plant, while other food staples of the region (e.g., maize, hickory nut [*Carya* sp.]) were not abundant. Taken together, the skewed nature of the faunal and botanic assemblages suggests that the site was the location of a hunting/butchering camp where individuals collected medicinal plants, rather than a habitation site. This study demonstrates the utility of the Shannon-Weaver index for distinguishing site types, as well as distribution of plants within and between sites.

Quantitative Analysis: Basic Results of Study Assemblages

This section presents the results of identification and analysis of the archaeobotanical remains from Cerro Baúl, Yahuay Alta, Quilcapampa, and Hatun Cotuyoc. A range of taxa, including field cultigens, tree fruits, medicines, and wild plant resources were recovered from each site ranging from locally available plant resources and cultivated products to imported through trade routes. Raw counts and weights of the plant taxa, as well as wood weight, are summarized for the respective site assemblages (see Appendix I-VI for a detailed list of plant counts and weight for each sample from the analyzed sites).

Cerro Baúl

A total of 117 samples, representing 117 liters of soil, from seven units at Cerro Baúl were analyzed (see Table 4.1).[6] The Cerro Baúl assemblage contains 13,353 seeds. Molle was both the most numerous in terms of raw count as well as the densest taxon recovered from the site, followed by quinoa, maize, and bean. In addition, five samples from *manos* and *batánes* produced starch grains identified as maize, *Canna* sp. (possibly achira), yuca, and grass phytoliths (Panicoideae, Pooideae) (Table 4.2; Figure 4.2).

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[6] Plant remains from Unit 25 are presented in this table, but are not considered in further calculations because they could date to the post-Middle Horizon.

Table 4.1 Plants Recovered from Cerro Baúl

Wood Weight (g)	**234.17**			
Total Flot Samples	**117**			
Total Liters	**117**			
Total Plants Recovered	**13,353**			
Family	**Taxon**	**Common Name**	**Count**	**Density**
Amaranthaceae	*Atriplex* sp.		16	0.14
	Chenopodium quinoa	Quinoa	1,222	10.44
	Chenopodium quinoa cf	Quinoa	1	0.01
	Amaranthus sp.	Kiwicha	35	0.30
	Chenopodium/Amaranthus	Quinoa/Kiwicha	1	0.01
Anacardiaceae	*Schinus molle*	Molle	9,300	79.49
Brassicaceae	*Lepidium* sp.		1	0.01
Cactaceae	*Armatocereus* sp.	Cactus	4	0.03
	Echinocereus sp.	Cactus	8	0.07
	Echinocactus sp. cf.	Cactus cf.	1	0.01
	Echinopsis sp.	Cactus	163	1.39
	Haageocereus sp.	Cactus	9	0.08
	Neoraimondia sp.	Cactus	1	0.01
	Cactaceae	Cactus Family	12	0.10
	Cactaceae cf	Cactus Family cf.	1	0.01
	Opuntia sp. cf.	Cactus cf.	1	0.01
Cucurbitaceae	*Lagenaria* sp.	Bottle Gourd	228	1.95
	Lagenaria sp. cf.	Bottle Gourd	2	0.02
	Cucurbita maxima	Zapallo	51	0.44
	Cucurbita maxima cf.	Zapallo	1	0.01
Cyperaceae	Cyperaceae	Sedge Family	8	0.07
Erythroxylaceae	*Erythroxylum coca*	Coca	2	0.02
Fabaceae	*Arachis hypogaea*	Peanut	48	0.41
	Desmodium sp.		6	0.05
	Fabaceae	Bean Family	29	0.25
	Fabaceae cf.	Bean Family cf.	1	0.01
	Phaseolus vulgaris	Bean	422	3.61
	Prosopis sp.	Algarrobo	47	0.40
	Prosopis sp. cf	Algarrobo cf.	17	0.15
Malvaceae	*Gossypium barbadense*	Cotton	73	0.62
	Gossypium barbadense cf.	Cotton	6	0.05
	Malvastrum sp.		53	0.45
	Malvastrum sp. cf		5	0.04
Oxalidaceae	*Oxalis* sp.		1	0.01
Papaveraceae	*Papaver* sp. cf.	Poppy Family cf.	1	0.01
Poaceae	*Zea mays*	Maize	1,021	8.73
	Zea mays cf.	Maize	7	0.06
	Cenchrus sp.		2	0.02
	Poaceae	Grass Family	21	0.18
Portulacaceae	*Portulaca* sp.		271	2.32
Solanaceae	*Capsicum* sp.	Ají	172	1.47
	Capsicum sp. cf	Ají	1	0.01
	Physalis peruviana	Aguaymanto	32	0.27
	Physalis peruviana cf.	Aguaymanto cf.	1	0.01
Verbenaceae	*Verbena* sp.		33	0.28
Violaceae	*Viola* sp.		1	0.01
	Viola sp. cf.		10	0.09
Zygophyllaceae	*Fagonia chilensis*		4	0.03
UID			492	4.21
UID Seed			136	1.16
Unidentifiable			169	1.44

Table 4.2 Starch Grains Identified from Groundstone Artifacts from Cerro Baúl

Sample Number	Specimen #	Unit	Recincto	Capa	Cuad	Rasgo	Material	Identification	Measurement L x W (Microns)
1	CB01-2316-1	7	F	C	61	1	Lithic (grinder)	*Zea mays*	13 x 13
									18.2 x 18.2
									16.9 x 15.6
									18.2 x 18.2
2	CB01-2338-3	7	G	C	32	3	Lithic (mano)	*Zea mays*	15.6 x 15.6
									15.6 x 15.6
									13 x 13
									13 x 11.7
									18.2 x 15.6
									18.2 x 18.6
								Manihot esculenta	18.2 x 15.6
3	CB02-09-1169	9	G	C	146	3	Lithic (mano)	*Zea mays*	18.2 x 18.2
									15.6 x 15.6
									15.6 x 15.6
									15.6 x 13
									18.2 x 18.2
									13 x 10.4
								Panicoideae	20.8 x 13
								Pooideae	46.6 x 18.2
4	CB02-09-1203	9	F	D	216	8	Lithic (batán)	*Zea mays*	20.8 x 20.8
									18.2 x 18.2
									18.2 x 16.9
									20.8 x 20.8
5	CB02-26-0773	26	A-1	G	4		Lithic (mano)	*Canna* sp.	101 x 59.8
								Zea mays	20.8 x 20.8
									18.2 x 18.2
									19.5 x 19.5
									16.9 x 15.6
								Pooideae	72 x 20.8

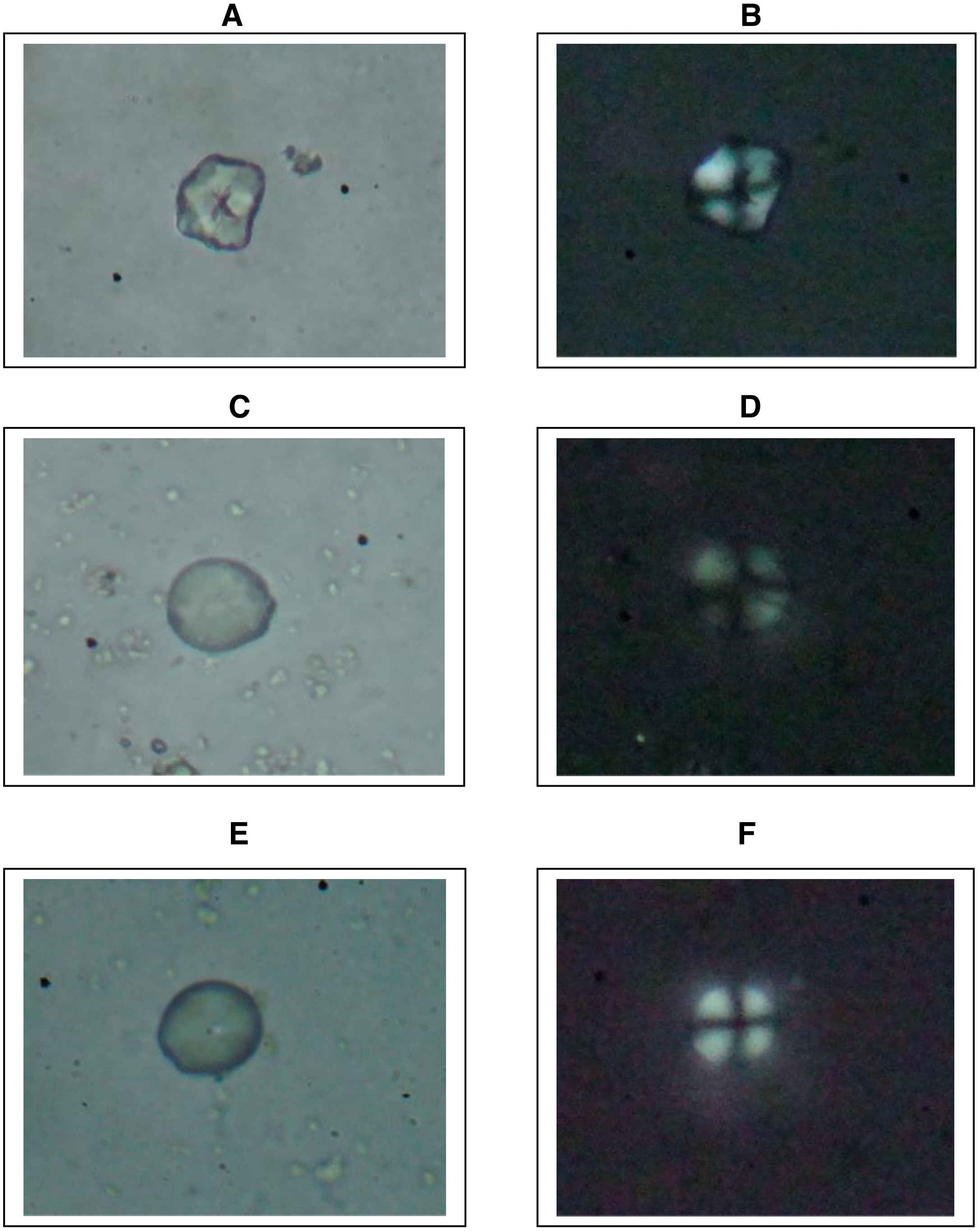

Figure 4.2 Photos of Starch Grains Identified from Groundstone Artifacts from Cerro Baúl (A) polyhedral shaped *Zea mays* starch grain, measuring 18.2 X 18.2 microns. Image captured with a single-light microscope at 400X magnification. (B) The previous starch grain seen under polarized light at 400X magnification. (C) Spherical shaped *Zea mays* starch grain, measuring 18.2 X 18.2 microns, captured with a single-light microscope at 400X magnification. (D) The previous starch grain seen under polarized light at 400X magnification. (E) Yuca starch grain, measuring 18.2 X 15.6 microns. Image taken with single-light at 400X, (F) The previous starch grain with polarized-light at 400X magnification.

Yahuay Alta

A total of 66 soil samples were analyzed from which a total of 1,429 identified seeds were recovered and identified from eight excavation units at Yahuay Alta (Table 4.3). In addition to those remains recovered via soil samples, plant remains that were hand-collected from the excavation screen were also analyzed and identified (see Table 4.4). A total of five microbotanical samples for starch grains and phytoliths were taken from *manos* (see Table 4.5). It is interesting that maize starch grains were found on groundstone artifacts at Yahuay Alta (see Figure 4.3), yet no macrobotanical remains of maize were recovered.[7]

Table 4.3 Plants Recovered from Soil Samples from Yahuay Alta

Wood Weight (g)	**25.58**			
Total Flot Samples	**66**			
Total Liters	**77**			
Total Plants Recovered	**1,429**			
Family	**Taxon**	**Common Name**	**Count**	**Density**
Anacardiaceae	*Schinus molle*	Molle	1,127	14.636
Asteraceae	*Bidens* sp.	Spanish Needles	2	0.026
Apiaceae	*Arracacia xanthorrhiza* cf.	Arracacha cf.	11	0.143
Cactaceae	*Echinopsis* sp.	Cactus	13	0.169
Chenopodiaceae	*Chenopodium quinoa*	Quinoa	86	1.117
	Suaeda sp.		2	0.026
Fabaceae	*Cassia* sp.		13	0.169
Malvaceae	*Gossypium barbadense*	Cotton	2	0.026
	Malva sp.		29	0.377
Nyctaginaceae	*Boerhaavia* sp.		1	0.013
Poaceae	*Bromus* sp.		9	0.117
	Poaceae cf.	Grass Family cf.	12	0.156
Portulacaceae	*Portulaca* sp.	Purslane	49	0.636
Salicaceae	*Salix* sp.		2	0.026
Verbenaceae	*Verbena* sp.		2	0.026
Zygophyllaceae	*Fagonia chilensis*		92	1.195
UID			800	
Unidentifiable			173	

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[7] It is possible that the maize identified on the Yahuay Alta groundstone is a result of sample contamination. Further microbotanical work is necessary to elucidate the nature of maize use at Yahuay Alta.

Table 4.4 Botanic Remains Recovered by Hand During Excavations at Yahuay Alta

Wood Weight (g)	**55.41**		
Total Plants Recovered	**197823**		
Family	**Taxon**	**Common Name**	**Count**
Anacardiaceae	*Schinus molle*	Molle	197,202
Annonaceae	*Annona* sp. *cf.*	Cherimoya cf.	1
Cucurbitaceae	*Cucurbita maxima*	Zapallo	60
	Cucurbita sp.	Squash	219
	Lagenaria sp.	Bottle Gourd	175
Cyperaceae	*Cyperus* sp.	Sedge Family	1
Malvaceae	*Gossypium* sp.	Cotton	2
Fabaceae	*Arachis hypogaea*	Peanut	160
	Prosopis sp.	Algarrobo	2
Unidentifiable			1

Table 4.5 Starch Grains Recovered from Groundstone Artifacts from Yahuay Alta

Sample Number	Specimen #	Sector	Recincto	Unidad	Capa	Quadricula	Rasgo	Material	Identification	Measurement L x W (Microns)
1	YA06-2-07-012-002	B	B	7	12	3		Lithic (mano)	Pooideae	59.8 x 15.6
										26 x 10.4
									Solanum tuberosum	31.2 x 26
										20.8 x 15.6
									Zea mays	20.8 x 18.2
										18.2 x 18.2
2	YA06-2-03-110-009	E	B	3	110	B	22	Lithic (mano)	*Solanum tuberosum*	23.4 x 22.1
										23.4 x 23.4
										31.2 x 31.2
										18.8 x 13
									Zea mays	23.4 x 18.2
										20.8 x 13
									No Identification	15.6 x 13
3	YA06-2-08-32-011	A	A	8	C	32	26	Lithic (mano)	*Zea mays*	18.2 x 13
										18.2 x 13
										23.4 x 18.2
										18.2 x 15.6
									Cucurbita ficifolia	18.2 x 13
4	YA06-2-08-007-011	A	C	8	B	7	5	Lithic (mano)	*Solanum tuberosum*	46.8 x 28.6
									Zea mays	20.8 x 15.6
5	YA06-2-08-036-012	A	A	8	C	36	5	Lithic (mano)	*Solanum tuberosum*	15.6 x 15.6
									Zea mays	18.8 x 15.6
										15.6 x 15.6
										18.2 x 16.9
										16.9 x 15.6
										15.6 x 15.6
										13 x 13
										13 x 10.4
										13 x 10.4

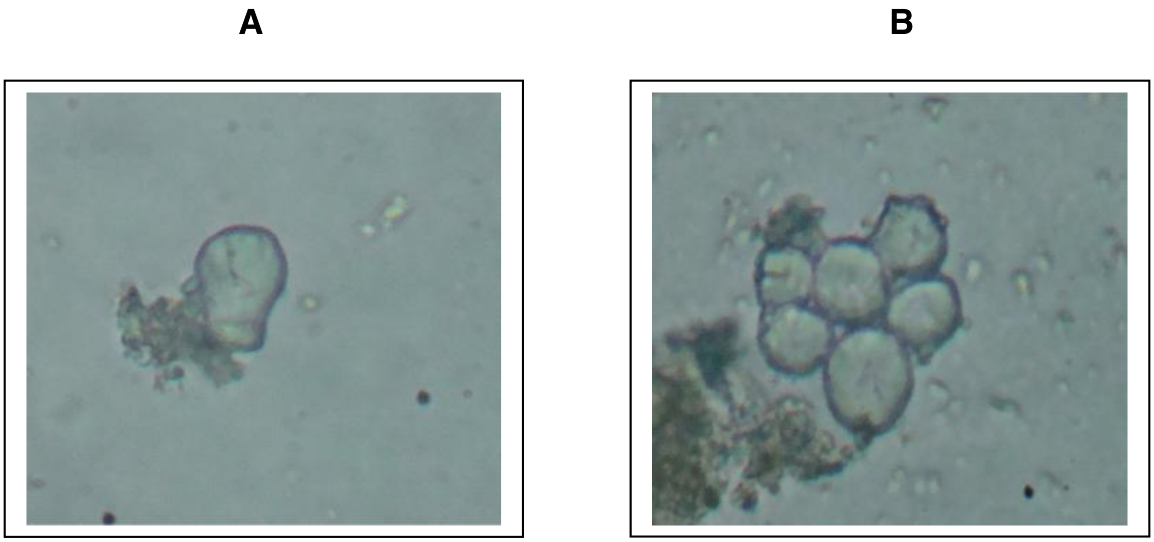

Figure 4.3 Starch Grains Identified from Groundstone Artifacts from Yahuay Alta
(A) Starch grain of *Cucurbita ficifolia* "chiclayo", measuring 18.2 X 13 microns. Image captured with a single-light microscope at 400X magnification. (B) Starch grains of *Zea mays*, grouped in a polyhedral shape, measuring 15.6 X 10.4 microns. Image captured with a single-light microscope at 400X magnification.

Quilcapampa

76 soil samples, resulting in 405 L of soil, from Quilcapampa were analyzed. In total, approximately 1,448,776 seeds were recovered (Table 4.6). A large amount of molle was recovered from excavated contexts (n=1,400,361). The next most numerous plants include quinoa (n=25,186), maize (n=141,848), and ají (n=2,111). Compared the to the other sites, a large range of fruit remains, including lucuma (n=295), aguaymanto (*Physalis peruviana*) (n=176), cactus seeds (n=106), and possible wild cherry (*Prunus* sp. cf.) (n=7) were recovered. 10 microbotanical soil samples from ceramic sherds were collected (Table 4.7). Maize, potato, and sweet potato starch grains were identified from the ceramics (Figure 4.4).

Table 4.6 Plants Recovered from Quilcapampa

Wood Weight (g)	**154.62**			
Number of Samples	**76**			
Total Liters of Soil	**405**			
Total Plant Count	**1,448,776**			
Family	**Taxon**	**Common Name**	**Count**	**Density**
Amaranthaceae	*Chenopodium quinoa*	Quinoa	25,186	62.19
	Chenopodium quinoa cf.	Quinoa	5	0.01
	Chenopodium/Amaranthus sp.	Quinoa/Kiwicha	17	0.04
	Amaranthus sp.	Kiwicha	338	0.83
Anacardiaceae	*Schinus molle*	Molle	1,400,361	3457.68
	Schinus molle cf.	Molle cf.	4	0.01
Cactaceae	*Echinopsis* sp.	Cactus	61	0.15
	Echinocereus sp.	Cactus	23	0.06
	Cactaceae	Cactus Family	22	0.05
Cannaceae	*Canna indica*	Achira	10	0.02
Cucurbitaceae	*Lagenaria* sp.	Bottle Gourd	218	0.54
	Lagenaria sp. cf.	Bottle Gourd cf.	26	0.06
	Cucurbita maxima	Zapallo	12	0.03
	Cucurbitaceae	Squash Family	65	0.16
	Cucurbitaceae cf.	Squash/Gourd cf.	13	0.03
Cyperaceae	Cyperaceae	Sedge Family	9	0.02
Erythroxylaceae	*Eyrthroxylum coca*	Coca	8	0.02
	Eyrthroxylum coca cf.	Coca	141	0.35
Fabaceae	*Inga feuillei*	Pacay	1,326	3.27
	Inga feuillei cf.	Pacay	105	0.26
	Anandenanthera colubrina	Vilca	16	0.04
	Fabaceae	Bean Family	202	0.50
	Fabaceae cf	Bean Family	6	0.01
	Phaseolus vulgaris	Common Bean	351	0.87
	Arachis hypogaea	Peanut	349	0.86
	Arachis hypogaea cf.	Peanut	8	0.02
Malvaceae	*Gossypium barbadense*	Cotton	181	0.45
	Gossypium barbadense cf.	Cotton Seed cf.	4	0.01
Rosaceae	*Prunus* sp. cf.	Wild Plum/Cherry cf.	7	0.02
Sapotaceae	*Pouteria lucuma*	Lucuma	295	0.73
	Pouteria lucuma cf	Lucuma cf.	83	0.20
Solanaceae	*Solanum tuberosum*	Potato	369	0.91
	Solanum tuberosum cf.	Potato cf.	263	0.65
	Capsicum sp.	Ají	2,111	5.21
	Capsicum sp. cf.	Ají cf.	7	0.02
	Physalis peruviana	Aguaymanto	176	0.43
Poaceae	Poaceae	Grass Family	31	0.08
	Zea mays	Maize	14,848	36.66
	Zea mays cf.	Maize	184	0.45
UID			729	
UID Seed			488	
Unidentifiable			118	

Table 4.7 Starch Grains Identified from Groundstone Artifacts from Quilcapampa

Sample #	Sector	Unit	N de EA	Quadrant	Locus	Material	Identification	Measurement L x W (Microns)
1	A	21	25		2021	Ceramic	*Solanum tuberosum*	20.8 x 15.6
								26 x 23.4
							Zea mays	13 x 13
								20.8 x 18
								18.2 x 15.6
2	A	25	29	M	2414	Ceramic	*Zea mays*	20.8 x 20.8
								15.6 x 13
								18.2 x 15.6
							Solanum tuberosum	26 x 26
								19.5 x 15.6
								13 x 10.4
3	A	21	25		2022	Ceramic	*Solanum tuberosum*	23.4 x 13
								18.2 x 15.6
								19.5 x 18.2
								20.8 x 15.6
								23.4 x 15.6
								33.8 x 20.8
								23.4 x 15.6
							Zea mays	15.6 x 15.6
								19.5 x 18.2
								18.2 x 15.6
4	A	22	26	A2	2115	Ceramic	*Zea mays*	18.2 x 13
								13 x 11.7
								18.2 x 15.6
								13 x 13
								20.8 x 15.6
5	A	21	25		2022	Ceramic	*Solanum tuberosum*	23.4 x 15.6
								23.4 x 20.8
								54.6 x 33.8
							Zea mays	18.2 x 18.2
								19.5 x 18.2
								13 x 10.4
								13 x 13
6	A	21	25		2021	Ceramic	*Solanum tuberosum*	53 x 28.6
							Zea mays	23.4 x 18.2
								13 x 13
								18.2 x 15.6
7	A	21	25		2021	Ceramic	*Zea mays*	18.2 x 16.9
								13 x 10.4
								18.2 x 18.2
								18.2 x 18.2
								13 x 13
								23.4 x 18.2
								18.2 x 15.6
								15.6 x 15.6
								18.2 x 15.6
								18.2 x 15.6
								18.2 x 15.6
								18.2 x 18.2
							Ipomoea batatas	15.6 x 13
							Solanum tuberosum	33.8 x 23.4
								33.8 x 20.8
								36.4 x 20.8
								20.8 x 15.6
8	A	21	25		2022	Ceramic	*Zea mays*	15.6 x 15.6
								18.2 x 18.2
								15.6 x 15.6
								13 x 13
							Solanum tuberosum	20.8 x 15.6
								20.8 x 19.5
								41.6 x 28.6
9	A	21	25		2024	Ceramic	*Solanum tuberosum*	15.6 x 14.3
								23.4 x 14.3
								22.1 x 16.9
								13 x 13
								23.4 x 14.3
								20.8 x 15.6
								15.6 x 13
								28.6 x 15.6
								36.4 x 23.4
								23.4 x 18.2
								37 x 26
								33.8 x 18.2
								31.2 x 20.8
								46.3 x 36.4
							Zea mays	13 x 13
10	A	25	29	J	2414	Ceramic	*Zea mays*	13 x 13
								15.6 x 13
								20.8 x 18.2
								23.4 x 20.8
								18.2 x 15.6
								20.8 x 15.6

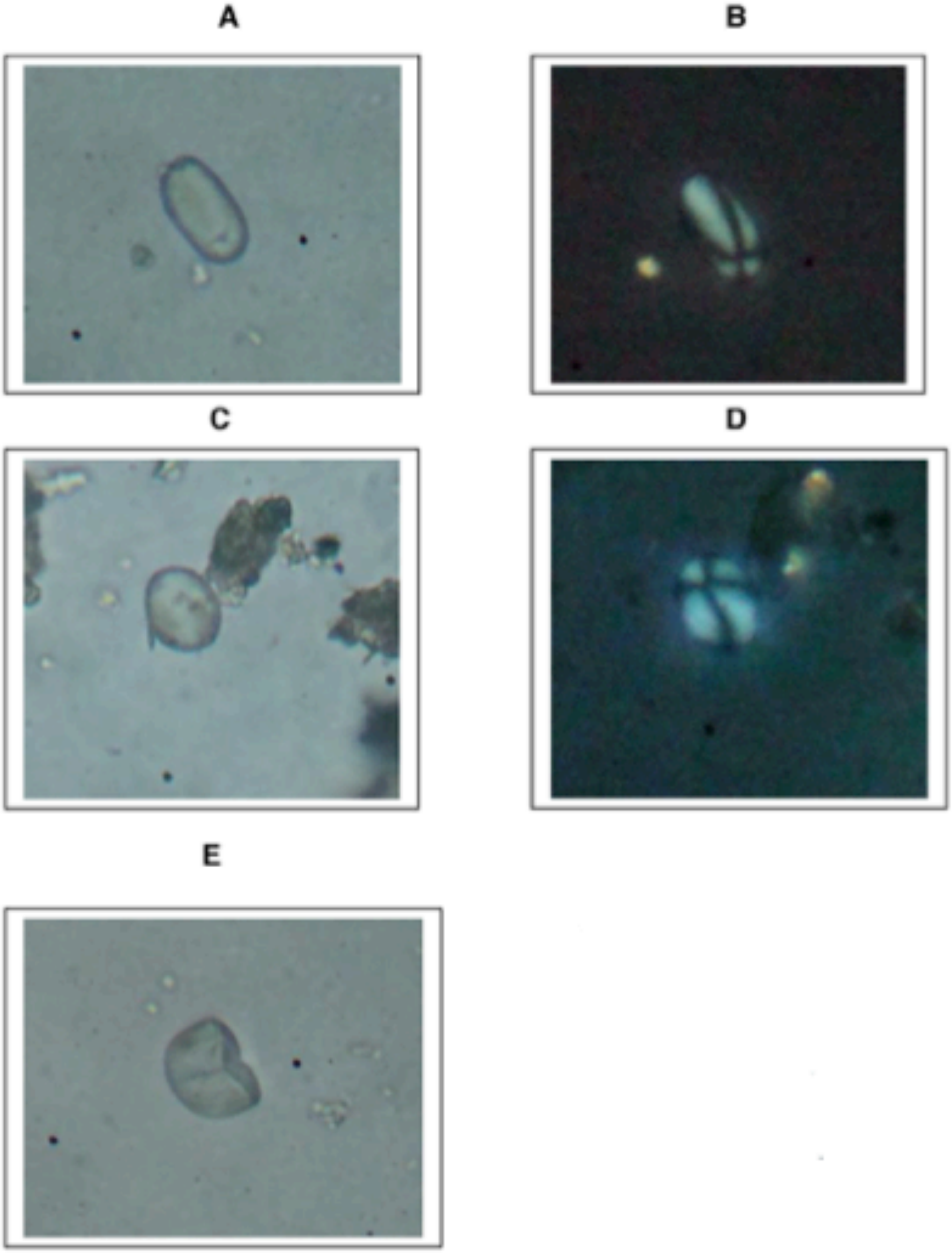

Figure 4.4 Starch Grains Identified from Ceramic Artifacts from Quilcapampa
(A) Starch grain of potato, measuring 23.4 X 13 microns. Image captured with a single-light microscope at 400X magnification. (B) The previous potato starch grain seen under polarized light at 400X magnification. (C) Starch grain of potato, measuring 18.2 X 15.6 microns wide, capture taken with a single light microscope at 400X, (D) The previous potato starch grain seen under polarized light at 400X magnification. (E) sweet potato starch grains measured at 15.6 X 13 microns

In addition, five human coprolites excavated on floor contexts from Sector A were scanned for seed remains (Figure 4.5). Maize kernels, ají, quinoa, as well as *Cereus* sp. and *Echinocereus* sp. cactus seeds., were recovered. Cactus seeds, especially uncarbonized seeds, have been interpreted as accidentally entering the archaeological record in the Andes accidentally through bioturbation, animal dung used as fuel, or windblown into sites (e.g., A. Mayer et al. 2016:51). The presence of cactus seeds in human coprolites provides support that the cactus seeds recovered at Quilcapampa represent subsistence practices rather than accidental inclusions.

Figure 4.5 Fragment of human coprolite recovered from Quilcapampa

Hatun Cotuyoc

A total of 109 plant remains were recovered from 480 liters of soil in 48 flotation samples collected from Hatun Cotuyoc (see Table 4.8). This site had the fewest plant remains recovered of the four sites, likely due to preservation issues as a result of greater rainfall and damp conditions characteristic of the Cusco region. Eight taxa were identified at least to the genus level. Maize had the highest density (.052), followed by quinoa (.046), molle (.035), and quinoa/kiwicha (.021). No microbotanical analysis was conducted at Hatun Cotuyoc.

Table 4.8 Plants Recovered from Hatun Cotuyoc

Wood Weight (g)	31.88			
Total Flot Samples	48			
Total Liters of Soil	480			
Total Plants Recovered	109			
Family	**Taxon**	**Common Name**	**Count**	**Density**
Amaranthaceae	*Chenopodium quinoa*	Quinoa	22	0.046
	Chenopodium/Amaranthus	Quinoa/Kiwicha	10	0.021
Anacardiaceae	*Schinus molle*	Molle	17	0.035
Asteraceae	*Bidens* sp.	Spanish Needles	1	0.002
Cactaceae	*Echinopsis* sp.	Cactus	1	0.002
Cyperaceae	*Cyprus* sp.	Sedge	6	0.013
Fabaceae	*Phaseolus vulgaris*	Common Bean	2	0.004
Poaceae	*Zea mays*	Maize	25	0.052
	Poaceae	Grass Family	6	0.013
	Poaceae cf.	Grass Family cf.	1	0.002
Solanaceae	*Capsicum* sp.	Ají	1	0.002
UID			1	0.002
UID Seed			16	0.033

Ethnobotanical and Ecological Description of Recovered Plant Taxa

A total of 1,463,667 identified carbonized macrobotanical remains, identified at least to the family level, were recovered from all four sites. Moreover, identified starch grains from artifacts reveal the presence of additional plant taxa not present in the macrobotanical assemblage. For example, potato starch grains were identified from groundstones at Yahuay Alta and yuca from Cerro Baúl, but macrobotanical remains from these taxa were not recovered. The residents of the various sites had access to a range of plant categories, including field cultigens, fruits, and other gathered or tended plants, as well as plants for fodder or fuel. Most of the wild plants, such as purslane (*Portulaca* sp.), were not able to be identified to the species level, so the family classification was used to discuss general uses for plants belonging to those families in the Andes.

In the discussion that follows, I provide general descriptions of the macrobotanical remains recovered from the assemblages, including information on environmental requirements, local and imported resources, as well as food and non-food uses for the plants. I used scientific and common names in English, Spanish, Quechua, and/or Aymara for the recovered taxa, consulting the vocabulary used in Brack Egg's (1999) *Diccionario Enciclopédico de Las Plantas Útiles del Perú* and Margaret Towle's (2007) *The Ethnobotany of Pre-Columbian Peru.* The common names of the plants of Peru are quite variable, so the most frequently used terms for the regions in which the work was conducted were used.

Field Cultigens

Maize

There is perhaps no other plant species that has received more attention than maize in archaeological and ethnobotanical literature of the Americas, the Andes being no exception. Domesticated in Mexico by approximately 6,700 B.C. (Piperno et al. 2009), maize made it to the northern Andes of Columbia before 6,000 B.C. and to coastal Ecuador by approximately 5,000 B.C. (Pearsall 2008). Early dates for maize in northern Peru come from the Norte

Chico region, dating from 3,000 – 1800 B.C. (Haas et al. 2013), and from the site of Caral, dating to 2300 – 2200 B.C.) (Shady Solis 2006). Further south, some of the earliest maize recovered in the southern Peruvian Andes comes from the preceramic site of Waynuna (2000–1600 B.C.) (Perry et al. 2006). Archaeological excavations have revealed that maize agriculture was practiced on the coast by the Initial Period (1800-800 B.C.) and Early Horizon (800-400 B.C.) (Pearsall 2008). The practice likely spread to the coast in Moquegua ~920-520 B.C. as evidenced at the sites of El Algodonal and Loreto Viejo (Owen 2009:137) and the highlands of the south-central Peruvian Andes by approximately 800 B.C. (see Chávez and Thompson 2006; Logan et al. 2012). The later dates for the spread of maize into the highlands has to do with the more extreme environment of the highlands, the lack of water, and the necessity for canal and terracing systems (Denevan 2001; Logan et al. 2012). As mentioned in Chapter III, terraced agriculture in the south-central Andes, most notably in the Cusco and Colca areas, raised the growing altitude for maize, allowing for the cultivation of many varieties of the grain from between 0-3,300 masl (Brack Egg 1999; Denevan 2001).

Maize has long occupied a central role in pan-Andean identity (Moore 1989). Early chroniclers (e.g., Guaman Poma de Ayala 1980[1615]) of Peru attest to the central role maize played in the Inca Empire. *Chicha* made from maize was used in a variety of state-sponsored Inca rituals (see Cobo 1990), reciprocal labor exchange (Morris 1979; Valdez 2006), and as offerings to the dead (Guaman Poma de Ayala 1980[1615]) (see Figure 4.6). Representations of maize stalks are also present on pre-Inca ceramics. For example, maize is represented on a variety of Wari ceramics and is seen in association with the Wari Staff God (Glowacki 2012: 144-146; Menzel 1964:26), perhaps signaling the importance of maize chicha in the Wari Empire as well (Valdez 2006). Beyond chicha, maize was integral in a variety of Inca stews and other dishes (Cobo 1990:198-199).

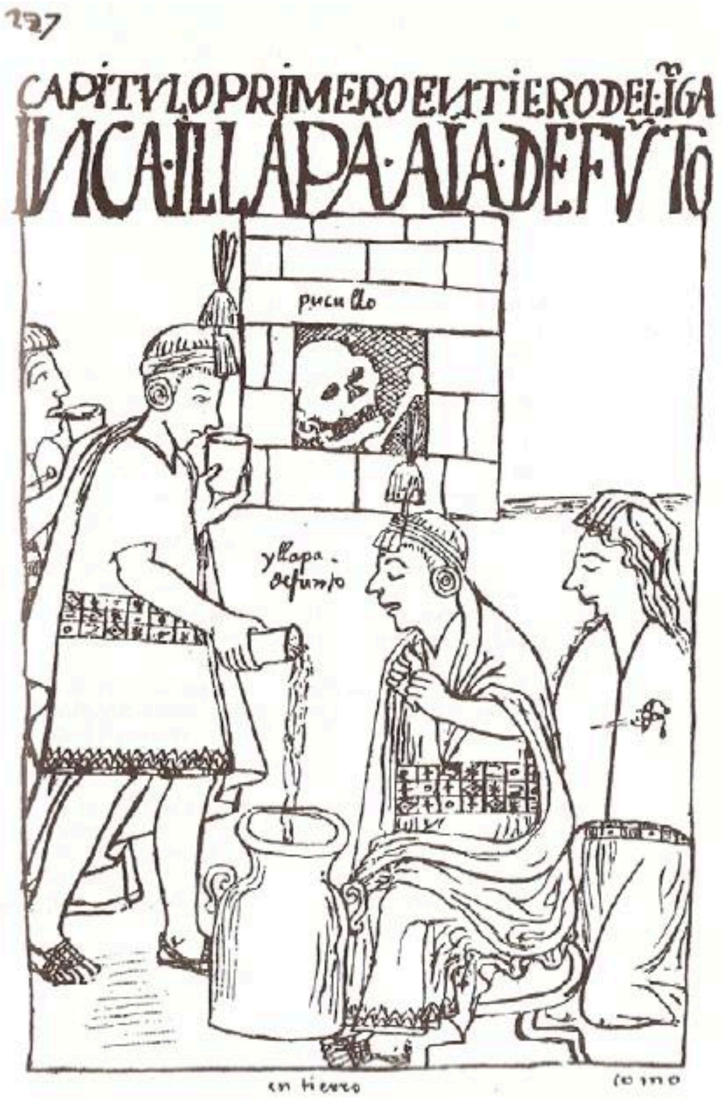

Figure 4.6 Chicha offered to the dead (Guaman Poma de Ayala 1980[1615]:262)

Quinoa

There are several species of chenopods native to Peru, the most economically important of which are quinoa and cañihua (Bruno and Whitehead 2003; Towle 2007:36). These species are early colonizers of disturbed areas and are often referred to as ecologically weedy. Research suggests they were domesticated around 3,500 years ago in the south-central Andes (Bruno 2006, 2008; Bruno and Whitehead 2003; Fritz et al. 2017; Langlie et al. 2011; Pearsall 1992). Evidence from the early Formative Chiripa site indicates low-level cultivation of *Chenopodium quinoa* alongside *quinoa negra* (*C. quinoa* var. *melanospermum* Hunziker) (Bruno and Whitehead 2003). The typical growing period for quinoa is between 90 and 200 days (Brack Egg 1999: 132) and can grow from the coast up to 4,000 masl. The seeds can be used to thicken soups and ground to make *chicha* or flour (Towle 2007:36). The alkaline ash from burned quinoa may also serve as a catalyst to activate the alkaloids when chewing coca leaves (Bruno 2008).

Chili Pepper

The chili pepper (known in the Andes by many names including *uchu*, *ají*, and/or *rocoto*) was independently domesticated in a range of environments including Mexico, highland Bolivia, the Amazon, the Caribbean, and other locals, and has a long history of cultivation and use in the central Andes. Ají peppers tend to grow best from 0-1500 masl but can be grown up to approximately 2,000 masl. Ají was domesticated by approximately 4,000 B.C. (Dillehay et al. 2012; Perry et al. 2007; Zarillo et al. 2008) and is comprised of five species, including *C. annum, C. chinense, C. frutescens, C. pubescens,* and *C. baccatum* (Chiou et al. 2014; Towle 2007:81-82). The earliest archaeological presence of chili peppers in Peru appears by at least 4,000 B.C. at the sites in the Chillón Valley (Cohen 1978) on the Peruvian Central Coast, and Huaca Prieta in the Chicama Valley as well as the sites of Waynuna in Arequipa (Perry et al. 2006; Perry et al. 2007). The peppers range in terms of size, color, shape, and intensity of heat, and today they are used as a condiment and an essential cooking ingredient in many dishes.

Peanut

The peanut, *maní* in Spanish or *inchis* in Quechua, is believed to have been domesticated in the tropical lowlands east of the Andes in the area between southeastern Bolivia, northwestern Argentina, northern Paraguay, and western Brazil, where several wild species exist today (Piperno and Pearsall 1998; Pozorski 1979; Towle 2007:43). This legume is an annual food crop that was adopted in coastal areas of Peru around ca. 6,000 B.C. based on AMS dates on macrobotanical peanut remains recovered from preceramic sites in the Ñanchoc Valley (see Dillehay et al. 2007; Piperno and Dillehay 2008). The timing of peanut domestication corresponds to the adoption of maize in coastal Peru. Peanuts can be prepared in a variety of ways, including roasting, boiling, and ground as an ingredient in soups, stews, or drinks such as *chicha* (e.g., Cutler and Cárdenas 1947; Fernández and Rodriguez 2007:107; Valdez 2006). The hull (or shell) of the peanut is most often recovered archaeologically, as the legume itself is most often consumed.

Potato

The potato (*papa* in Quechua) is an iconic food of the Andean highlands but can be grown from the coast up to around 4,000 masl. There is an immense diversity within *Solanum* leading to thousands of landraces of potato, each with a different color, texture, size, flavor, use, and storage quality. Domestication and cultivation of potato plants occurred by approximately 7,000 years ago in highland regions of Ecuador, Peru, and Bolivia (Pearsall

2008). Potato remains have been recovered from preceramic sites in the Casma Valley dating to approximately 2000 B.C. (Ugnet et al. 1982). Traditionally, potatoes are served boiled or roasted with or without the skin, cooked in an earth oven (*pachamanca*), or made into *chuño,* a freeze-dried form of potato made by leaving the tubers outside during freezing temperatures at night which can be stored for years (see Brush et al. 1981; Bruno 2008). Today, potatoes are a commonly consumed food and are included in soups, stews, or as a side.

Common Bean

The common bean is a climbing annual vine with oblong pods that produce 4-6 seeds. Current research proposes that the common bean was domesticated independently in both Mesoamerica and the Andes (Bitocchi et al 2013; Chacón et al. 2005). Indeed, wild forms of *Phaseolus* are distributed over a wide area ranging from northern Mexico to northwestern Argentina, in dry regions at altitudes ranging from 500 to 2000 masl. Domesticated *Phaseolus* varieties tolerate numerous environmental conditions in tropical and temperate zones and germinate rapidly in temperatures above 18°C (Brack Egg 1999:383). Beans are well known for their nitrogen-fixing properties and are often planted alongside maize, which depletes soils of nitrogen after successive planting episodes. In addition, beans are high in protein and represents a nutritional complement to maize, the latter of which is deficient in amino acids lysine and isoleucine, which beans have in abundance; a consumption ratio of 70% maize to 30% bean provides the appropriate mix of amino acids for a complete protein (see Mt. Pleasant 2016).

Beans were a staple in coastal regions during the Preceramic (6000 to 4200 B.C.) in Peru (Hastorf 1999:45-51) and became widespread by the Initial Period (1800 – 1000 B.C.). On the north coast of Peru, the remains of common bean have been recovered from Huaca Prieta in the Chicama Valley (Bird and Hyslop 1985:233), the Initial Period Gramalote site (Pozorski 1976:97) and Early Intermediate Period sites (Bardolph 2017) in the Moche Valley, as well as from Guitarrero Cave, Callejón de Huaylas, Ancash (~6,000 B.C.) (Kaplan et al. 1973), and Ayacucho Caves, Ayacucho (~4,000-3,000 B.C.) (MacNeish et al. 1980). Beans were commonly grown in the coast and middle valleys of Peru by the Middle Horizon and have been recovered from many Wari sites (see Anders 1986; Biwer 2018; Biwer and Nash 2017; Moseley et al 2005; Sayre and Whitehead 2017; Skidmore 2014).

Squash

There are approximately 20 New World species of squash (*Cucurbita* spp.) which grow well in temperate environments but require good soil fertility (Brack Egg 1999:166). Within the *Cucurbita* genus, three food species were present in prehispanic Peru, including *C. maxima*, *C. moschata*, and *C. ficifolia* (Towle 2007:89-92; Pearsall 2008:108). *Cucurbita maxima* (zapallo) is an annual vine native to South America (east of the Andes) in Lowland Bolivia and Argentina that produces large round, oblong, or turban-shaped fruits with thing ovate-ellipsoid white seeds and orange flesh (Towle 2007:90). *Cucurbita ficifolia* flesh is white, and seed color ranges from black to brown. *Cucurbita ficifolia* are a cold-tolerate oblong-to globular-shaped squash of variable size cultivated from Mexico to Chile (Towle 2007:89), though its origin is thought to be South American. Archaeological remains of *Cucurbita ficifolia* have been recovered from preceramic levels at Huaca Prieta (Whitaker and Bird 1949). *Cucurbita moschata* is oblong or crooked-neck shaped with plump, ovate to elliptical, seeds (Towle 2007:91). *Cucurbita moschata,* likely domesticated in Mesoamerica, is perhaps the most widely distributed variety ranging archaeologically from sites in the southwestern United States to Peru with early evidence for use in the Ñanchoc Valley of Peru dating to approximately 7,200 B.C. (Dillehay et al. 2007; Piperno and Dillehay 2008). Although early uses for these species likely involved using the hard rinds as containers, the seeds are oily and edible, and the flesh of domesticated varieties is widely consumed roasted or boiled in soups and stews.

Bottle Gourd

The bottle gourd is not a New World native, but rather is believed to have an African origin as a result of squashes floating across the Atlantic to South America (see Kistler et al 2014). Bottle gourds are most often associated with use as a container, cup, tool, as a model for pottery vessels, or as a float for fishing nets (Yacovleff and Herrera 1935:314), though young (unhardened) gourd rind can be eaten along with the oily seeds (Pearsall 2008:108). In Peru, early evidence for domesticated gourd comes from levels dating to ~2200 B.C. at the preceramic site of Buena Vista in the Chillón Valley (Duncan et al. 2009) and from preceramic levels at Huaca Prieta (Bird and Hyslop 1985).

Cotton

Cotton was widely cultivated for its vegetal seed fiber, which was the source of raw material for many textiles (Dillehay et al. 2007; Pearsall 2008; Pozorski 1979). Cotton is generally found archaeologically in the form of bolls, seeds, raw fibers, and as thread in bags, clothing, and nets. In addition, the oil from the seed is edible, and medicinal concoctions can be made from different parts of the plant to treat hemorrhoids, cough, and wounds (Brack Egg 1999:226-227). Cotton is well suited to dry conditions and grows well in a variety of locations in tropical regions of South America (Brack Egg 1999:226; Pearsall 2008:108). Domesticated during the Preceramic Period in Peru around 4000 B.C., cotton is routinely found archaeologically at many early coastal sites such as those in the Ñanchoc Valley (Dillehay et al. 2007) and was available (through cultivation or trade) to most populations in Peru by the Middle Horizon (e.g., Bardolph 2016; Cook and Parrish 2005; Roque et al. 2003).

Coca

There is perhaps no other plant more important to daily and ritual life in the Andes than coca (see Allen 1988; Plowman 1984). In general, coca can be cultivated along areas of the Peruvian coast and in the high and low Amazon (Brack Egg 1999:201-202). Two species of cultivated coca, each of them with two varieties, exist in Peru: Huánuco or Bolivian coca (*Erythroxylum coca* var. *coca*), coca de Amazonia (*Erythroxylum coca* var. *ipadu*), Trujillo coca (*Erythroxylum novogrnatense* var. *truxillense*), and Columbian coca (*Erythroxylum novogrnatense* var. *novogrnatense*). The drought resistant Trujillo coca variety, likely stemming from Huánuco coca, is cultivated on the Western slopes of the Andes from 200–1,800 masl and represents the major source of commercial coca today (Pearsall 2008:109).

Coca was, and still is, an important part of daily life, economic exchange, and a key component of ritual and religious ceremonies in the Andes (see Allen 1988). There are ethnohistoric and ethnographic sources corroborating early Spanish accounts highlighting the central role of coca in the highlands (e.g., Abercrombie 1998:348; Allen 1988:21-22; Hyslop 1984:312; Murra 2002:359). It is a stimulant that can be used as a tea to combat altitude sickness, fatigue, and hunger, as well as provide relief from headaches and joint pain (see Brack Egg 1999:201; Mortimer 1901; Allen 1988). Coca is also commonly chewed by placing a few carefully folded leaves encircling a piece of *llipta,* a substance made from lime or quinoa stalk ash, in the mouth between the gums and cheek which activates the alkaloids to provide stimulation. Today, coca is distributed as a form of a gift for labor (Arnold 1993; E. Mayer 2002:178; Valdez 2012:77) and is used in divination and healing (Allen 1988:133). In the prehispanic past the use of coca may have been more restricted.

Archaeological evidence for coca in the central Andean highlands is rare. However, in contrast to the highlands there is better evidence for the use of coca on the coast during the Preceramic Period. For example, Dillehay et al. (2010) report evidence for coca chewing associated with lime production on mounds dating to ~6,050 B.C. in the Ñanchoc Valley, Peru. Evidence also comes from Initial Period (ca. 3600-800 B.C.) sites (see Cohen 1978; Moore 2014:136-44; Pearsall 2006:190; Quilter 2014:64). Coca is present at the Early Horizon (ca. 600-1 B.C.) site of Chavín de Huántar (Burger 1992:129). By the Middle Horizon, coca is commonly found in coastal and highland sites with good preservation, such as at Casa Vieja in the lower Ica Valley (Cook and Parrish 2005). Coca is also noted to have been cultivated in the coastal Moquegua Valley following the Middle Horizon (see Indriate and Buisktra 2001; Knudson and Buikstra 2007), but could have been cultivated during the period as well.

Fruits

Overall, fruits were not overly abundant within the archaeobotanical assemblages from the four sites. This is likely due to the small seeds of fruits often being consumed with the fruit (e.g., *Rubus* spp.); it is more common to recover other remains from fruits, including pods, stems, and other non-edible portions. Environmental differences between the valleys, discussed in Chapter III, may have also affected the dietary contribution of fruit at these sites. Nevertheless, the seeds of several cacti (*Armatocereus* sp., *Echinopsis* sp., *Echinocereus* sp., *Haageocereus* sp.) were recovered, though not evenly, from the analyzed sites.

While cacti grow naturally in the vicinity of these sites, the recovery of these cactus seeds are interpreted as evidence of human cultivation of cactus fruit as food; seeds from cacti are commonly recovered in archaeological sites in the Andes due to disturbances in the stratigraphic profile, such as bioturbation or plant root activity (e.g., A. Mayer et al. 2016). However, the recovery of cactus seeds from human coprolites at Quilcapampa suggests caution for such interpretations. While it is likely that many cactus seeds enter archaeological contexts via root activity, bioturbation, and other means, cactus fruit likely represented a valuable tended food source and should not be completely removed from considerations of human subsistence activities. Recovered tree fruits include lucuma (*Pouteria lucuma*), molle (*Schinus molle*), and pacay *(Inga feuillei*). These fruits, discussed below, still grow in Peru today and remain popular sources of food, medicine, dye, and beverages.

Lucuma

Lucuma is a domesticated tree fruit native to the Andes. The evergreen tree grows 8-10 meters tall and produces an ovate fruit with green skin, a sweet mealy orange flesh, and one or more hard seeds inside. The lucuma tree is often associated with the coastal regions of Peru but can be cultivated up to 3,000 masl (Brack Egg 1999:411). The tree is primarily cultivated for its fruit, which can either be eaten raw or dried and powered, though the hardwood can also be used for fuel, furniture, or building materials (Towle 2007:76). Lucuma possesses a range of medicinal properties and is used to treat anemia, infections, and diarrhea (Brack Egg 1999:411). Early remains of lucuma have been recovered from Late Archaic (3,000 – 1,800 cal B.C.) sites in the Norte Chico region (Haas et al. 2004) and preceramic contexts at El Paraíso (1800 to 1500 B.C.) (Quilter et al. 1991). Lucuma has been recovered from the Middle Horizon sites of Beringa (Coleman Goldstein 2010:136; Tung 2012:260) and Mina Primavera (Vaughn et al. 2007:18), among others.

Goldenberry/Aguaymanto

Goldenberry, also known as aguaymanto, is a member of the Solanaceae family. The bush is present from the *costa* to the Amazonian *selva* at a maximum altitude of approximately 1,500 masl (Brack Egg 1999:386). Aguaymanto grows to 1 m tall and produces small spherical fruits that are orange-yellow in color and contain many seeds. It is native to Peru, but today ranges from Venezuela to Chile. The fruit, rich in Vitamins A and C, can be eaten raw but has many other uses. Medicinal uses of aguaymanto include treating hemorrhoids, inflammation, and as an antiseptic; the unripe fruit can also be made into soap

(Brack Egg 1999:386-387). Today, it is common to find aguaymanto included as an ingredient in cakes and marmalade.

Cactus

There are some 40 genera and 240 species of cacti in Peru (Brack Egg 1999:88). Cacti represent an important source of fruit in the Andes, especially in extremely arid environments. Drought tolerant, these plants grow in most ecological zones throughout Peru. Cacti recovered from the study sites that would likely have been used as a food source include *Armatocereus* sp., *Echinocereus* sp., and *Haageocereus* sp., the fruits of which could have either been gathered wild or cultivated. However, seeds identified to the genus *Echinopsis* were only recovered from Quilcapampa samples. Perhaps the most well-known member of this genus is *Echinopsis pachanoi,* the San Pedro cactus, which is used to create a hallucinogenic substance with the same name (also called huachuma on the north coast of Peru) (Brack Egg 1999:503). It is not known at this time if the recovered *Echinopsis* sp. seeds are indeed from the San Pedro cactus, or if they represent another member of the genus such as *E. chalaensis* or *E. schoenii* (see Pauca and Quipuscoa 2017).

Tended Tree Crops

Algarrobo

Seeds recovered from two of the study sites are identified to the genus *Prosopis.* Beresford-Jones (et al. 2009:304) notes the great phenotypic plasticity of *Prosopis*, leading to taxonomic confusion; on the south coast of Peru huarango refers to *Prosopis* sp., yet huarango refers to *Acacia macracantha* on the Peruvian north coast (Beresford-Jones

2011:130; Brack Egg 1999:13). Although algarrobo has been used as a general term given by the Spanish for species that resemble the carob tree (*Ceratonia silique*), I use the term algarrobo in reference to *Prosopis* sp. as is common in Moquegua and other areas of the south-central Peruvian Andes.

Algarrobo has many uses. The wood is an excellent source of firewood and charcoal, the seeds are edible, and the pods can be used as livestock fodder (Towle 2007:56). The wood is commonly found in coastal Peruvian archaeological sites (see Cohen 1978; Towle 2007:56). Algarrobo was, and continues to be, an important part of the ecosystem on the central and south coasts of Peru. Interestingly, Beresford-Jones et al. (2009; see also Beresford-Jones 2011) show how gradual human-induced deforestation of riparian huarango forests in the lower Ica Valley (after the Early Intermediate Period) was directly tied to loss of soil fertility and erosion, eventually leaving the fragile desert ecosystem barren.

Pacay/Pacae

The range of the pacay tree includes the coast, highlands, and jungle at altitudes from 0–3000 masl (Brack Egg 1999:261). The tree, grown for its wood, shade, and nitrogen-fixing abilities, also produces long pods with seeds surrounded by a white, sweet pulp that is eaten raw (Towle 2007:47). The tree also has medicinal properties, including treatment for diarrhea, hemorrhoids, and as a digestive aid (Brack Egg 1999:261). Pacay was widely cultivated on the Peruvian coast by 2500 B.C. (Haas et al. 2004; Piperno and Pearsall 1998; Solis et al. 2001), and is present in many Middle Horizon sites, such as Casa Vieja (Cook and Parrish 2005), Beringa (Tung 2007), and sites located in the lower Ica Valley (Beresford-Jones et al. 2007).

Molle

Molle is native to the Andean Cordillera but is a highly invasive species that has since spread to Central America, Mexico, California, the Southwest and Southeast United States, as well and South Africa and Australia, as a result of human action. There are a number of uses for molle. The resin can be used as an insect repellent, either rubbed on the body or planted around agricultural fields to repel pests (Brack Egg 1999:450-451). The leaves contain a volatile oil that can be used as an antiseptic as well as a treatment for rheumatism and ulcers (Brack Egg 1999:450-451). Molle grows well in dry environments, making it an invaluable fuel and building material in areas where trees tend to be scarce. The leaves can also be processed to make a yellow dye (Brack Egg 1999:450-451; Yacovleff and Herrera 1935).

Significantly, molle drupes are an ingredient for making *chicha de molle,* an alcoholic beverage. There are various methods for making chicha de molle, but generally the molle drupes are processed either by soaking or boiling in water to remove sugars (Goldstein and Coleman 2004; Jennings and Valdez 2018; Valdez 2012) and then "squeezed out" (Kramer 1957:322). The result is a pepper-flavored liquid that is left out to ferment for several days (maize flour or other ingredients may be added) and later consumed fresh. The practice of soaking/boiling and squeezing molle results in a change in the form of the seed from a spherical to an oblong-lobed shape (e.g., Figure 4.7 [see also Biwer and VanDerwarker 2015; Goldstein et al. 2009; Sayre et al. 2012]) which I refer to here as *processed* molle; molle that exhibits evidence of the retention of resin and unchanged shape is referred to as *unprocessed*. Molle drupes processed in this manner have been recovered from various Wari and Wari-influenced sites in the provinces (see Green and Goldstein 2010; Goldstein et al. 2009; A. Mayer et al. 2016; Tung 2007) and in the Ayacucho heartland (see Sayre et al. 2012).

Figure 4.7 Processed Molle Recovered from Hatun Cotuyoc

Wild/Other Resources

A number of wild/miscellaneous taxa were identified in the assemblages from the study sites. These include weedy taxa, plants with various medicinal and economic uses, comestible plants, and species used as fodder or fuel (see Miller 1998; Miller and Smart 1984; Pearsall 1988). It is important to note that these categories are not mutually exclusive; many species included in the Wild/Other Resources classification have multiple uses. There are other taxa that may represent incidental additions to the archaeological record, as previously discussed, that were accidentally transported to the sites by animals, humans, or wind. Some species in this category could only be identified to the Family level (e.g., Poaceae) due to the numerous taxa within multiple genera and the difficulty in providing a more specific identification. In addition, different parts of these plants (e.g., leaves, roots, stems, seeds) have different uses.

A number of taxa in this category are edible or have edible parts. For example, the leaves of *Portulaca* sp. (purslane, *llutu-llutu* in Quechua) can be eaten raw, cooked in soups and stews, or made into condiments and drinks in the Andes (Brack Egg 1999:407) as well as North America (Medsger 1996; Scarry 2003). There are 6 genera and 26 species of *Portulaca* native to Peru (Brack Egg 1999:407). It is commonly found from the Costa to the Quechua zones, occurring along streams, canals, and in agricultural fields up to ~3,000 masl (Brack Egg 1999:407). Other comestible plants identified include *Amaranthus* sp., *Atriplex* sp., *Bidens* sp., *Malvastrum* sp., *Portulaca* sp., *Salix* sp., *Verbena* sp., and *Viola* sp.

Many of the species in this category are also considered field weeds. These include *Amaranthus* sp., *Boerhavia* sp., *Chenopodium* sp., *Fagonia chilensis*, *Malvastrum* sp., *Portulaca* sp., *Suaeda* sp., and *Verbena* sp., all of which are associated with agricultural ecology in canal-fed small holdings ranging from 1400 to 2500 masl. Although several of these species are useful, and are often tolerated in modern subsistence farming, they may also represent field-processing activities in archaeological contexts brought in as incidentals alongside field cultigens, or also perhaps inside camelid dung used for fuel (Pearsall 1988).

Several species, (*Amaranthus* sp., *Cenchrus* sp., *Chenopodium* sp., and *Portulaca* sp.), are also noted to be used as fodder for livestock (Brack Egg 1999). *Bidens* sp. is specifically mentioned as fodder for *cuy* (Brack Egg 1999:69). As previously discussed in this chapter, fodder is one vector through which seeds may be deposited into the archaeological record. This process is complicated, however, by the fact that species are sometimes used as both fodder for animals and food for humans (see Wright 2014; Pearsall 1988); uses of plants may change based on a number of factors, including environmental conditions, sociopolitical status, and the quality and quantity of the recent harvest.

Alongside the ability for many of these plants to be eaten, a number of medicinal uses are recorded for species in this category as well. For example, purslane is known to be a diuretic and an effective treatment for dysentery (Brack Egg 1999:407). *Boerhavia* spp. can be used as a diuretic and as a purgative (Brack Egg 1999:73) and *Verbena* spp. are used in the Andes to treat infections, bronchitis, and fever (Brack Egg 1999:520-521). *Amaranthus* sp. not only represents a food species, the leaves and seeds of which are edible, but also can be used as medicine to treat diarrhea, sore throat, cramps, and rashes (Brack Egg 1999:27).

One of the most interesting plants recovered, from Quilcapampa, is vilca (*Anandenanthera columbrina*). Vilca is a member of the Fabaceae family that produces a legume, the seeds of which are thin, brown, and orbicular. This tree grows from 3-27 m high at elevations up to 2700 masl ranging from the western slopes of the Peruvian Andes south to Paraguay, Bolivia, and northern Argentina (Reis Altschul 1964). Vilca is most notable for its use as a hallucinogenic and a purgative, due to the tryptamine alkaloids in the seeds (see Knobloch 2000; Torres 1995; Torres and Repke 1996). The seeds are ground and ingested as snuff, enema, or smoked to induce the hallucinogenic experience (see Bélisle 2019; Knobloch 2000; Torres and Repke 1996).

Vilca is present in Wari iconography as well as other Middle Horizon cultures. Patricia Knobloch (2000) identified the plant in Wari iconography as a seed pod with ovate shapes representing the seeds; this imagery is present on textiles, tunics, stone sculptures, and ceramics (see Knobloch 2000:392-396). Knobloch suggests vilca may have been added to *chicha* based on ethnographic accounts (see Isbell 1978:151-158; Quispe 1969:35-38). The presence of iconographic representations of *vilca* on Wari pottery recovered from Conchopata suggests a politico-religious role of *chicha* in Wari ritual, in which an authoritative priest would serve the *chicha* with a vilca additive (Knobloch 2000:400).

Quantitative Analysis: Comparing Patterns of Plant Use Within and Between the Sites

While the presence and range of plant remains at the sites are a useful starting point for considering the general ecological context of the study sites, these data provide little interpretive value for discussions of spatial patterning of plant use due to issues of preservation and recovery bias discussed earlier in this chapter. They can be transformed, however, into ratios and other quantitative measures that have more interpretive power.

Diversity/Richness

Considering the richness and evenness values for the four study sites, several patterns become clear (Table 4.9). There is some variation in terms of richness (H') between the Wari sites. Cerro Baúl (1.2) and Hatun Cotuyoc (2.05) have high richness values while Quilcapampa is comparatively lower (.18). This reveals that the Quilcapampa assemblage is more skewed in terms of taxonomic representation as compared to Cerro Baúl and Hatun Cotuyoc. While this could be the result of the large number of molle seeds recovered from Quilcapampa (n=1,400,361), when molle is removed from the calculation richness is only minimally reduced (.16); richness values drop for all sites when molle is removed. This pattern suggests that the richness (H') of the Cerro Baúl and Quilcapampa assemblages are low because the evenness (V') values are also low, as evenness is a component of richness. The richness of Hatun Cotuyoc, in contrast, is the highest of any of the sites. This is likely due to issues of preservation, though it is possible that residents of the site were cultivating and/or gathering a larger number of plants than their counterparts in Siguas and Moquegua.

Table 4.9 Shannon-Weaver Diversity and Evenness Values[8]

	H (Richness)		**V (Evenness)**	
Site	**Molle**	**No Molle**	**Molle**	**No Molle**
Cerro Baúl	1.2	0.99	0.13	0.12
Quilcapampa	0.18	0.16	0.05	0.04
Hatun Cotyuoc	2.05	1.74	0.54	0.2
Yahuay Alta	0.93	0.74	0.25	0.46

The Yahuay Alta botanic assemblage richness (H') (.93) is lower than that of Cerro Baúl (1.2) (Table 4.9); even when molle is removed the richness (H') value (.74) of the Yahuay Alta botanic assemblage is lower than Cerro Baúl (.99). Therefore, residents at Yahuay Alta likely practiced a dissimilar set of plant selection strategies as compared to their Wari neighbors at Cerro Baúl.

In terms of evenness, there appears to have been a similar distribution of plant taxa at Cerro Baúl and Quilcapampa (Table 4.9). Evenness values for the Cerro Baúl (.13) and Quilcapampa (.04) assemblages are similarly low. In contrast, Hatun Cotuyoc has a more even assemblage (.54). If we remove molle, however, the evenness of the Hatun Cotuyoc assemblage (.2) becomes comparable to Cerro Baúl (.12) and Quilcapampa (.04). I interpret this to suggest that Wari peoples did not evenly focus on different plants. Instead, Wari

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[8] Desiccated botanical remains were recovered from Cerro Baúl, Quilcapampa, and Yahuay Alta. Hatun Cotuyoc contained no desiccated remains.

residents focused more intensively on a select group of plant remains, most notably molle, maize, quinoa, ají, peanut, squash, and gourd.

Ubiquity Analysis

Ubiquity scores were calculated for each site and listed in descending order to evaluate differences in taxa presence. Ubiquity scores are presented for all recovered taxa except those that were not confirmed identifications (i.e., cf., UID, UID seed, Unidentifiable).

Cerro Baúl

Beginning with general ubiquity trends at Cerro Baúl, the most ubiquitous taxon by far was molle (90%) (Table 4.10). This pattern suggests molle use or deposition was widely distributed at the site, occurring in multiple contexts. Other ubiquitous taxa include quinoa (70%), maize (55%), *Portulaca* sp. (24%), and bottle gourd (20%). Notable comestible taxa that were less present in the samples include ají (14%), common bean (11%), and peanut (9%). Coca was present at the site in a single context, Unit 9, suggesting limited distribution at the site.

Table 4.10 Taxon Ubiquity at Cerro Baúl

Taxonomic Family	**Common Name**	**Ubiquity (%)**
Schinus molle	Molle	90
Chenopodium quinoa	Quinoa	70
Zea mays	Maize	55
Lagenaria sp.	Bottle Gourd	20
Portulaca sp.		24
Malvastrum sp.		17
Capsicum sp.	Aji	14
Phaseolus vulgaris	Bean	11
Verbena sp.		10
Cucurbita maxima	Zapallo	8
Poaceae	Grass Family	11
Arachis hypogaea	Peanut	9
Physalis peruviana	Aguaymanto	9
Prosopis sp.	Algarrobo	5
Echinocereus sp.	Cactus	7
Haageocereus sp.	Cactus	6
Gossypium barbadense	Cotton	5
Cactaceae	Cactus Family	5
Atriplex sp.		4
Echinopsis sp.	Cactus	4
Cyperaceae	Sedge Family	4
Fabaceae	Bean Family	4
Amaranthus sp.	Kiwicha	4
Armatocereus sp.	Cactus	3
Desmodium sp.		2
Fagonia chilensis		2
Erythroxylum coca	Coca	1
Cenchrus sp.		1
Lepidium sp.		1
Neoraimondia sp.	Cactus	1
Oxalis sp.		1
Viola sp.		1
Chenopodium /Amaranthus	Quinoa/Kiwicha	1

Yahuay Alta

Molle is present in 30% present of samples at Yahuay Alta making it the most ubiquitous taxon (Table 4.11). Quinoa (12%) and *Portulaca* sp. (11%) are then next highest in ubiquity at the site. All other taxa fall below 8% ubiquity, suggesting a restricted distribution.

Table 4.11 Taxon Ubiquity at Yahuay Alta

Taxon	**Common Name**	**Ubiquity (%)**
Schinus molle	Molle	30
Chenopodium quinoa	Quinoa	12
Portulaca sp.	Purslane	11
Fagonia chilensis		8
Bidens sp.	Spanish Needles	3
Cassia sp.		3
Bromus sp.		3
Verbena sp.		3
Echinopsis sp.	Cactus	2
Suaeda sp.		2
Boerhaavia sp.		2
Salix sp.		2

Quilcapampa

Quilcapampa ubiquity (Table 4.12) values suggest a similar pattern to Cerro Baúl in terms of the most ubiquitous taxa at the site. Molle was the most present taxon recovered from soil samples throughout Sector A (84%), followed by maize (64%), ají (47%) and quinoa (46%). Following these taxa, pacay (30%), bottle gourd (21%), and lucuma (21%) appear in a number of samples throughout the site.

Table 4.12 Taxon Ubiquity at Quilcapampa

Taxon	Common Name	Ubiquity (%)
Schinus molle	Molle	84
Zea mays	Maize	64
Capsicum sp.	Aji	47
Chenopodium quinoa	Quinoa	45
Inga fuelli	Pacay	30
Lagenaria sp.	Bottle Gourd	21
Pouteria lucuma	Lucuma	21
Arachis hypogaea	Peanut	13
Fabaceae	Bean Family	13
Gossypium barbadense	Cotton	13
Echinopsis sp.	Cactus	9
Phaseolus vulgaris	Common Bean	8
Amaranthus sp.	Kiwicha	6
Cucurbitaeae	Squash Family	6
Physalis peruviana	Aguaymanto	6
Poaceae	Grass Family	6
Solanum tuberosum	Potato	6
Anandenanthera colubrina	Vilca	4
Cactaceae	Cactus Family	4
Echinocereus sp.	Cactus	4
Cucurbita maxima	Zapallo	3
Cyperaceae	Sedge Family	3
Canna indica	Achira	1
Eyrthroxylum coca	Coca	1

Hatun Cotuyoc

At Hatun Cotuyoc, taxa ubiquity is noticeably lower than at the other studied sites (see Table 4.13). Quinoa has the highest presence at the site (21%), followed by maize (19%), and molle (10%). The remaining taxa are present in less than 10% of the samples from the site.

Table 4.13 Taxon Ubiquity at Hatun Cotuyoc

Taxon	**Common Name**	**Ubiquity (%)**
Chenopodium quinoa	Quinoa	21
Zea mays	Maize	19
Schinus molle	Molle	10
Cyprus sp.		8
Poaceae	Grass Family	6
Chenopdium /Amaranthus	Quinoa/Kiwicha	4
Bidens sp.	Spanish Needles	2
Echinopsis sp.	Cactus	2
Phaselous vulgaris	Common Bean	2
Capsicum sp.	Ají	2

A number of interesting trends emerge from the ubiquity patterns. First, molle is consistently scored in the top three taxa in the assemblage. The most interesting pattern is the similarity in molle ubiquity for the Wari sites, Cerro Baúl (90%) and Quilcapampa (84%). However, molle ubiquity at Hatun Cotuyoc is relatively low (10%), likely due to issues of preservation discussed above (Figure 4.8). However, the relatively low ubiquity of molle at Yahuay Alta (30%), as compared to Cerro Baúl and Quilcapampa, represents a differential pattern of use (discussed further in Chapter IV).

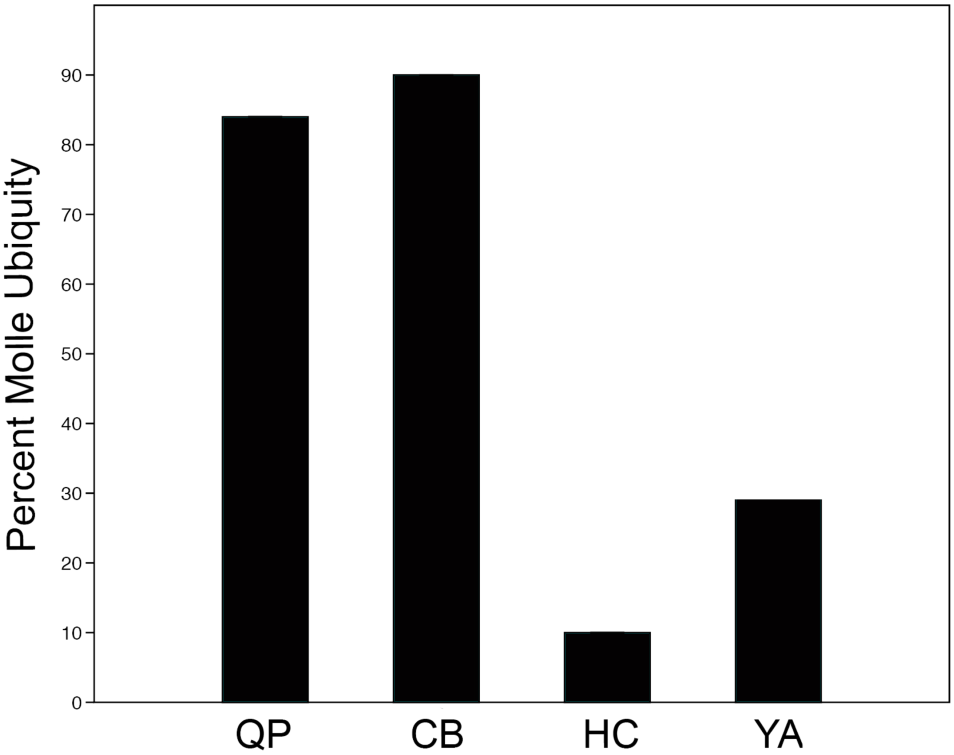

Figure 4.8 Molle Ubiquity at the Four Sites

Quinoa has a relatively high ubiquity score and is highly ranked in all four assemblages. Given that quinoa is a nutritious resource that thrives in semi-arid conditions from the *costa* to 4,000 masl, it is not surprising to find that its use was widespread at each of the three study regions. It is interesting, however, that quinoa is ranked second at Cerro Baúl in terms of ubiquity (70%) and first at Hatun Cotuyoc (21%) yet is ranked fourth in terms of presence at Quilcapampa (45%). This may signal less widespread use of quinoa at Quilcapampa in favor of other resources or more restricted cooking contexts as compared to the other sites in contrast to the extensive use of quinoa at Cerro Baúl and Hatun Cotuyoc. Quinoa is able to be grown in a wide range of ecological zones and has a long history of cultivation in the Andes as previously discussed (see Bruno 2006; Bruno and Whitehead 2003; Pearsall 2008).

Maize has a high ubiquity score at all the Wari sites, being ranked either second or third in presence. This pattern suggests maize use was also widespread at Wari provincial sites, which is in line with results of stable isotope analysis revealing high amounts of C_4 plants (i.e., maize) were being consumed by Wari peoples in Ayacucho (Finucane et al. 2006; Finucane 2009) and Cusco (Turner et al. 2018). The agricultural projects in the provinces (e.g., Schreiber 1992, 1992; Valencia Zegarra 2005; Williams 2002) could have been used to grow large amounts of maize present in Wari provincial sites. In comparison to the Wari pattern of maize use, maize is absent in the macrobotanical assemblage at Yahuay Alta. Thus, maize remains are one way in which Huaracane foodways significantly differed from those of their Wari neighbors.

Ají is another plant that appears regularly at Wari sites, though it is somewhat less ubiquitous than the previously discussed plants. At Quilcapampa ají was present in 47% of samples and was ranked third in ubiquity. However, ají was not very ubiquitous at Cerro Baúl (14%) or Hatun Cotuyoc (2%). This may be because Quilcapampa is closer the coast (~1500 masl) and is within a prime growing zone for ají, while Cerro Baúl (~2600 masl) and Hatun Cotuyoc (~3170 masl) are at higher altitudes where it may have been more difficult to grow ají. Indeed, fruits (including ají, cactus fruit, lucuma, aguaymanto) in general were more ubiquitous at Quilcapampa than at other sites, lending support that perhaps environmental conditions limited the amount of ají that could be grown at higher altitudes. It is possible, however, that ají use was more restricted for reasons other than environmental constraints such as the preference for other plants to flavor foods and provide essential vitamins.

Two plants recovered from Cerro Baúl and Quilcapampa that have very low ubiquity values include vilca and coca. Vilca, recovered from units 17, 22, and 23 at Quilcapampa, has a ubiquity score of 4%. Historically vilca seeds, which would have been imported, are generally processed into a powder and inhaled, making them the primarily used portion of the plant. The presence of vilca can be taken as indirect evidence that a hallucinogenic substance was created and used at Quilcapampa, though residue analysis is needed to confirm this hypothesis. Furthermore, the presence of vilca in three units, though low in frequency, suggests that the creation of hallucinogens wasn't regulated to one specific area but was perhaps more widely used throughout the residential sector of the site either for use in ritualistic activities or as an ingredient in *chicha.*

Coca was present at both Cerro Baúl (1%) and Quilcapampa (1%) but recovered from limited contexts at the sites. At Cerro Baúl, coca was recovered from Units 9 and 41, which are adjacent elite domestic contexts. At Quilcapampa, coca was recovered from Unit 23, which is interpreted as a domestic context associated with cooking and food processing. The portion of coca destined for consumption are the leaves, which are packed together to form a pocket to hold a ball with *llipta* (mixture of ash and/or lime) and held between the gums and cheek. It is possible to cultivate coca in the Siguas Valley, though present-day cultivation was not observed in the region at the time of this analysis. The seeds would be removed from the branches before use, and thus are not likely to be transported alongside the leaves during trade, making the recovery of coca seeds rare. Consequently, the low ubiquity of coca at the sites must be interpreted with caution, as the seeds alone do not necessarily accurately represent extent of use.

A basic summary of the ubiquity data reveals some broad similarities and differences between plant remains recovered from the four study sites. The range and types of plants recovered at the three Wari assemblages are similar. These plants include maize, quinoa, ají, beans, and zapallo. There are some key differences, however, that must be explored further through a consideration of taxonomic abundance.

Density Analysis

I now turn to the density measure to investigate plant abundance at the sites. I use density to investigate differences in plant categories, including field cultigens, fruits, tended trees, and wild/misc. plants, as well as to investigate maize and molle individually at the sites. Using box plots, I assess statistical differences between plant categories at each of the sites. Due to differential methods of collection of soil samples during excavation, not all of the assemblages are directly comparable. Instead, I present a qualitative comparison of plant use at the sites to examine patterns of plant collection and production.

Cerro Baúl

Beginning with Cerro Baúl, I break down the botanic assemblage into categories of field cultigens, fruits, tended trees, and wild/misc. plants in order to characterize relative levels of plant use. Comparing the plant categories, tended tree crops, which include molle and algarrobo remains, were more dense than other categories of plants (Figure 4.9) due to the large amount of molle recovered. If the molle drupes are removed, densities of tended tree crops fall in line with those of field cultigens and wild/miscellaneous (Figure 4.10). Density of field cultigens, including maize, ají, cotton, gourd, squash, peanut, and common bean, are similar to wild/miscellaneous plants, which comprise *Atriplex* sp., coca, Cyperaceae, kiwicha, *Malvastrum* sp., Poaceae, *Portulaca* sp., and quinoa.[9] It is interesting to note that density of fruits, which includes aguaymanto and cactus, is statistically lower than other plant categories at Cerro Baúl, suggesting use or access to fruits at the site was limited as compared to other plants.

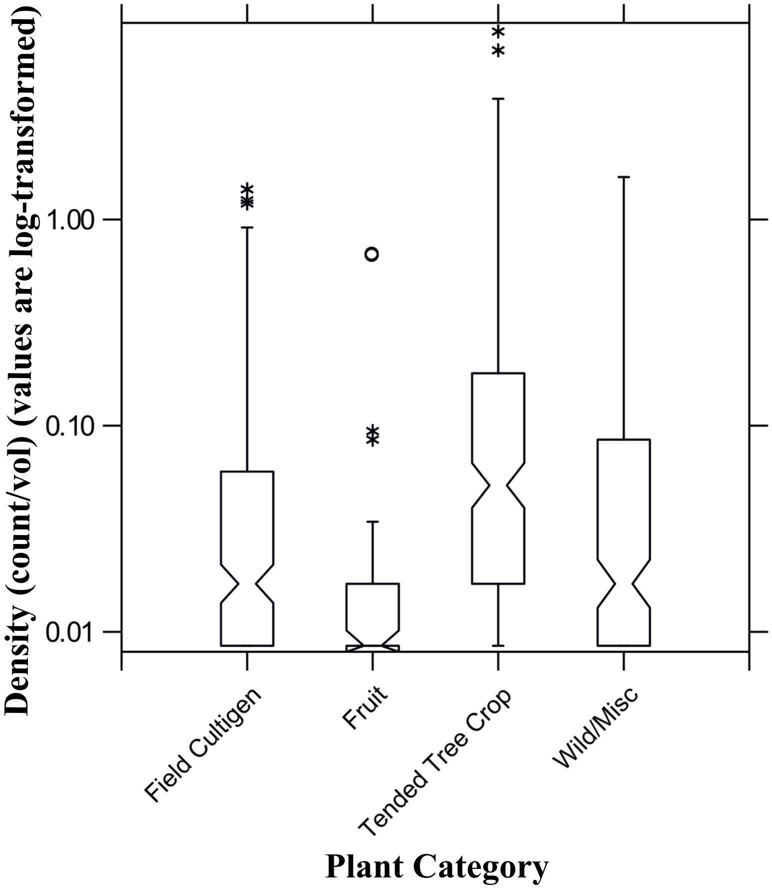

Figure 4.9 Box Plot Comparison of Density of Plant Categories at Cerro Baúl

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[9] No determination was made on whether the recovered quinoa and/or kiwicha remains were domesticated or wild varieties and were placed in the wild/miscellaneous category until such analysis can be determined.

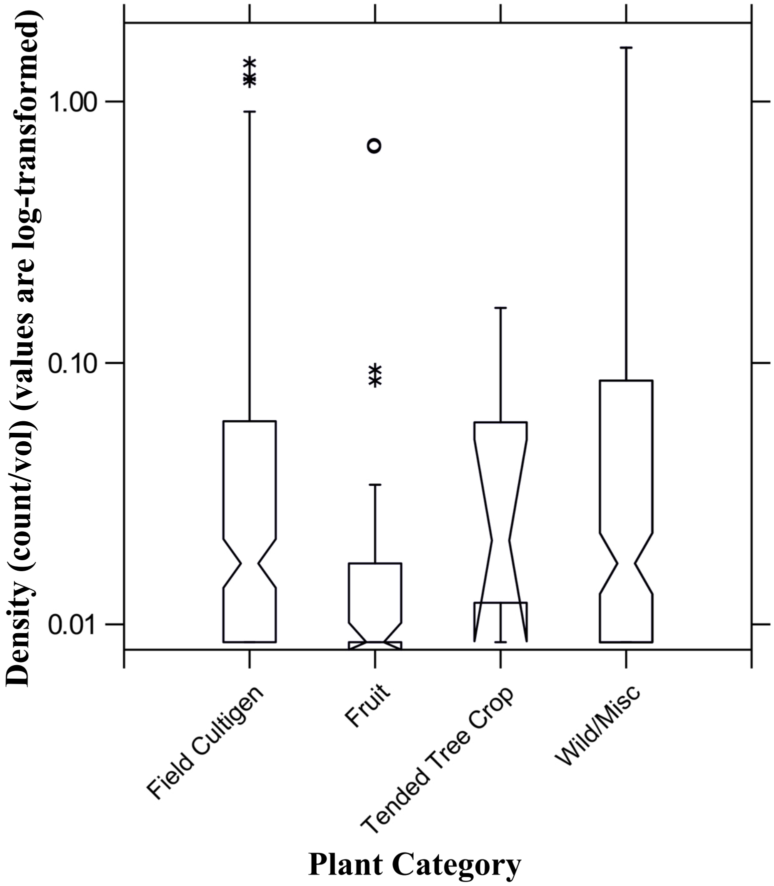

Figure 4.10 Box Plot Comparison of Density of Plant Categories at Cerro Baúl (molle removed)

Maize remains can be broken down into individual components. Maize is not only recoverable as a kernel, which represents the edible portion of the grain, but also as cupules, embryos, and cobs/cob fragments. While the remains of kernels may indicate cooking or consumption activities, cupules are indicative of processing activities where kernels are removed from the cob. Because kernels represent the edible portion of maize and cupules represent discard, low ratios of kernels to cupules would indicate that an elevated level of maize processing took place (see Scarry and Steponaitis 1997:117; VanDerwarker 2006:102). The presence of maize embryos can also indicate grinding activities occurred within an activity area as a result of the use of the groundstone forcing the embryo off the kernel; other processing activities, such as hominy production (e.g., Briggs 2016:323; Katz et al. 1974) which forces the embryo off the kernel, may also explain the presence of maize embryos. Finally, cobs may represent cooking activities, as cobs have a use life as a stirring or cooking implement after the kernels have been removed and can also be used for fuel.

Considering maize remains recovered from Cerro Baúl, I find overlap in densities of cupules, embryos, and kernels, suggesting maize processing, cooking, and discard activities all took place in similar amounts at the site (Figure 4.11). Maize cobs, however, have a lower density than the other portions of the grain, which is to be expected given the fragility of the cob and its uses after kernel removal. This may be due to a number of factors, including taphonomic processes, the use of maize cobs as cooking utensils, or the possibility that many were used as fuel at Cerro Baúl.

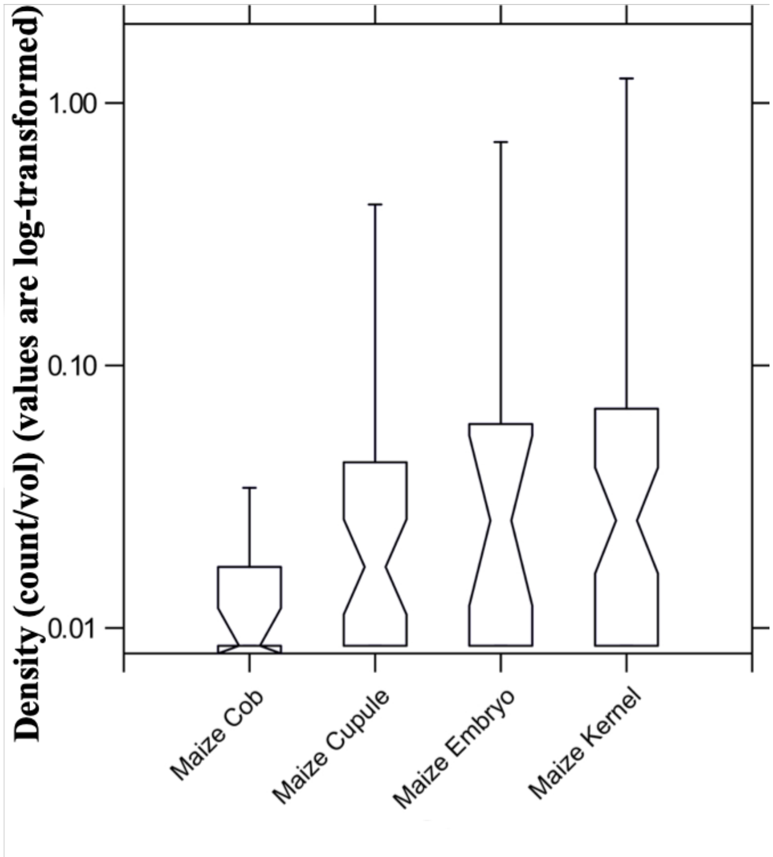

Figure 4.11 Box Plot Comparison of Maize Densities at Cerro Baúl

Considering evidence for molle processing for *chicha*, detailed previously, I find the majority of molle to have been recovered in processed form (Figure 4.12). Both carbonized and desiccated molle are statistically more abundant than the non-processed forms. This indicates that the majority of recovered molle was soaked and/or squeezed to brew *chicha de molle*. Additionally, some of the processed dregs were carbonized signifying molle was also used in low amounts as a fuel or possibly burned alongside other refuse. Finally, it is interesting to note that molle stems, which are considered to be indicative of processing activities, have a lower density than the processed seeds. This suggests molle was collected and processed off-site, perhaps in the terraces or fields directly surrounding Cerro Baúl or Cerro Mejía, and then brought to Cerro Baúl for brewing.

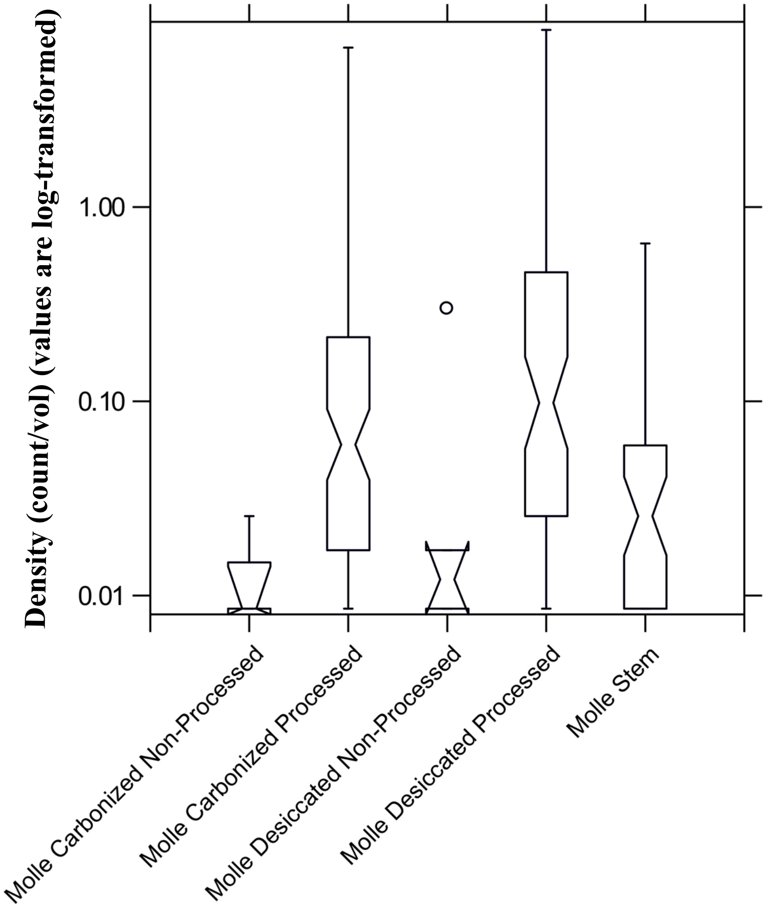

Figure 4.12 Box Plot Comparison of Densities of Processed and Non-Processed Molle at Cerro Baúl

What becomes clear in terms of importance of plant categories at Cerro Baúl is that field cultigens, tended tree crops, and wild/miscellaneous plants have similar densities and ubiquities, suggesting broadly similar amounts were present and processed at the site. Fruit remains, however, are less abundant than the other categories. While aguaymanto and cactus fruit seeds were recovered, the environment and altitude at Cerro Baúl may not have been favorable for producing other types of fruits. Indeed, while Brack Egg (1999) notes that lucuma can be grown up to altitudes of 3,000 masl, which includes Cerro Baúl, lucuma is not widely cultivated in the Upper Valley today, suggesting the area may not be favorable for the plant. The microenvironments present in the Andes within and between valleys often create variable growing conditions within close proximity. Thus, the pattern of low fruit density suggests fruits were not widely cultivated and that Wari colonists lacked access (or desire) to obtain large-seeded fruits from the middle valley or coastal regions through trade.

Quinoa, which was second in terms of density and ubiquity, could have been gathered in the wild, as these plants thrive in disturbed habitats (e.g., Bruno and Whitehead 2003; Fritz et al. 2017). Nevertheless, quinoa may also represent a staple crop central to traditional Andean cuisine (e.g., Bruno and Whitehead 2003; Fritz et al. 2017:58; Krügel 2011:28-30). Maize, which was the third highest plant taxa in terms of density and ubiquity, was grown on the terraces surrounding the Wari colony and likely brought to the top of Cerro Baúl (on the cob) for processing. Although maize is lower in density and ubiquity than quinoa, it also was likely a dietary staple at the Wari colony, much as it is proposed to have been in the Wari heartland in Ayacucho (Finucane 2007, 2009; Finucane et al. 2006). Ají pepper, peanut, and squash/bottle gourd, were also somewhat ubiquitous and abundant, suggesting they played secondary roles in subsistence practices at the colony.

Tubers, including yuca and achira, were also present. Identified only as starch grains recovered from groundstones, the presence of these domesticated root crops reveals Wari colonists may have produced the crop; irrigated terraces made it possible to produce these water-intensive roots. It is possible that potato, perhaps in the form of *chuño,* was also cultivated, but macrobotanical remains of potato are unlikely to preserve here. Thus, the importance of using macrobotanical and microbotanical analysis together cannot be understated. Further analysis of both groundstone and ceramics must be conducted in order to ascertain the breadth of tuber and root crop production at the colony.

Yahuay Alta

A comparison of plant categories recovered from Yahuay Alta shows densities of cultigens (arracacha, cotton, quinoa), fruits (cactus), and tended trees (molle) to be statistically similar (Figure 4.13). Wild resources (*Bidens* sp., *Cassia* sp., *Fagonia chilensis*, *Malva* sp., *Cassia* sp.), however, are less dense at the site. Molle drupes represent the only tended tree resources recovered from soil samples at the site. Molle remains from the site include processed and non-processed desiccated drupes as well as desiccated stems, though absolute counts of categories of molle (i.e., desiccated processed, carbonized processed, etc.) were not obtained for the present analysis.

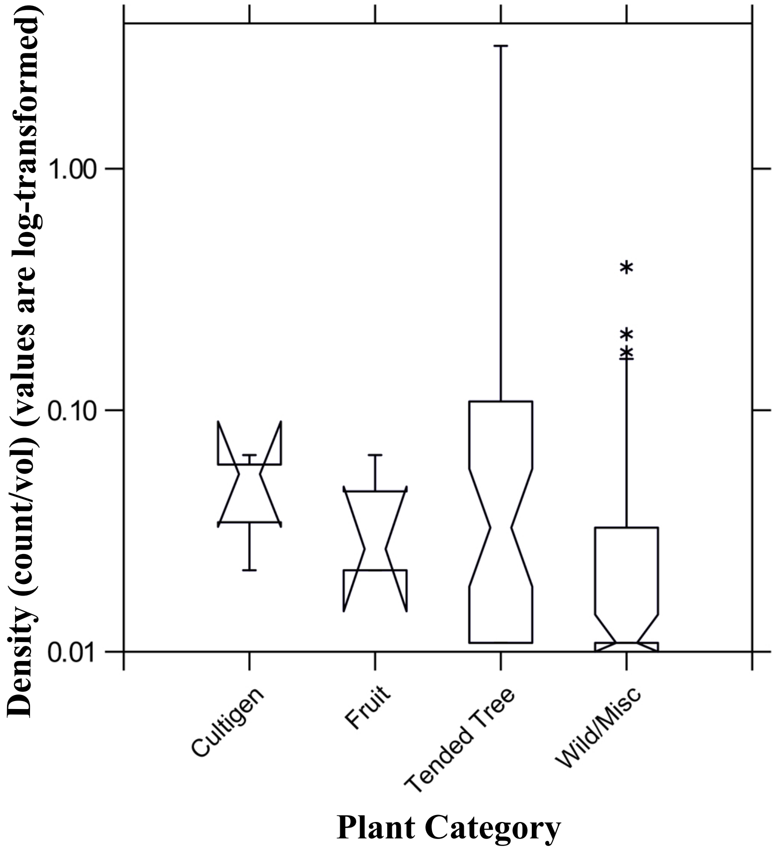

Figure 4.13 Box Plot Comparison of Density of Plant Categories at Yahuay Alta

Considering botanic remains collected from soil samples and by hand during excavation (e.g., peanut, squash, bottle gourd), the Middle Horizon Huaracane occupants of the site focused on tubers, legumes, and cucurbits. This low-intensity cultivation system was supplemented by locally gathered cactus fruit and wild resources, such as tree seeds (e.g., algarrobo) and wild plants that grew in agricultural fields or in disturbed areas around the site (e.g., *Bidens* sp., *Cassia* sp.), though these latter plants did not play a significant role in subsistence practices at the site. Huaracane residents also may have cultivated potato, which was identified through starch grains from groundstone. Fruit remains were limited to locally available cactus fruits. Tended tree crop remains recovered include algarrobo and molle, the latter of which was found in large quantities. Maize was absent from the site; no kernels were recovered, and processing remains (cupules, cobs) were not identified. As previously noted, maize starch grains taken from groundstones were identified, but further investigations are required to examine this pattern as these starch grains could represent contamination.

Field cultigens were an important component of subsistence practices at Yahuay Alta. Residents of the site, however, appear to have practiced a maize-free subsistence system. As previously mentioned, maize starch grains were identified from groundstone artifacts recovered from Yahuay Alta, creating a discrepancy between the macrobotanical and microbotanical assemblages; was maize part of Huaracane foodways at Yahuay Alta? Previous research suggests that maize was part of Huaracane subsistence strategies to some extent (e.g., Goldstein 2003, Green 2015). Further research is necessary to elucidate the use of maize in Huaracane foodways at Yahuay Alta and elsewhere in the Moquegua Valley.

The lack of maize at Yahuay Alta is noteworthy as it represents a distinct strategy more similar to Early Ceramic period groups from the coast than their contemporary Wari and Tiwanaku neighbors. This finding is in line with stable isotope analysis of Huaracane skeletal remains. Sandness (1992:49) found that the Huaracane diet relied heavily on C3 plants (approximately 50%) and marine resources (23% - 50%), while C4 plants comprised only a small amount of their diet (3% - 8%). In contrast, C4 plants comprised a much large portion (46% - 75%) of the diet of Tiwanaku colonists (Sandness 1992:49; see also Goldstein 2003:164). The lack of recovery of macrobotanical maize remains supports the results of stable isotope analysis.

Overall, the Huaracane diet at Yahuay Alta appears to have focused on a local tradition of small-scale farming of tubers (arracacha and possibly potato) and field cultigens (peanut, gourd, squash, cotton). The residents of Yahuay Alta either lacked access to or were not able to procure non-local comestibles, such as maize and ají, or other plants (e.g., coca, *vilca*), or even relatively small quantities of exotic luxury goods (Goldstein 2000:355). The exception to this is in the form of the large number of molle remains recovered from the site. As I will argue in the two following chapters, molle was a staple of Wari provincial foodways and was adopted by Huaracane peoples at Yahuay Alta from their Wari neighbors who brought the practice of brewing *chicha de molle* with them (see Chapter VI).

Quilcapampa

I find abundance of the plant categories at Quilcapampa to be similar (Figure 4.14). Field cultigens (achira, cotton, maize, potato, peanut, bean, ají, zapallo, bottle gourd) have similar densities as wild/miscellaneous plants (coca, kiwicha, quinoa, Cyperaceae, Fabaceae, and vilca) and fruits (lucuma, cactus fruit, aguaymanto). Tended tree crops (molle, pacay), however, have the highest densities of plants at the site with slight overlap with fruits. When molle remains are removed from consideration, there is statistical overlap between all plant categories (Figure 4.15).

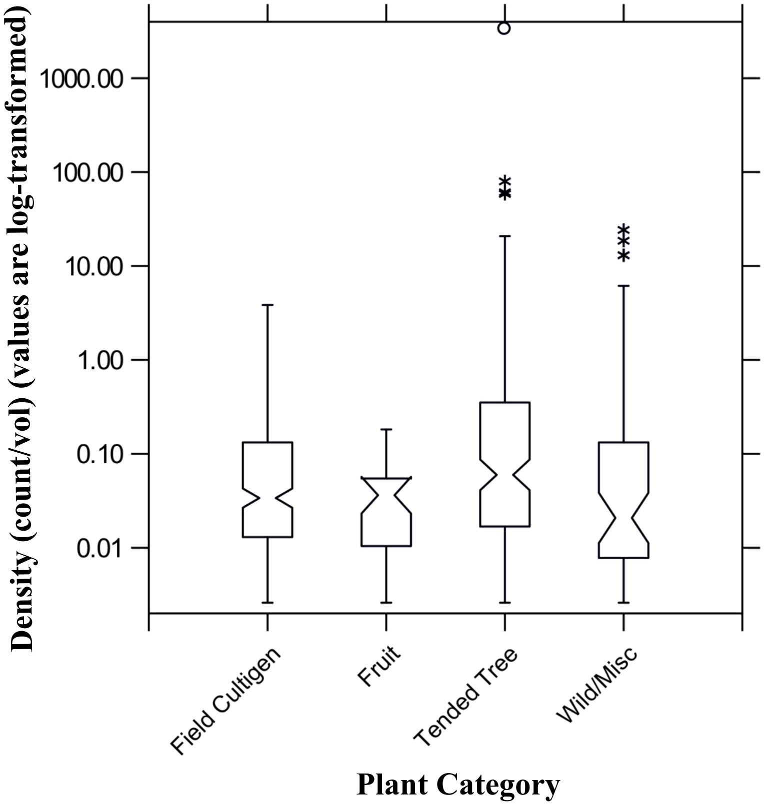

Figure 4.14 Box Plot Comparison of Density of Plant Categories at Quilcapampa

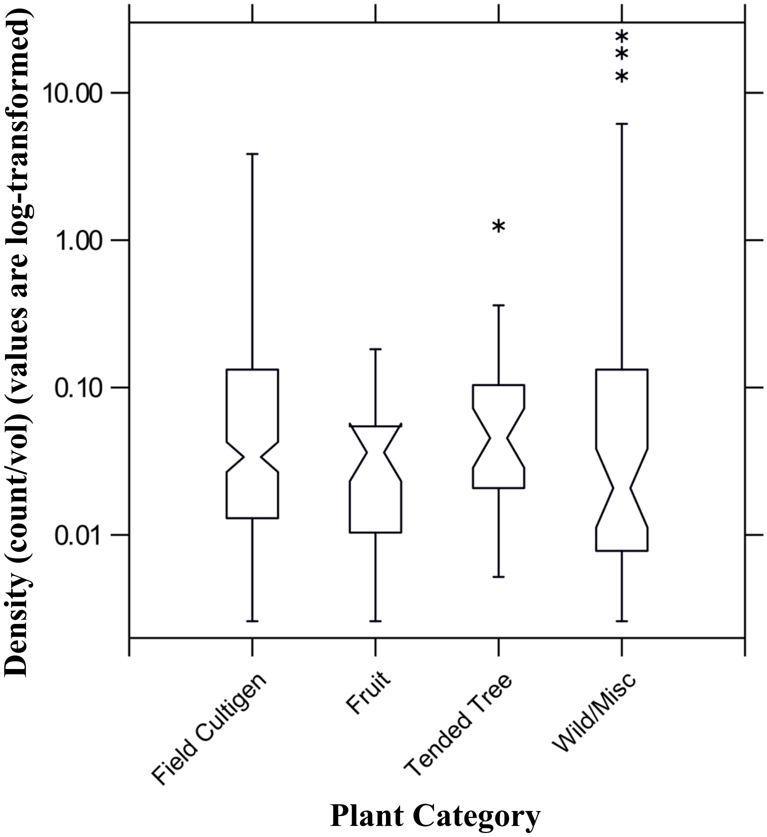

Figure 4.15 Box Plot Comparison of Density of Plant Categories at Quilcapampa (molle removed)

Maize cupules were the most dense form of maize recovered (Figure 4.16). In addition, densities of maize cobs, embryos, and kernels overlap statistically suggesting maize processing was conducted on-site. It is no surprise that maize cupule density at Quilcapampa is high. Considering the maize patterns at the site, it appears that maize was cultivated in nearby fields (possibly near the Rio Siguas) and then brought back to the site on the cob to be stored or cooked, after which numerous cupules would litter middens, domestic floors, and other food-related areas related to processing activities. The large number of cupules could also be the result of preservation; the vast majority of the cobs and cupules recovered were desiccated, a product of excellent preservation at the site.

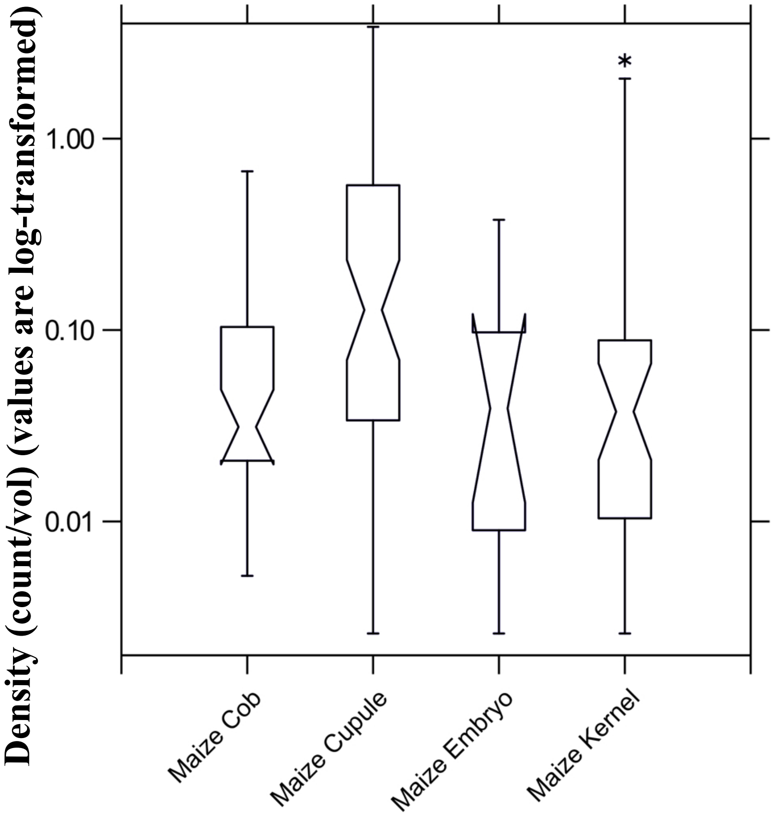

Figure 4.16 Box Plot Comparison of Maize Density at Quilcapampa

Breaking down molle remains into desiccated/carbonized and processed/non-processed categories, I find desiccated processed molle to be the most abundant form of molle at the site (Figure 4.17). Interestingly, molle stems are comparable in density to carbonized processed, carbonized non-processed, and desiccated non-processed. Further, there is statistical overlap between carbonized non-processed and carbonized processed molle. Taken together there appears to be a mix of production and processing practices that took place on site. The high density of stems suggests molle was collected from the surrounding area, possibly from nearby tended molle groves, and not completely removed from the branches or stems before reaching Quilcapampa. Further, site residents appear to have engaged in on-site processing of molle for the production of *chicha de molle*.

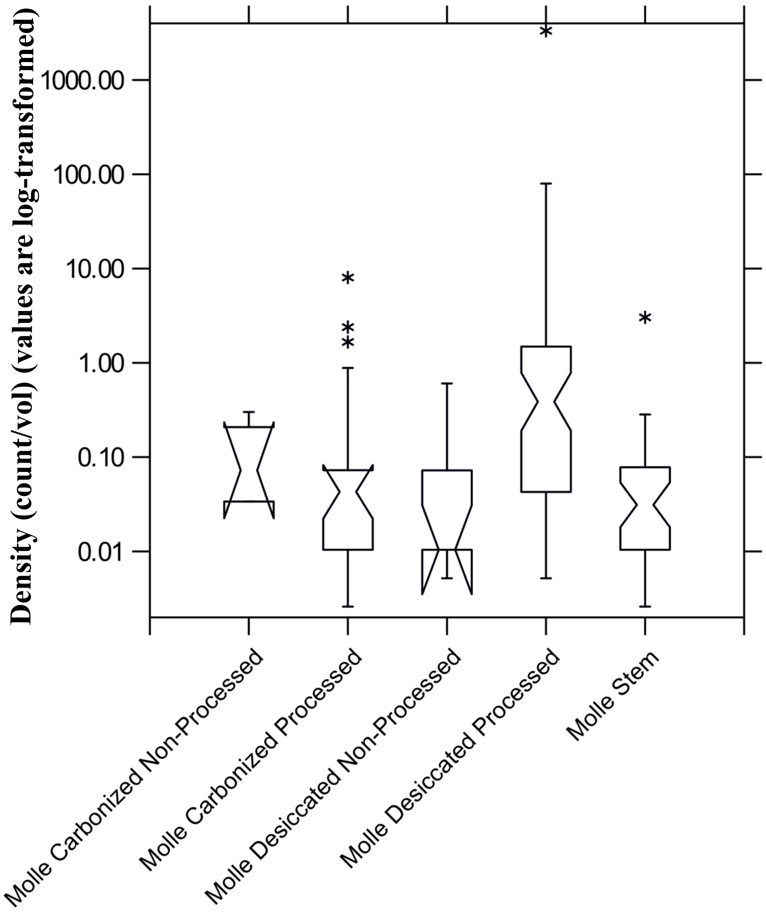

Figure 4.17 Box Plot Comparison of Densities of Processed and Non-Processed Molle at Quilcapampa

At Quilcapampa, all plant categories were evenly distributed in terms of density. Molle, the densest taxa recovered, was found in large amounts in pit features but was also spread throughout activity surfaces, hearths, and middens. Quinoa was second highest in terms of ubiquity, and maize was second in density. So, while quinoa was widely distributed throughout all contexts, maize remains were far more abundant than quinoa denoting the importance of maize agriculture at Quilcapampa (Figure 4.18). It is noteworthy that maize cupules were recovered in higher densities than maize kernels, embryos, and cobs at Quilcapampa. As cupules and embryos may represent maize processing activities (Scarry and Steponitis 1997; VanDerwarker 2006:102-105), maize cobs were likely taken from the fields, stored on site, and then processed to remove the kernels.

Figure 4.18 Example of maize cobs recovered from Quilcapampa

Other field cultigens, including ají, squash, gourd, peanut, potato, and achira, were recovered macrobotanically and represent important foods alongside maize and quinoa. Recovered remains of tended tree crops included molle and pacay, a tree crop which was not recovered at the other Wari sites. Fruits, including aguaymanto, cactus fruit, and lucuma, were also abundant. All of these plants could have been produced locally. Residents of Quilcapampa took advantage of the close proximity of the floodplain and tended fields located only hundreds of meters from the site. Molle, pacay, and lucuma trees could have been tended within the vicinity of the site, providing residents with reliable access to tree crop products and fruit and fuel for fires.

Quilcapampa residents also had access to non-local plant resources, notably coca and vilca. Located on a pampa overlooking the Rio Siguas, Quilcapampa bisects a road that travels from one side of the valley to the other, connecting the site to the large system of Wari roads (see Edwards and Schreiber 2014:229; Schreiber 1984, 1991; Williams 2017) and network of sites throughout the south-central Andes. As a result, site residents could have had access to products of the *selva,* including coca and vilca, though coca could have been cultivated locally as well. While it is possible to produce coca in the Quilcapampa locality, it is much less probable (but perhaps possible) that vilca was produced locally but instead provides evidence of trade, likely from Ayacucho or the eastern slopes of the Andes.

Hatun Cotuyoc

Overall, plant density was low at Hatun Cotuyoc compared to the other sites. Densities of field cultigens (ají, maize, bean), tended tree crops (molle), and wild/miscellaneous plants (*Bidens* sp., quinoa, Cyperaceae, Poaceae) all overlap (Figure 4.19). There was a single fruit seed recovered (cactus). Molle was the only plant taxon recovered from the tree crop category, so removing molle from consideration removes the group entirely.

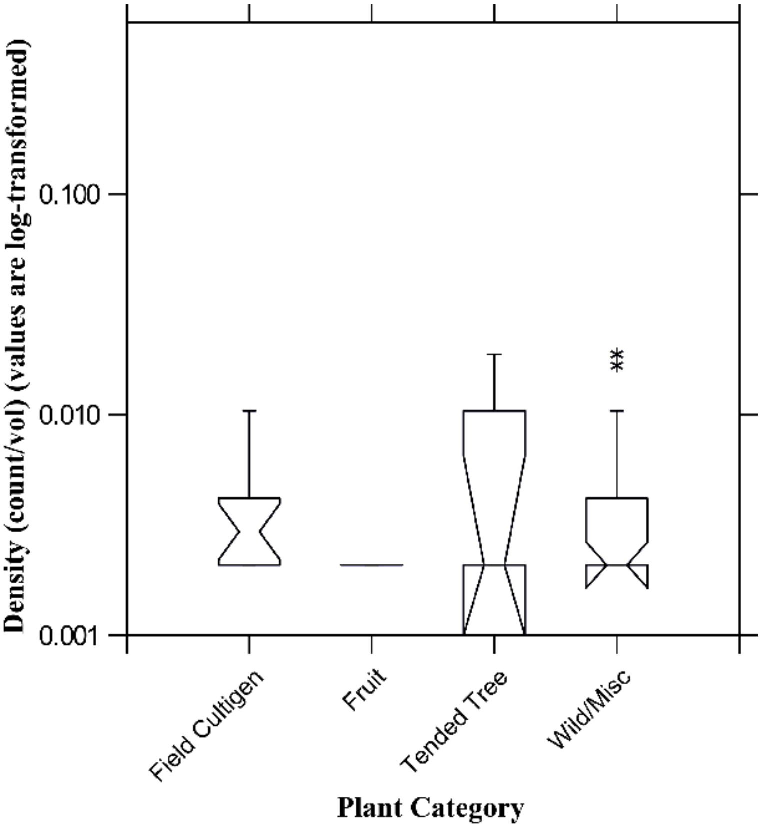

Figure 4.19 Box Plot Comparison of Density of Plant Categories at Hatun Cotuyoc

Too few maize remains were recovered to make a comparison of individual portions. Of the 25 total maize specimens recovered from Hatun Cotuyoc, kernels (n=18) were the most prevalent, followed by cupules (n=2) and cob fragments (n=5). While the low sample size of maize makes a comparison of maize parts untenable, residents of the site appear to have relied on maize agriculture at least minimally and processed some maize on-site. Recent stable isotope research on the remains of Wari residents of Hatun Cotuyoc, however, indicates that maize was likely a dietary staple for site residents (see Turner et al. 2018). Based on my analysis of the macrobotanical assemblage, I concur with the stable isotope data that maize was likely an important part of the foodways of residents of Hatun Cotuyoc.

Molle was also recovered from Hatun Cotuyoc. All recovered molle drupes (n=17) were carbonized and are found to have a similar form to the carbonized and desiccated molle remains from Cerro Baúl and Quilcapampa (Figure 4.7). While molle density is low, the presence of processed molle nonetheless indicates residents used the fruit in a similar was as colonists at other Wari sites with documented molle remains, including Quilcapampa, Cerro Baúl, and Cerro Trapiche. In addition, while ancient environments may differ significantly from those of the present (e.g., Beresford-Jones 2011), it is nonetheless noteworthy that a large number of molle trees presently grow in the vicinity of Hatun Cotuyoc and the nearby Wari site of Pikillaqta in the Lucre Basin, possibly pointing to the importance of the tree in the area in the past.

Considering the macrobotanical remains recovered from Hatun Cotuyoc, maize, bean, and ají were the densest field cultigens recovered. A single carbonized cactus seed, suggestive of the fruit, was also recovered. Molle was the only plant in the tended tree crop category recovered from the site. Wild/miscellaneous seeds identified include quinoa, a comestible, as well as *Cyperus* sp., *Bidens* sp. and Poaceae. No microbotanical analysis was conducted at Hatun Cotuyoc.

The collected data suggest occupants of Hatun Cotuyoc practiced agricultural strategies typical of the quechua zone; they grew maize, beans, and ají, collected and grew quinoa, and gathered local cactus fruit. *Cyperus* sp. cane was collected from the nearby river to construct thatched walls, screens, or roofs. The *Bidens* sp. and grass seeds (Poaceae) may represent *cuy* fodder or incidentally collected seeds brought alongside cultigens to the household. The climate is not conducive to the preservation of starchy tubers, although Hatun Cotuyoc is located in prime tuber farming zone and potatoes and/or other root crops could have been produced there.

Discussion

The plant data presented in this chapter provide several insights concerning: 1) subsistence production, 2) trade, and 3) food-related activities at the sites. The Wari botanic assemblages analyzed in this dissertation are comprised primarily of cultivated plants. All sites included ají, common bean, kiwicha, maize, and quinoa, all of which are likely cultivated (Table 4.14). In addition, all sites yielded molle and cacti which could be either cultivated or tended. Aguaymanto, achira, bottle gourd, coca, cotton, and zapallo were present at Cerro Baúl and Quilcapampa, but not at Hatun Cotuyoc. Yuca, recovered as starch grains, was identified only at Cerro Baúl, while pacay, sweet potato, and vilca were recovered exclusively at Quilcapampa. Many of these plants commonly occur in the botanic assemblages at sites throughout the Andes, detailed earlier in this chapter, and are certainly part of the quintessential Andean diet. Further, some of the differences in foodways at the sites can be attributed to environmental differences of the respective region, as I have previously discussed.

A comparison of densities of plant categories at the sites, including field cultigens, tended trees, and wild/misc. seeds, shows that these plant groups are comparable among Wari provincial sites. Indeed, there is a statistical overlap between these categories at all of the included Wari sites suggesting residents of these sites likely invested similar amounts of time and energy in producing cultivated species as they did tending trees and gathering wild/misc. plant resources. However, not all of the plant categories are statistically similar in the Wari assemblages; I found a statistical overlap between all four categories of plants in the Quilcapampa assemblage, yet this is not the case for all of the sites. At Cerro Baúl and Hatun Cotuyoc, fruit remains are statistically lower than cultigens, tended trees, and wild/misc. plant remains indicating fruits were either not preferred by the site occupants or that they were more difficult to obtain. As I have already discussed, this is likely due to lower elevation of Quilcapampa and its position within a prime growing zone for many fruits, including ají, and lucuma. Cerro Baúl (~2600 masl) and Hatun Cotuyoc (~3170 masl), on the other hand, are at higher altitudes which would not preclude the cultivation of these plants, yet unique the microenvironments and higher altitude of the regions may have made it more difficult to produce these taxa.

Table 4.14 Plant Presence at Study Sites

Taxon	Cerro Baúl	Quilcapampa	Hatun Cotuyoc	Yahuay Alta
Achira	X	X	-	-
Aguaymanto	X	X	-	-
Ají	X	X	X	-
Algarrobo	X	-	-	X
Bean	X	X	X	-
Bottle Gourd	X	X	-	X
Coca	X	X	-	-
Cactus	X	X	X	X
Cotton	X	X	-	X
Cyperaceae	X	X	X	X
Kiwicha	X	X	X	X
Lucuma	-	X	-	-
Maize	X	X	X	-
Manihot	X	-	-	-
Molle	X	X	X	X
Quinoa	X	X	X	X
Pacay	-	X	-	-
Peanut	X	X	-	X
Potato	-	X	-	X
Sweet Potato	-	X	-	-
Vilca	-	X	-	-
Zapallo	X	X	-	X

It is likely that the incongruent presence of fruit remains at Cerro Baúl and Hatun Cotuyoc compared to Quilcapampa is a result of either: a) differential environmental conditions, or b) the fact that the seeds are consumed by humans when they eat the fruit and thus are not often recovered in archaeological contexts. It is certainly possible that some fruits, such as aguaymanto, were completely consumed and thus would explain why there are less fruit taxa at Cerro Baúl and Hatun Cotuyoc as compared to Quilcapampa. On the other hand, lucuma seeds are large, dense, and not eaten, resulting in a high likelihood of the seed entering the archaeological record and recovery. Lucuma seeds, however, were only recovered from Quilcapampa. Consequently, I suggest that the dissimilar environmental conditions, including rainfall and elevation, was a limiting factor concerning fruit availability between the sites.

Previous research (e.g., Goldstein et al. 2009; Sayre et al. 2012; Schreiber 1992; Valdez 2006) has demonstrated maize was an important component to Wari subsistence production. For example, stable isotope data (Finucane et al 2006; Finucane 2009; Turner et al. 2018) suggest high amounts of maize were consumed in both Ayacucho and in the provinces. The results of this analysis concur with archaeobotanical and stable isotope studies regarding the importance of maize remains in Wari subsistence production. Maize was identified at all three Wari sites. At Cerro Baúl, I found that maize cobs have statistically lower densities compared to kernels, cupules, and embryos. This is not unsurprising given that maize cobs are unlikely to preserve in the archaeological record due to taphonomic processes and the fact that they are often used for fuel and/or as a tool after the maize kernels are removed. This pattern of lower amounts of cobs could also be taken to suggest that maize was shelled prior to transport to the summit of the site. While this is certainly a possible scenario to explain the lack of cobs, maize kernels store better on the cob making it unlikely that they would be removed for storage. I suggest that it is more likely that the former explanation of maize cobs simply not making it into the archaeological record is the most likely explanation, as this is a common occurrence in many sites in the Americas.

Molle remains at Quilcapampa and Cerro Baúl provide resolution concerning processing and brewing activities. At Cerro Baúl, I found statistically significant differences in the density of molle remains. Specifically, both carbonized and desiccated processed molle remains are significantly greater than non-processed remains. Further, molle stems are statistically lower than the processed remains. What this means in terms of molle use is that molle was taken off the trees and transported to the summit of Cerro Baúl for making *chicha de molle.* In comparison, the residents of Quilcapampa gathered molle and brought it to the site to be processed for use in brewing. Further, comparing the different types of molle I found a statistical overlap between carbonized non-processed, carbonized processed, desiccated non-processed, and molle stems. The only type of molle that is statistically higher than all other categories is desiccated processed, which makes sense given that there would a large accumulation of molle remains at the site where brewing took place. One important note is that the molle from a majority of contexts from both sites is desiccated, suggesting that after the drupes were used for brewing, they were discarded; the slightly elevated amounts of carbonized non-processed molle comes from Quilcapampa Unit 17 where molle was found to have been comingled with burnt roof thatch as a result of a burning event. Therefore, while some of the dregs could have been used as fuel, it was not a common practice.

Evidence for access to non-local plant resources is also present in the assemblages in the form of vilca and (possibly) coca. At Quilcapampa, vilca was recovered from three units yet it was not identified at Cerro Baúl. As I have already detailed, vilca grows in warmer more tropical environments than the typical highland Andean local. The most likely source of the vilca is from the Ayacucho or Cusco regions where it is known to grow today. This is speculative, however, and must be further investigated. Nevertheless, the presence of the non-local plant shows that residents of Quilcapampa had access to resources from the Wari heartland.

The patterns of coca recovery and use are unclear. While coca is mostly considered a plant resource grown on the tropical eastern slopes of the Andes, it can be cultivated at lower altitudes near the western coast of Peru. Therefore, I consider the presence of coca at Cerro Baúl and Quilcapampa to represent potential evidence for intraregional exchange of coca leaves. It is possible, however, that the recovered coca was grown locally. Greater attention must be paid to coca by archaeologists and archaeobotanists to clarify the areas of cultivation, distribution, and use of the plant prior and during the Middle Horizon.

The Huaracane at Yahuay Alta grew squash, gourd, (possibly) arracacha, quinoa, kiwicha, peanuts, and gathered wild legumes and cactus fruits. Cotton was grown as a foodstuff and/or as an economic plant for making fiber. Thus far, the results of this dissertation indicate Huaracane subsistence production focused on low-intensity terrace and floodplain agriculture. The Huaracane community at Yahuay Alta grew cultigens, gathered wild resources from the surrounding area, and perhaps tended cacti to collect the fruit. These findings are consistent with previous research (see Costion 2009; 2013; Goldstein 2000, 2005; Goldstein and Magilligan 2011; Owen 2005).

Based on the present analysis, Huaracane subsistence production at Yahuay Alta was distinct from their Wari neighbors. Huaracane plant assemblage diversity is lower than Wari sites, indicating they did not grow or have access to as wide of a variety of plants as compared to their Wari neighbors in Moquegua. Further, key plant resources common in Wari botanical assemblages, such as maize, beans, aguaymanto, and ají, are absent from Yahuay Alta (Table 4.14).

Interestingly, a comparison of plant categories at Yahuay Alta shows that gathered fruits (i.e., cactus fruit) appear to have played a more important role in Huaracane subsistence practices than those of the Wari at Cerro Baúl. Indeed, fruit abundance at Yahuay Alta is statistically similar to cultigens and tended tree fruits whereas fruits are statistically less abundant at Cerro Baúl than the other plant categories. In addition, stable carbon isotope research on Huaracane human bone samples from the Huaracane boot tomb cemetery demonstrated that the Huaracane diet relied heavily upon C_3 plants (Goldstein 2000:324, 2003:163). This is in opposition to their Wari neighbors who likely relied heavily on C_4 plants (i.e. maize) (see above). On a related note, Huaracane settlements throughout the middle Moquegua Valley are noted to yield relatively few *batánes* and *manos* (Costion 2009:25), which are common at Wari sites, suggesting little time was spent processing foods (e.g., maize, peanuts, ají, etc.) in ways similar to those of Wari colonists.

Perhaps the most interesting plant taxa recovered from Yahuay Alta is molle. As I have already demonstrated, molle is present at Yahuay Alta in large amounts. The presence of molle, which has been attributed to Wari identity (e.g., Green and Goldstein 2010; Goldstein et al. 2009; Sayre et al. 2012), at Yahuay Alta is interesting. While I have already discussed that there are a number of uses for molle, the: 1) large amounts of molle drupes, and 2) evidence of processed molle drupes, suggests that they were used to *chicha de molle.* This is interesting given that *chicha de maize,* which is popular in Peru today as well as in Prehispanic times, was perhaps not produced by the Huaracane at Yahuay Alta. Why then would Huaracane peoples adopt Wari brewing practices and begin brewing *chicha de molle*? Molle drupes are not present in Late Formative (pre-Middle Horizon) contexts but instead only appear during the Middle Horizon concurrent with Wari incursion. Are the *chicha de molle* brewing practices of the Wari and Huaracane similar or different? Finally, how does the adoption of *chicha de molle* add to our understanding of Wari-Huaracane interaction in Moquegua? I explore issues of Wari and Huaracane food production, cuisine, culture contact, and *chicha de molle* brewing further in Chapter VI.

This chapter presented an overview of the botanical assemblages recovered from Cerro Baúl, Quilcapampa, and Hatun Cotuyoc. As I have demonstrated, there certainly are differences in foodways between the Wari provincial sites analyzed in this dissertation, such as a higher abundance of fruits at the lower elevation site of Quilcapampa as compared to the rest of the sites that are closer to the highlands. There are also some differences in terms of use to particular plants, such as vilca at Quilcapampa and yuca at Cerro Baúl. These inconsistencies are likely the result of environment, trade, and/or social factors that must be further investigated. Some similarities, however, do exist in terms of the Wari plant assemblages that require additional attention (Table 4.14). In particular, there are five plant taxa that are present at all three provincial Wari sites: molle, maize, beans, ají, and quinoa. Could the presence of these five taxa at all three provincial Wari sites demonstrate that these taxa are part of a communal Wari cuisine held in common by members of disparate Wari colonial locals? Were these plants used in the same ways at these sites?

In the next chapter (Chapter V) I provide a more in-depth analysis of Wari provincial foodways. Presence and abundance of plant remains, while useful for evaluating general subsistence patterns, are not sufficient to reconstruct Wari cuisine. Cuisine is composed not only of food remains, but is an agglomeration of production, transport, processing, serving, and discard patterns surrounding the food as well as the social, political, economic practices of the society. More specifically, I compare food activity patterns between Cerro Baúl and Quilcapampa in order to investigate organization of Wari provincial cuisine. Considering the communal plants that occur at all Wari sites, can we identify common food activity patterns that made up Wari provincial cuisine? How can the plant data weigh in on social, economic, and political differences at the sites that may provide insight into site organization? In order to answer these questions, I will compare and contrast the spatial patterns of food activities at Wari provincial sites.

CHAPTER V

DINING TOGETHER: PROVINCIAL FOODWAYS IN THE WARI EMPIRE

In this chapter, I present a quantitative analysis of intra-site spatial patterns of foodways at Cerro Baúl in the Moquegua Valley and Quilcapampa in the Siguas Valley.[10] First, I focus on the plant data collected from features to explore differences in organization of plant foodways. Next, I employ correspondence analysis (CA) using paleoethnobotanical data from features to test patterns in the organization of food processing, cooking, storage, and discard. The identified patterns from Cerro Baúl and Quilcapampa will be qualitatively compared to assess similarities and differences in the organization of foodways at the sites. The results of this investigation will allow for more developed interpretations of the use of space and food-related activities at the sites.

Spatial analysis represents one of many important contributions that paleoethnobotanists can make to the field of archaeology. Archaeological sites are palimpsests of human activities where traces of daily practices are often obscured by myriad formation processes that can often be difficult to interpret. Nevertheless, there have been an increasing number of paleoethnobotanists who have successfully used different methods of spatial analysis to identify areas of food storage, food preparation and processing, and refuse disposal, and examine the intersection of foodways and political economy, ritual, gender, identity, and divisions of class and status (e.g., Cutright 2009; Farahani et al. 2017; Gumerman 1994; Hastorf 1990, 1991, 2003; Logan et al. 2012; Marston 2010; Sayre and Whitehead 2017; Twiss 2012; van der Veen 2003; VanDerwarker 2006, 2010;

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[10] Hatun Cotuyoc is excluded from this analysis due to low densities of plant remains as compared to Cerro Baúl and Quilcapampa.

VanDerwarker and Detwiler 2002; VanDerwarker and Idol 2008; VanDerwarker et al. 2007, 2014). This type of analysis can provide greater resolution of past human activities when interpreting archaeological assemblages.

A Spatial Analysis of Plant Remains from Defined Wari Architectural Spaces

While conducting spatial analysis on botanical data has become more prevalent within the last decade the approach nevertheless remains rare within the specialization of archaeobotany (see VanDerwarker et al. 2014:205). The purpose here is to not only define and compare food-related activities within and between Wari provincial locals/centers, but also add to the growing body of literature demonstrating the utility of intrasite analysis of plant remains for informing interpretations of spatial organization at archaeological sites.

In a recent synthesis of trends in intrasite analysis using archaeobotanical remains, VanDerwarker et al. (2014:206) identify two general approaches to analyzing and interpreting architectural space using plant data. The first approach uses previously assigned interpretations of architectural space and use prior to the spatial analysis. These designations often take the form of elite/non-elite and public/private architectural areas, or "sociospatial loci that are defined based on other archaeological datasets" (VanDerwarker et al. 2014:206). Studies employing this first approach tend to focus on anthropological issues of social status, political economy, gender, ritual, and power.

One of the most compelling examples of spatial analysis using plant remains in the Peruvian Andes comes from Hastorf's classic study of Inka interference in the agricultural production, political economy, and diets of the local Sausa people in the Upper Mantaro River Valley in central Peru (Hastorf 1990, 1991, see also D'Altroy and Hastorf 2001).

Hastorf's analysis points to a shift in the plant diet of local Sausa elites and non-elites. During the Wanka II phase (A.D. 1300-1460), prior to the arrival of the Inka, Hastorf found widespread restrictions in maize during the Wanka II phase with a greater abundance of maize remains in elite patio compounds compared to non-elite compounds (Hastorf 1990:275). During the subsequent Wanka III phase (A.D. 1460-1533), after Inka incursion, the differences with respect to presence and ubiquity of crop plants between non-elite and elite compounds diminishes. The Inka interfered in local political and domestic economies by reassigning local production to focus on producing greater amounts of maize. The result was that local non-elites produced more, and had greater access to, maize over time thereby leveling status differences.

Wari sites have also been the subject of spatial reconstructions of foodways. Sayre and Whitehead (2017; see also Sayre et al. 2012) test spatial patterns of plant-related activities between domestic and ritual architectural space at Conchopata (see Chapter II). Investigating the use of space at the site, Sayre and Whitehead find quinoa to be the most abundant and ubiquitous plant recovered, followed by molle, maize, and parenchyma tissue (e.g., potato) (Sayre and Whitehead 2017:Table 6.1). The authors argue that brewing remains are more associated with ritual contexts and the remains of comestible plants are more related to households (Sayre and Whitehead 2017:139). They interpret their findings as evidence for the presence of large communal feasts involving *chicha* alongside the remains of quotidian meals, though boundaries of ritual and domestic spaces appear to overlap, which the authors suggest may be further untangled using multivariate analysis (Sayre and Whitehead 2017:139).

The second approach uses quantitative analysis of plant remains as the starting point for spatial analysis (VanDerwarker et al. 2014:208). Using this approach, neither prior designations of functional categories nor definitions of public/private, elite/non-elite, etc., are used. Instead, this method uses data from activity spaces, floors, and features as the starting point of exploratory analysis to 1) identify features that deviate from the central tendency of the plant assemblage, or 2) place plant remains on a plot in order to determine relationships of association or clusters (VanDerwarker et al. 2014:208). This approach employs exploratory methods of data analysis, such as principle components analysis or correspondence analysis, which do not rely on previously ascribed contextual interpretations but instead use plant data as a baseline from which functional categories may be determined.

One example of a case study employing this approach comes from the Upper Saratown, a seventeenth century archaeological site in North Carolina (VanDerwarker et al. 2007). The authors are interested in the daily menus of the inhabitants of Upper Saratown and whether these quotidian foods differ from feasts, possibly including exotic, unusual, or special combinations of foods. Using principle components analysis, VanDerwarker and colleagues identified two features that deviated from the central tendency (2007:Figures 2-7, 2-8, and 2-9). This is due to Feature 52 comprising mainly maize cob, maize cupule, grape (*Vitis* sp.), plum (*Prunus americana*), peach (*Prunus persica*), maypop (*Passiflora incarnanta*), and ragweed (*Ambrosia* sp.) while Feature 170 is dominated by maize kernel, bean, sunflower (*Helianthus annuus*), acorn (*Quercus* sp.) meat/shell, and hickory nutshell; both features contain an inordinate amount of maize differentiating them from the rest of the features at the site. Comparing the makeup of these features to the domestic assemblage, the authors conclude that the plant remains from Features 52 and 170 stand out from other features at Upper Saratown. The authors interpret the differences between the plant assemblage from Features 52 and 170 as relating to revitalization of traditional foodways as a result of contact with Europeans and the adoption of non-native comestibles.

Drawing on these previous studies, my approach to characterizing quotidian foodways focuses on identifying outliers in the botanic assemblages as a means to distinguish unique contexts associated with food activities. I use boxplots and heat maps of species density measures to identify features the deviate from the assemblage norms. Maize kernel to cupule ratios are used to assess locations of maize processing and cooking to illustrate spatial differences in maize-based food activities. Finally, correspondence analysis is used to assess the association between structures and plant taxa. Taking these methods together, I hope to demonstrate site-level patterns in foodways that may be compared qualitatively to gain a deeper characterization of intersite and intrasite Wari provincial foodways.

Investigating Spatial Organization of Food-Related Activities at Cerro Baúl

I begin my spatial analysis of plant resources at Cerro Baúl by focusing on five plant taxa, including: maize, molle, quinoa, beans, and capsicum. In the previous chapter, I identified these five taxa as present at all Wari sites analyzed in this dissertation. Here, I use boxplots to present density data from all units at the site in order to identify samples/units that represent statistical outliers (see VanDerwarker et al. 2014:222). These samples may represent distinct contexts of plant use, providing evidence for divisions in the organization of plant activities among the sites.

Beginning with maize, including maize kernels, cupules, embryos, and cobs, I find a wide range of maize densities at Cerro Baúl (Figure 5.1). There are three outliers present within the maize data, all of which come from Unit 41 Room E Feature 3. This feature was identified as an ash lens with large amounts of wood charcoal and plant remains. Maize was present in this feature alongside molle, common bean, quinoa, zapallo, *Portulaca* sp., and some wild gathered plants (e.g., *Atriplex* sp., *Verbena* sp.).

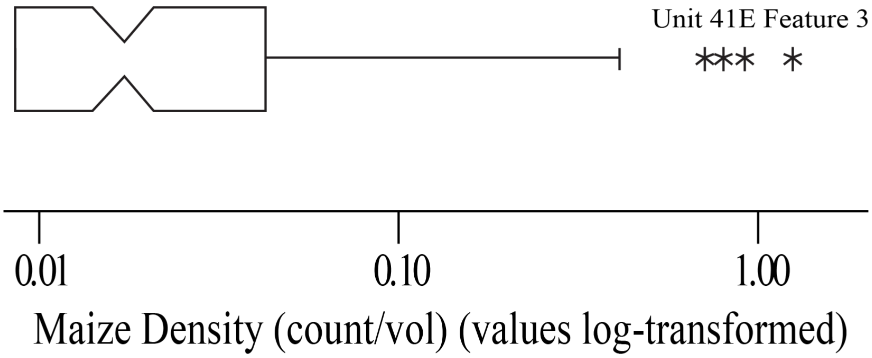

Figure 5.1 Total Maize Densities Across Cerro Baúl Units

Using a maize kernel to cupule ratio is one way to assess the level of maize processing that took place in a context (see Scarry and Steponaitis 1997:117; VanDerwarker 2007:102). Before maize kernels can be ground into flour they must be removed from the cob, resulting in the separation of kernels from cupules and cobs. The results are potential differences in the densities of maize parts throughout an archaeological site related to the organization of plant-based activities at the site. A lower kernel to cupule ratio indicates higher levels of maize processing took place in a particular context. On the other hand, a higher kernel to cupule ratio, which indicates more kernels are present relative to cupules in a given context, would suggest more cooking or consumption of maize occurred (Scarry and Steponaitis 1997:117). This measure has potential for illuminating past processing, cooking, and consumption activities as well as informing on differences in identity related to food, including gender and sociopolitical status, as well as labor practices.

Table 5.1 presents the results of the kernel to cupule calculation using absolute counts of maize from samples which have both maize kernels and cupules present. Considering the unit mean, I find Units 9 and 41, both of which are part of the patio group compound, to have the highest average kernel to cupule ratio. These figures not only demonstrate that Wari elite contexts at Cerro Baúl are most associated with high maize abundance, but more specifically that these units are also associated with maize kernels (the part meant for consumption) than any other unit at the site.

The presence of both fermentable and non-fermentable plant remains in this feature make it likely that the context represents the residues of cooked meals rather than *chicha* production (see Biwer and VanDerwarker 2015; Goldstein et al. 2009). Further, taking the mean maize density and kernel to cupule ratio together I interpret these data to suggest that the residents of the patio group were provisioned with shelled maize. The mean kernel to cupule ratio for non-elite contexts at Cerro Baúl (Table 5.1), including Units 7, 24, 26, and 42, are generally lower than Units 9 and 41, suggesting that while Wari non-elite foodways at Cerro Baúl did include maize non-elite households may have had had to engage in more processing activities than elite households. There is, however, no statistical difference in maize remains between elite and non-elite contexts (p-value=.43).

Table 5.1 Maize Kernel to Cupule Ratio by Sample for Cerro Baúl[11]

Sample	Unit	Context	Maize Kernels	Maize Cupules	Kernel to Cupule Ratio
21	7 F	Possible Elite	1	1	1.0
				Unit Mean	**1.0**
30	9 F	Elite	2	2	1.0
39	9 F1	Elite	46	1	46.0
				Unit Mean	**23.5**
97	24 A	Non-elite	9	3	3.0
73	24 A	Non-elite	2	2	1.0
102	24 B	Non-elite	1	2	0.5
59	24 C	Non-elite	2	1	2.0
				Unit Mean	**1.6**
109	26 A1	Possible Ritual	2	12	0.2
110	26 A1	Possible Ritual	4	48	0.1
				Unit Mean	**0.1**
105	41 A	Elite	2	1	2.0
28	41 A	Elite	8	5	1.6
6	41 B	Elite	36	1	36.0
107	41 B	Elite	5	6	0.8
10	41 C	Elite	3	1	3.0
8	41 C	Elite	1	1	1.0
				Unit Mean	**7.4**
99	41 E	Elite	107	1	107.0
98	41 E	Elite	145	3	48.3
100	41 E	Elite	93	5	18.6
				Unit Mean	**57.97**
117	42 A	Public	23	5	4.6
66	42 A	Public	6	3	2.0
116	42 A	Public	25	25	1.0
115	42 A	Public	12	14	0.9
				Unit Mean	**2.1**

It is possible, however, that some of these residues are the results of ritual activities (see Glowacki 2005, Nash and deFrance 2019) where the cobs were burned with kernels attached. While it is possible the maize residues could have been deposited in this context as a result of ritual activity, I would expect kernels, cupules, embryos, and cob fragments to be recovered in relatively equal amounts as a result of maize burning on the cob. Instead, the kernel to cupule ratios from this compound indicate maize kernels were primarily associated

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[11] Unit 41 Room E is presented separate from the rest of Unit 41 because the units are not directly accessible to one another

with this space. Thus, the association with maize kernels is indicative of a cooking context rather than a ritual deposit. However, regardless of secular vs. ritual use of maize in this context, the residents of the patio group compound appear to have been provisioned with shelled maize.

It is interesting that Unit 42, a food preparation room that makes up part of the brewery likely used for processing plants for food (and/or possibly *chicha*), has the fourth highest mean kernel to cupule ratio (2.1) at the site, though it is considerably lower than Units 9 and 41 (Table 5.1). Therefore, the brewery was likely not provisioned with shelled maize. Instead it appears that maize was both removed from the cob and cooked in Unit 42. This pattern is more in line with non-patio group maize processing activities (Units 7, 24 Room B and C, and possibly Unit 26) than the patio group context.

Next, I compare molle remains between units. Figure 5.2 reveals that the range of molle densities between units is considerable. There are, however, no apparent outliers within the dataset indicating molle density is comparable across all units. This pattern reveals that within the sampled contexts, *chicha de molle* brewing and/or discard of dregs was extensively practiced at Cerro Baúl. It is reasonable to conclude that similar densities of molle across units, including elite, non-elite and specialized locations for public feasting, suggests that *chicha de molle* was a collective part of Wari food-related activities at the site. These findings add to the growing pattern of molle not only being ubiquitous at Wari sites, and therefore associated with multiple social, political, and economic contexts (Sayre and Whitehead 2018; Sayre et al. 2012), but also as related to Wari identity (*sensu* Goldstein et al. 2009), though *not* exclusively elite identity.

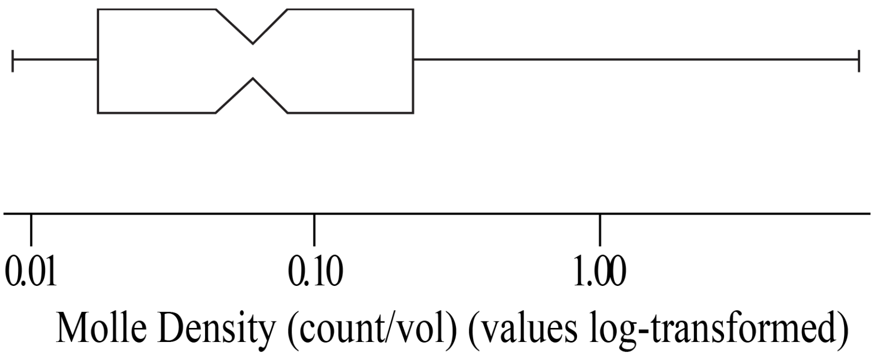

Figure 5.2 Total Molle Densities Across Cerro Baúl Units

There are, however, some differences in molle density present within the dataset. For example, molle density is higher in Unit 41 Rooms A, B, and C than in Unit 9 (Figure 5.3). Unit 41 Rooms A, B, and C are interpreted as multi-use domestic contexts for food preparation, craft production, or other household actives, and form part of the compound associated with the Unit 9 elite patio group (see Moseley et al. 2005; Nash 2012a; Nash and deFrance 2019). However, Nash (2010) reports a lack of fermentation vessels or large hearth features associated with brewing *chicha* in this context. Thus, a high molle density in Unit 41 Rooms A, B, and C may represent the discard of molle (the majority of which is processed) dregs. It is unclear at this time where the *chicha de molle* was produced, whether in the brewery, nearby domestic space, or elsewhere, at this time. Nevertheless, molle appears to be more associated with Unit 41 Rooms A, B, and C than Unit 9.

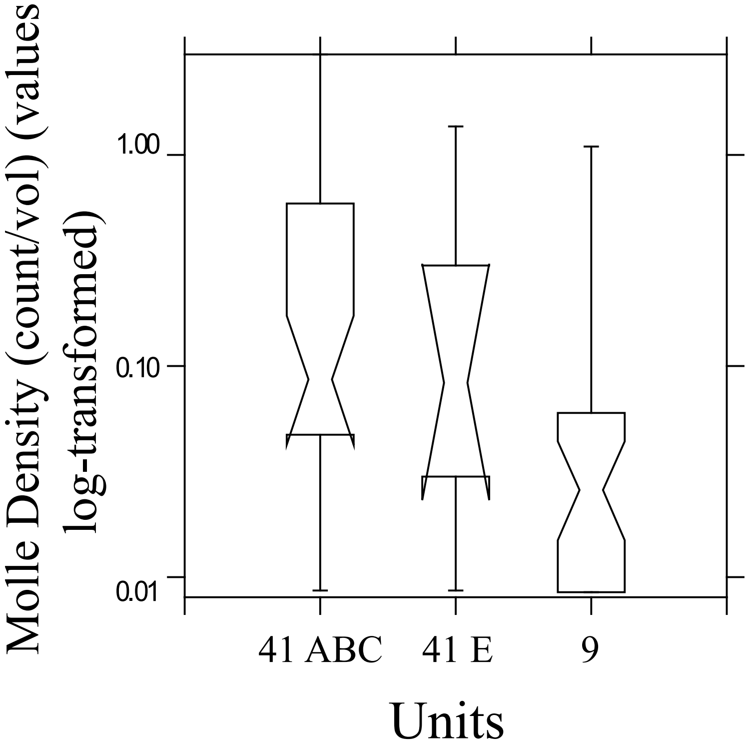

Figure 5.3 Molle Densities from Units 9 and 41 Rooms ABC and Room E

Similar to molle, I found quinoa to have a wide range of densities at Cerro Baúl (Figure 5.4). There are, however, no statistical outliers of quinoa in the dataset. This pattern shows that the abundance of quinoa recovered from each of the included units, while variable, is comparable. This does not mean that quinoa is equally associated with all units, as I will demonstrate in the following section when I employ correspondence analysis to test for spatial associations between the archaeological units and plant taxa. It does imply, however, that quinoa was a part of quotidian foodways throughout the site and may not be segregated by socioeconomic class or use contexts.

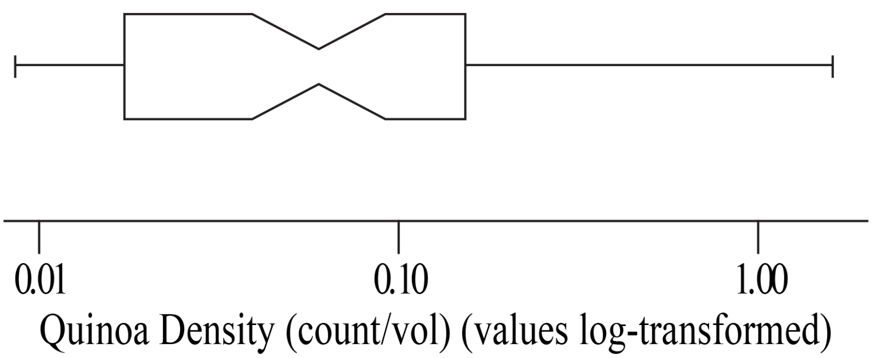

Figure 5.4 Total Quinoa Densities Across Cerro Baúl Units

Overall, frequencies of common bean at Cerro Baúl are low with many units yielding only one or two specimens. The low rate of recovery of beans is to be expected as the cotyledons represent the consumable portion of the seed and thus do not often make it into the archaeological record. Comparing densities of beans, one outlier and a second far outlier can be observed (Figure 5.5). Both of these outliers are located in Unit 42, the brewery room that was the location of intensive food processing. The association between the Brewery (Units 1 and 42) and beans, along with other comestible plants, may representing not only brewing activities but also the preparation of food for Wari feasting events (Moseley et al. 2005; Nash 2012b). It is interesting that beans are not present in high densities in either the elite compound (Unit 9, Unit 25, Unit 40 Rooms A and C, and Unit 41) or non-elite contexts (Units 7, 24, 26), suggesting they played a larger role in commensal feasting practices than in quotidian (elite or non-elite) foodways at Cerro Baúl.

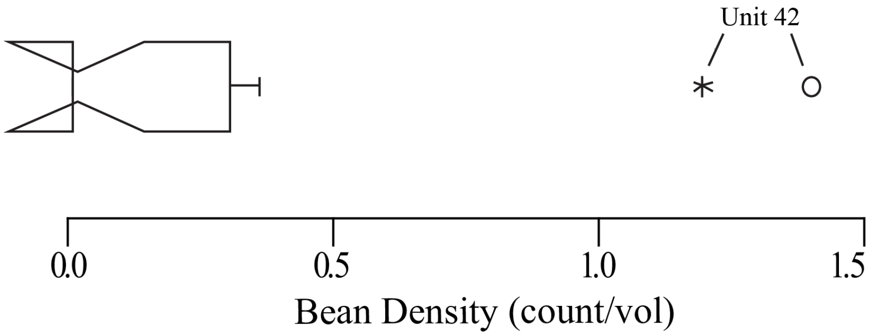

Figure 5.5 Total Bean Densities Across Cerro Baúl Units

Finally, the boxplot comparing chili pepper densities across Cerro Baúl reveals two outliers (Figure 5.6). The sampled contexts from Unit 24 Room A (outermost asterisk) and Unit 26 (innermost asterisk) are statistical outliers for median density of Capsicum in the botanic assemblage. As noted above, Unit 24 Room A is a domestic context adjacent to the elite patio group that contained large amounts of domestic refuse, including: lithics, ceramics, animal bone, and botanic remains. A large amount of molle was also recovered from Unit 24 Room A (see Goldstein et al. 2009:152). Overall, these remains likely represent domestic refuse from food processing and/or cooking.

The association of chili pepper outliers with Unit 26 is noteworthy. Known as the temple annex, the function of Unit 26 is currently unclear. The proximity up Unit 26 to the adjacent D-shaped temple, however, suggests that it may have been a storage or receiving area associated with the temple activities. Faunal remains recovered from this unit represent locally available species including two camelid offerings (llama/alpaca), lizards, and rodents (deFrance 2014). One of the camelid offerings (which was especially well-preserved) was butchered, defleshed, and rearticulated before internment (deFrance 2014:79). The elevated levels of chili peppers in Unit 26 and capsicum suggests that plant food-related activities were also part of the temple events; a dedicated hearth on the western end of the unit supports the idea that the space functioned, at least partially, as an area for preparing or cooking food. Perhaps there is a connection between the Temple Annex and food-based activities? A comparison of faunal and plant remains from the Temple Annex is necessary to elucidate the role of both plant and animal foods in ritual activities.

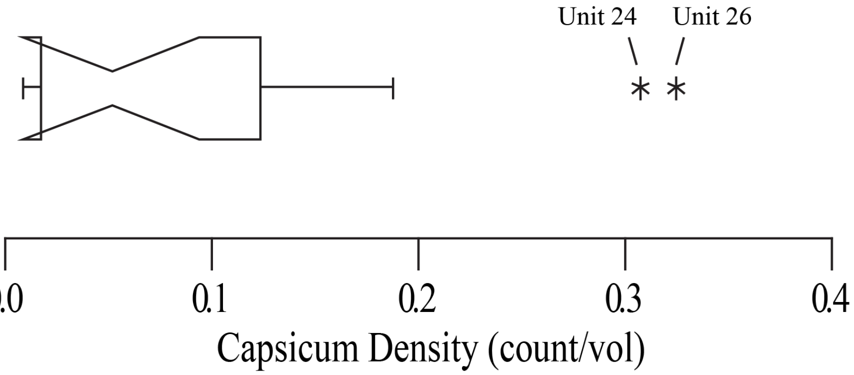

Figure 5.6 Total Capsicum Densities Across Cerro Baúl Units

What do these results contribute to our understanding of the organization of food-based activities at Cerro Baúl? I have shown access to and/or use of maize was not uniform throughout the site. Compared to other units, the elite compound (Unit 9, Unit 41) had maize densities far above the norm compared to the other units. The association between maize and elite contexts reveals the crop contributed a significant portion to the occupants' daily foodways. This is not to say, however, that maize was not a part of the diet of Cerro Baúl residents of lower socioeconomic statuses. Indeed, non-elite domestic contexts also provided evidence of maize remains signaling maize was part of the diet of lower-status residents, but in lower densities as compared to the elite. The brewery food processing room (Unit 42) also has a high density of maize remains. These remains may represent the residues of meals for state-sponsored feasts produced within the brewery. Unit 42, however, is part of the larger brewery context. Therefore, we cannot rule out that the maize remains in this unit, which are also associated with quinoa and beans, represent a *chicha* boiling context that operated on a smaller-scale than the boiling room in Unit 1 (see Moseley et al. 2005).

There are also apparent differences in the location and intensity of maize processing at Cerro Baúl. In particular, the plant data suggest that Unit 41 was a domestic space where large amounts of maize kernels were cooked yet little maize processing took place. Consequently, the residents (or household staff) of the patio group received shelled maize ready to be cooked and/or stored, a privilege afforded to them by their elevated status. In comparison, Units 7, 24 and 26 display the lowest kernel to cupule ratios at the site, suggesting the inhabitants engaged in higher levels of maize processing, possibly for transport to other households alongside fulfilling their own subsistence needs. One speculative explanation for the high levels of maize processing in Unit 26 is that maize was prepared in this unit and then brought to the nearby D-shape temple (Unit 10) for use in ritual activities.

Based on the available data, maize kernels were likely removed from the cob/processed at locations outside of the elite compound before transport to Units 9 and 41 for cooking. It is also feasible that maize was removed from the cob off-site (e.g., in fields) resulting in a low representation of maize cupules in the assemblage; 17 of the 22 samples from which kernel to cupule ratios were calculated show either more or equal numbers of kernels relative to cupules, suggesting that a portion of the maize brought to the site may have been already shelled. This makes sense logistically, as removing the kernels from the cobs would reduce both weight and bulk during transport to the top of the mesa. On the other hand, maize stores better on the cob, implying that maize storage could have taken place off site (perhaps at the base of Cerro Baúl) as well.

The patterns of molle distribution at Cerro Baúl are compelling. Building on previous research (e.g., Goldstein et al. 2009; Moseley et al. 2005), I find molle to be ubiquitous throughout Cerro Baúl. As I have demonstrated, there are no statistical outliers for molle present in the dataset, suggesting no analyzed contexts had significantly more molle seeds than others. There are, however, differences in molle density when comparing units. For example, I have shown that Unit 41 has higher densities of molle than Unit 9. Considered alongside the maize data, Unit 41 could have been the location for brewing *chicha* together with other cooking activities. Unit 9 was not only an elite domestic patio group, but also a center private politics involving feasting with various foods and *chicha* made with molle and/or other ingredients (deFrance 2014; Moseley et al. 2005; Nash 2012a; Williams et al. 2008). Thus, the *chicha de molle* that may have been brewed in or near Unit 41 was perhaps consumed in the Unit 9 patio group or Unit 25, which archaeologists also interpret as a meeting area for political activities at Cerro Baúl (Moseley et al. 2005; Nash 2011; Nash and Williams 2009:264).

Unit 42, a food processing location within the brewery, provides evidence of elevated densities of beans and large amounts of maize cooking and processing. If the brewery was a location dedicated to the production of *chicha* made from molle and other ingredients (e.g., maize, quinoa, etc.), the association between beans and this processing room suggests that food-related activities beyond brewing took place in Unit 42. Further, while it is likely that some maize processed in this room was intended for making *chicha*, I suggest that a portion could also have been used for other consumption purposes. Therefore, Unit 42 may have been a location for processing and cooking food for feasting-related activities as well as for brewing *chicha* using fermentable grains and fruits, such as maize and molle.

The relationship between architectural space and ají peppers remains is intriguing. Contexts representing outliers for *Capsicum* sp. remains include a midden/domestic context (Unit 24 Room A) as well as the Temple Annex (Unit 26). What is the connection between these spaces and ají? Perhaps the Temple Annex is associated with the ritual functions of the directly adjacent D-shaped temple structure. If so, this would suggest *Capsicum* remains were also important in Wari ritual practice. Ají seeds have been recovered from ritual hearths at the Formative Period site La Galgada in northern Peru (see Grieder et al. 1988). Perhaps ají was ritually burned at Cerro Baúl in a similar way. On the other hand, these rooms may have been a residence for temple officials. Based on the association with *Capsicum* and the Unit 24 patio group, which is interpreted as likely a non-elite household space with mixed domestic and craft production activities, perhaps the *Capsicum* seeds represent the preparation of meals for ritual practitioners or as part of an offering. These hypotheses must be tested to confirm or modify our interpretations of the association between *Capsicum*, ritual, and status at Wari sites.

Investigating Spatial Organization of Food-Related Activities at Quilcapampa

Beginning with a comparison of the total density of plant remains from Units in the central portion of Sector A at Quilcapampa, I find the overall density of plant remains by sample to be relatively comparable (Table 5.2). Some units have a mean density of 1.0 or less, indicating the average density of plant remains are comparatively low. However, Unit 23 (mean density of 1.17), Unit 25 (mean density of 8.74), and Unit 28 (mean density of 158.72), have higher mean densities. Unit 28 has a significantly higher mean density due to the large number of molle seeds recovered from the unit; the high standard deviation for Unit

28 shows that there is a high degree of variation between samples from this unit likely as a result of the large amount of molle.

Table 5.2 Total Densities of Plant Remains from Quilcapampa

Unit	Mean Density	Standard Deviation
17	0.29	0.96
19	0.18	0.45
20	0.05	0.05
21	0.36	1.09
22	0.11	0.20
23	1.17	3.73
24	0.28	0.53
25	1.76	8.74
26	0.13	0.21
27	0.03	0.03
28	158.72	707.76

Beginning my analysis of Quilcapampa plant remains, I found maize abundance (including kernels, cupules, embryos, and cobs) to be highest in units located in the central portion of Sector A (Figure 5.7). Mean maize density is highest in Unit 19 (.93) followed by Units 24 and 25 (.7). There were no outliers present in the dataset.

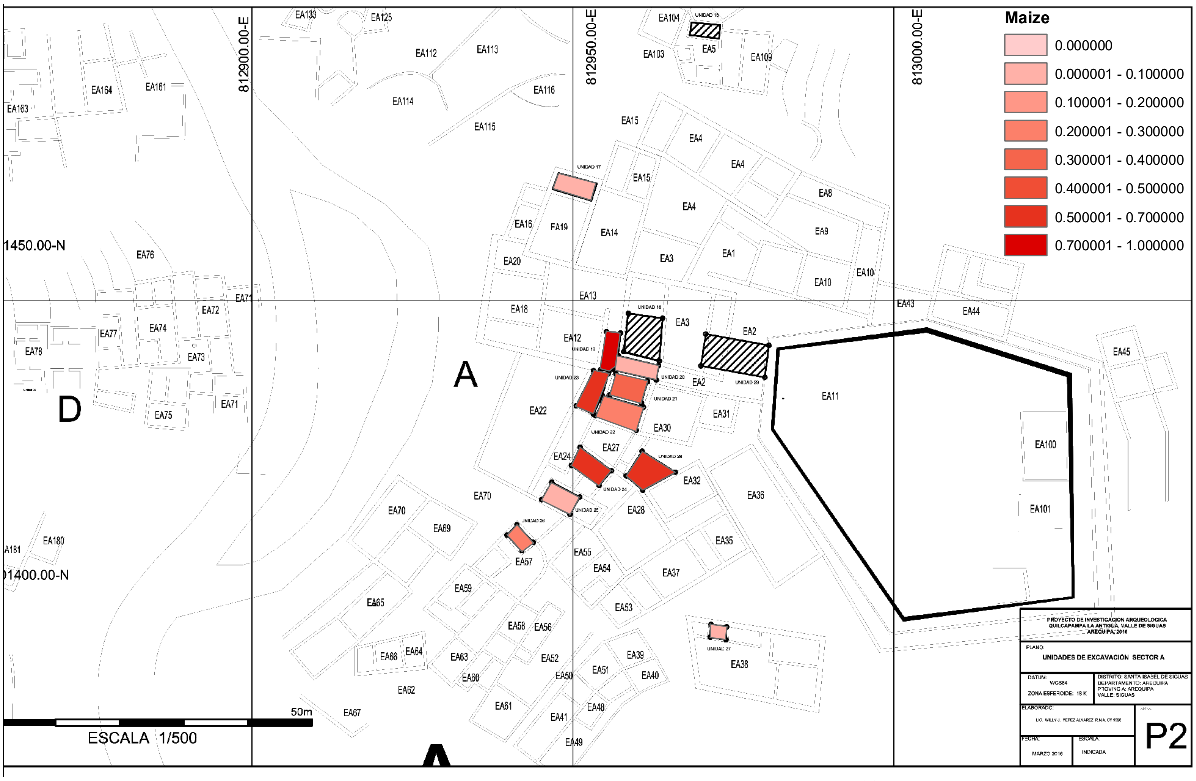

Figure 5.7 Total Maize Mean Densities Across Quilcapampa Units[12]

An analysis of kernel to cupule ratios from Quilcapampa provide evidence for locations of maize cooking and processing (Table 5.3). In particular, Units 21, 23, 25, and 28 are of interest. Unit 25 contains a mixture of high (e.g., Locus 2421=24.25) and low (e.g., Locus 2414=.03) kernel to cupule ratios within the same unit. This reveals that Unit 25 was associated with both the shelling of maize as well as cooking or discard. Units 21 and 23 contain loci with high and low kernel to cupule ratios suggesting they were also associated with maize processing, preparation, and discard. Unit 28, with only one kernel to cupule ratio calculated, shows a high amount of kernels indicative of cooking activities.

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[12] Density maps were created for the Quilcapampa dataset due to the large number of units being compared, which made identifying meaningful patterns using boxplots difficult. Density maps were not created for Cerro Baúl because fewer units were compared.

Accordingly, I interpret these units (21, 23, and 25) as locations where multiple stages of food-related activities occurred.

Table 5.3 Maize Kernel to Cupule Ratio by Sample for Quilcapampa

Locus	Unit	Maize Kernels	Maize Cupules	Kernel to Cupule Ratio
1609	17	13	23	0.57
1610	17	7	49	0.14
			Unit Mean	**0.35**
2021	21	29	155	0.19
2022	21	823	97	8.48
2024	21	12	43	0.28
			Unit Mean	**2.98**
2104	22	41	690	0.06
			Unit Mean	**0.06**
2111	23	12	155	0.08
2213	23	1242	1448	0.86
2214	23	834	468	1.78
2215	23	4	714	0.01
			Unit Mean	**0.68**
2312	24	25	813	0.03
			Unit Mean	**0.03**
2414	25	4	67	0.06
2421	25	97	4	24.25
			Unit Mean	**12.15**
2708	28	162	20	8.10
			Unit Mean	**8.10**

In the previous chapter, I revealed molle was widely distributed at Quilcapampa. There are, however, differences in molle mean densities between the units. Figure 5.8 reveals that while molle was present in most units, the highest concentration was found in Unit 28. Indeed, Locus 2707, located in Unit 28, is identified as an outlier (noted as an asterisk), suggesting the locus represents a special context. Locus 2707 (Figure 5.9) is a large pit of molle located in the southwestern portion of Unit 28, the largest amount of molle recovered from a single locus at the site (n=1,292,092). Recovered alongside the molle pit was domestic pottery and various plant remains, including maize, lucuma, quinoa, ají, pacay, and bean.

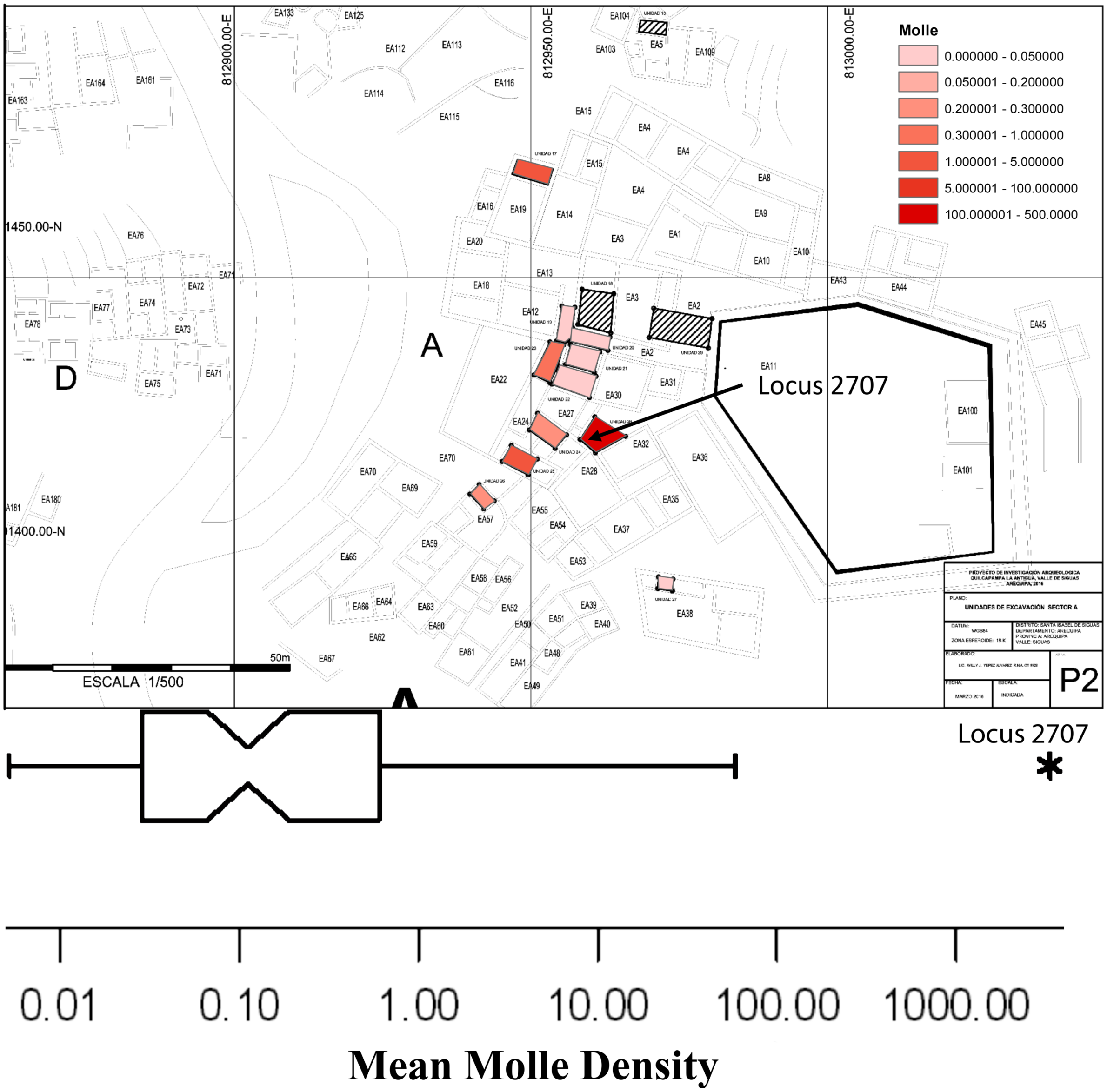

Figure 5.8 Total Molle Mean Densities Across Quilcapampa Units

Figure 5.9 Photo of Unit 28 Locus 2707 (Photo Credit: Patricia Quiñonez Cuzcano)

A large quantity of quinoa (n=25,186) was identified in the Quilcapampa botanic assemblage (see Chapter IV). While the assemblage-wide density of quinoa is high, its distribution is limited. Comparing the mean quinoa densities of the units, I found Unit 23 to have the highest quinoa density (10.9), followed by Unit 22 (2.59) (Figure 5.10). The high density of quinoa recovered from these units, especially Unit 23, lends support to interpretations of these contexts were intensively used for food processing, cooking, or discard.

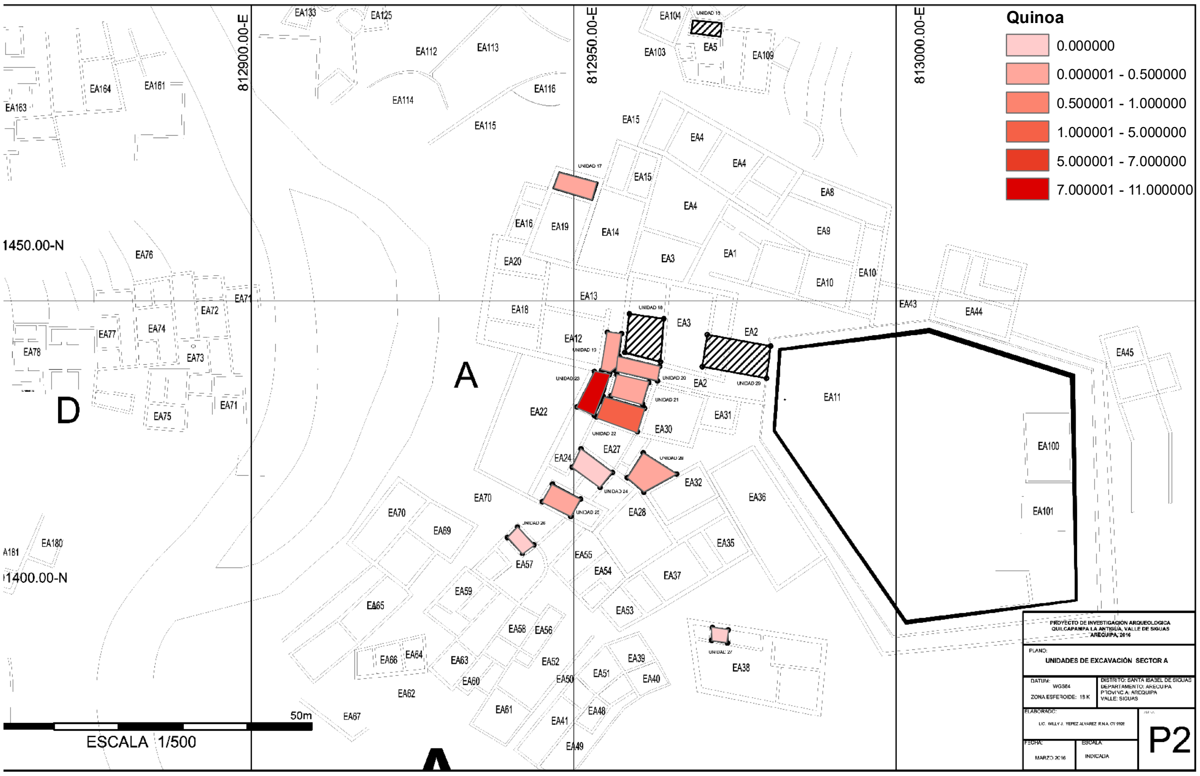

Figure 5.10 Total Quinoa Mean Densities Across Quilcapampa Units

The densities of *Capsicum* remains does not vary significantly from unit to unit (Figure 5.11). Most units in Sector A have a low mean *Capsicum* density (.02-0.1 mean density). The highest mean ají density is in Unit 23 (0.6), which I have suggested to have been a domestic cooking space. Considering these patterns, ají peppers appear to have been associated with most domestic contexts sampled and likely represent typical foods available to most residents of the site.

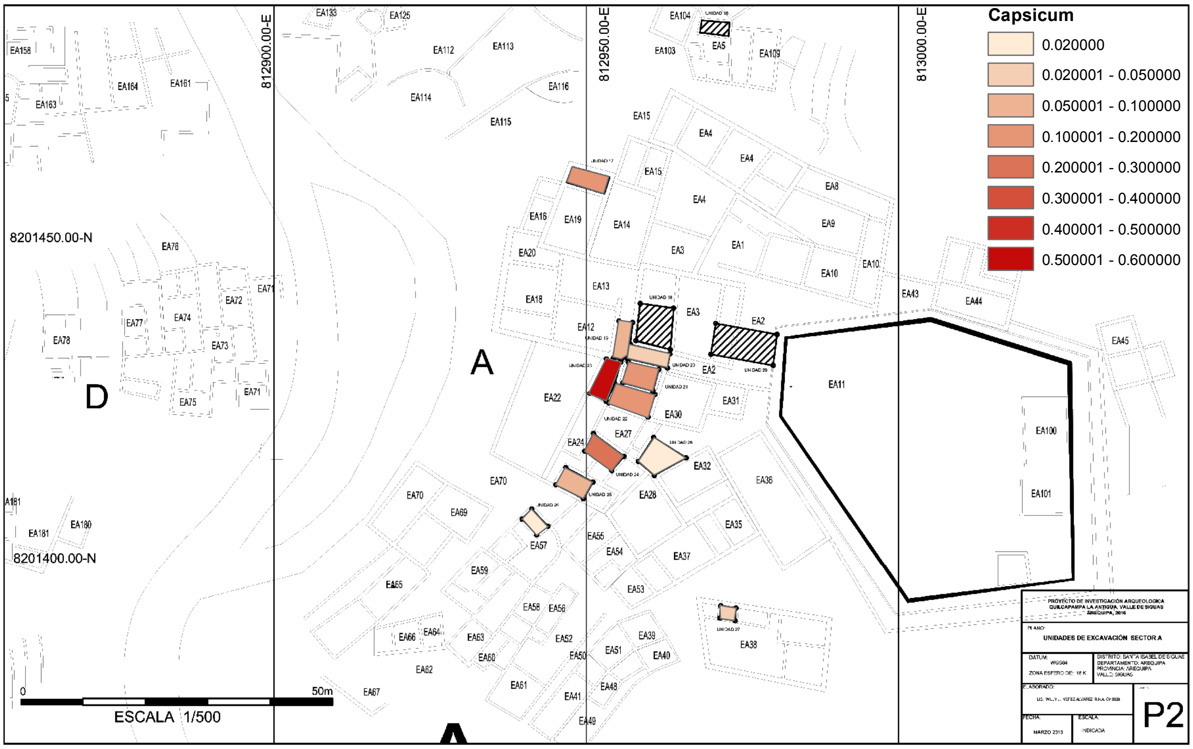

Figure 5.11 Total Capsicum Mean Densities Across Quilcapampa Units

Common beans were found to have a low mean density at Quilcapampa, indicating they were not abundant (Figure 5.12). This is supported by a low ubiquity score of 8% (see Chapter IV) suggesting a low bean distribution. Unit 21 was found to have the highest mean bean density (.39) followed by Unit 23 (.06) and Unit 22 (.02). All other units lacked bean remains. This is not surprising as beans are unlikely to preserve in the archaeological record because the bean itself is a consumable and is often eaten; this could also explain the low density and ubiquity of beans at Quilcapampa.

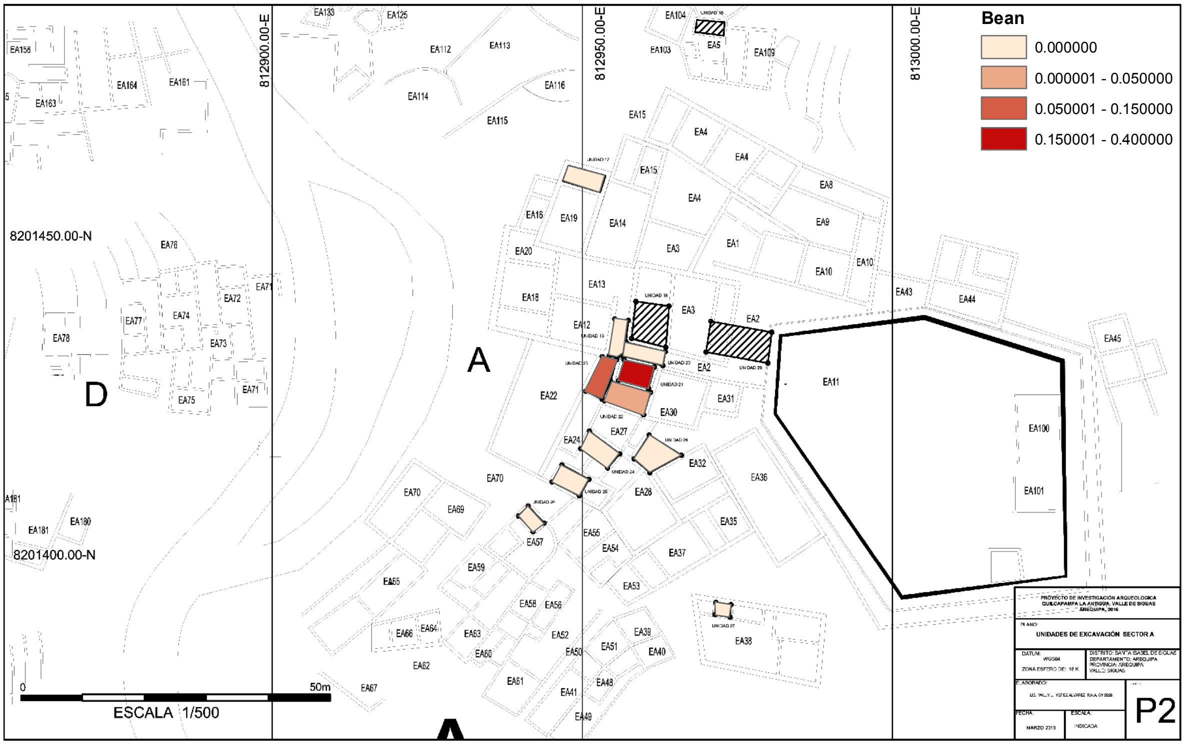

Figure 5.12 Total Common Bean Mean Densities Across Quilcapampa Units

The analysis of the Quilcapampa botanic assemblage reveals several patterns regarding the organization of foodways at the site. The comparison of plant remains between units, including both maize and quinoa, indicates that there were several locations associated with food processing, cooking, and/or discard. These units, specifically Units 21, 23, and 25, appear to be locations of domestic activities involving food. The presence of hearths, middens, domestic pottery, and other household items found during excavation support the interpretation of these spaces acting as locations of processing/discard of plant foods.

The distribution of molle at Quilcapampa is central for defining the organization of foodways at the site. Molle densities are similar between the sampled units, yet a statistical outlier (Unit 28 Locus 2707) was identified. Locus 2707 is a large deposit of molle representing special brewing activities that fall outside of normal use compared to other areas of the site. It can be concluded that the production and/or discard of *chicha de molle* was widespread at Quilcapampa. Unlike Cerro Baúl, a brewery was not identified at Quilcapampa and there does not appear to have been a central location for the brewing of *chicha de molle* or any other alcoholic beverage at the site.

While informative on basic patterns of food-activities at the unit level, further resolution is needed to provide a more detailed representation of plant food processing and discard activities that transcend unit boundaries. To increase the visibility of variation in food activities, I employ correspondence analysis (detailed below) using plant data to examine which features and loci differ significantly from each other in terms of abundance. Using this type of analysis, I hope to designate unique contexts, designate the associations between plant resources, as well as establish clusters of archaeobotanical and architectural remains. The utility of this analysis is to distinguish associations of plant remains to social, political, and/or economic contexts within archaeological sites.

Multivariate Analysis

I now turn to an exploratory multivariate analysis of plant data recovered from features excavated at Cerro Baúl and Quilcapampa. Correspondence analysis is a useful multivariate technique that is well-suited for analyzing archaeobotanical material (see VanDerwarker 2010). This is due to its ability to accommodate: 1) large numbers of species; 2) presence/absence data; and 3) datasets that include numerous zero values, which are common in archaeobotanical analysis (VanDerwarker 2010:86). Correspondence analysis uses nominal (categorical) unstandardized data to calculate the chi-square distance of weighted averages of columns (artifacts, elements, plant taxa, etc.) and rows (contexts, sites, periods, etc.) (see Greenacre 1984; Shennan 1997). The purpose of correspondence analysis is to determine the distances between observed and expected (zero) values; the closer a value is to zero, the closer it is to the expected value. Similar component scores indicate a close relationship while dissimilar scores indicate a weak relationship. The results (component scores) are displayed graphically. The positions of the points on the plot inform on the similarities between the rows, similarities between the columns, and the association between rows and columns (see Baxter 1994; Greenacre 1984; Shennan 1997). This technique is useful because it can assess the presence of rare and/or common plant taxa and measure associations between species data and archaeological space, among other issues (see VanDerwarker 2010:86).

An example of the utility of correspondence analysis using archaeobotanical data is highlighted in VanDerwarker's (2010) case study integrating botanic and faunal data from the site of La Joya in the Sierra de los Tuxtlas in southern Veracruz, Mexico. Using botanic and faunal data from the Early (1,400-1000 B.C.), Late (400 B.C. – A.D. 100), and Terminal (A.D. 100-300) Formative Period occupations, VanDerwarker found that the Early Formative residents of La Joya farmed maize and beans at low levels that did not significantly impact the composition of local fauna. By the Late Formative, however, an increase in the amount of disturbance fauna in the archaeological records, evidenced by similar component scores of disturbance fauna and the Late Formative period, indicates the residents of La Joya significantly altered the ecology of their local landscape (VanDerwarker 2014:Figure 4). This pattern is explained as the result of intensified farming practices from the Early to Late Formative Periods. Further, VanDerwarker (2010:90) shows that the Terminal Formative Period component scores are correlated with wild resources, including fish, waterfowl, arboreal animals, and gathered fruits. This is explained as a diversification of subsistence strategies to include a greater variety of plant and animal foods from an increased range of habitats as a result of the volcanic eruption that occurred during the Terminal Formative period. The correspondence analysis supports the patterns that VanDerwarker made using independent analysis of the botanic and faunal assemblages, emphasizing the utility of the method for integrating datasets.

Cerro Baúl

The first run of correspondence analysis shows most units cluster around the zero value (Figure 5.13) (see Appendix VII for plant counts used in Cerro Baúl CA). There are, however, two units that are pulled away from the cluster around the central tendency. Unit 42 is shown to be associated with common bean, cotton, and algarrobo. This is not surprising due to the large amount of beans recovered from Unit 42 (see above). The other cluster shows Unit 24 Rooms B and C to be clustered around *Portulaca* sp. and quinoa.

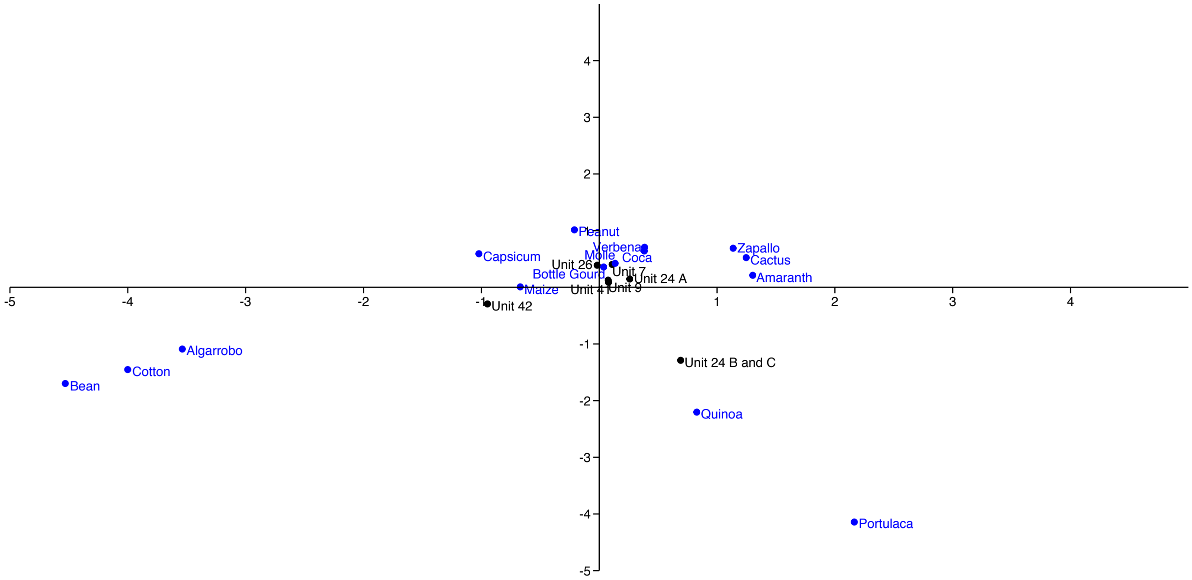

Figure 5.13 Plotted Component Scores from Cerro Baúl Plant Taxa (First Run)

I conducted a second correspondence analysis, removing both Unit 42 and molle (Figure 5.14). Unit 42 likely represents a special context for cooking activities and should not be compared to household foodways. I have previously shown molle to have been present in all contexts, often in high densities, thus skewing potential patterns in the dataset. The removal of Unit 42 and molle from the correspondence analysis will allow for a very different view of the spatial relationships of plant remains and archaeological units to come into focus.[13]

The results of the second run reveal several interesting patterns. In particular, three distinct clusters are identified. Units 7, 9, and 41 cluster together with bean, bottle gourd, maize, verbena, and coca. Unit 26 is pulled away from the rest of these units in association with peanuts, *Capsicum*, and algarrobo. Last, Units 24 Room A and Unit 24 Room B and C are pulled away from the central tendency. Unit 24 Room A is most associated with cactus, amaranth, and zapallo while Unit 24 Room B and C is most associated with portulaca; quinoa appears to be associated with all rooms in Unit 24.

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[13] Data cleaning is standard practice in multivariate analysis because some samples with large or small amounts of taxa can mask real trends (see VanDerwarker et al. 2014:221).

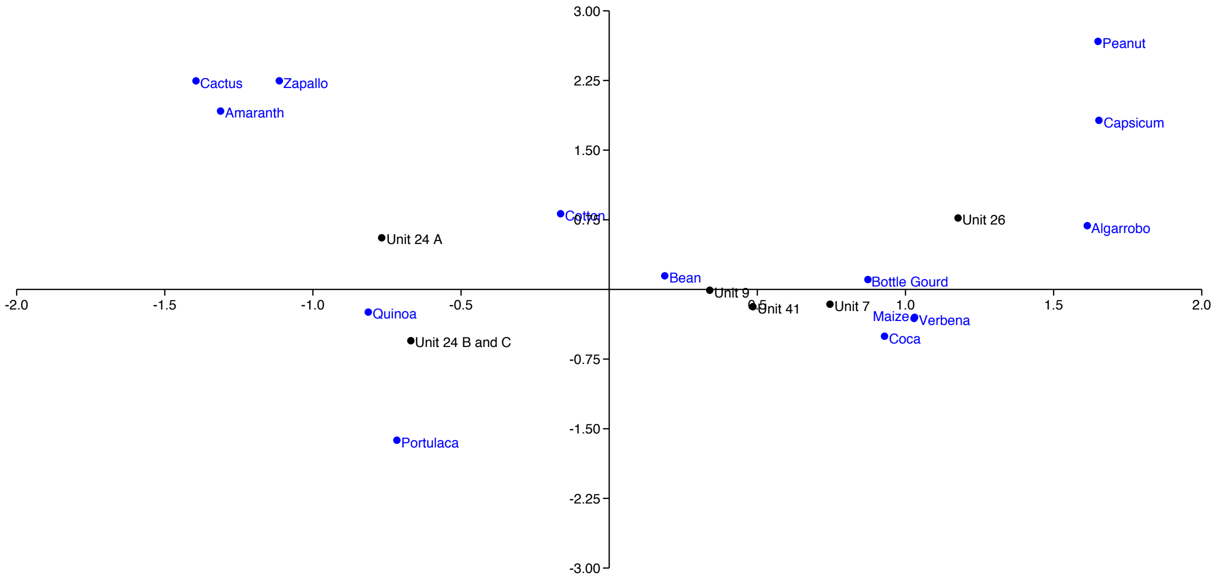

Figure 5.14 Plotted Component Scores of Cerro Baúl Plant Taxa (Second Run)

The results from the correspondence analysis support my previous findings of a close association between maize and the elite compound (specifically Units 9 and 41). In addition, while Unit 42 was initially found to cluster with beans, suggesting the taxon is most associated with the context, the removal of Unit 42 from the analysis shows the elite patio group to be most associated with beans. This suggests that while beans were an important part of commensal feasts, they may also be linked to elite foodways and/or are associated with Wari cuisine. Further, bottle gourd remains, which are used as cups or bowls, suggest a heavy focus on drinking and/or eating in this context. This pattern could be related to *chicha* consumption during both private feasts and quotidian meals in the patio group. The association between coca and the elite patio group is also interesting. It appears that Wari elites at Cerro Baúl had, or perhaps controlled, access to this agricultural product imported to the colony from the coast and/or from the Bolivian *selva*. This pattern is tentative, however, and must be confirmed through further archaeobotanical analysis.

The association of the Temple Annex (Unit 26), with peanut, *Capsicum*, and algarrobo is interesting. Peanuts and *Capsicum* are noted to have been luxury and/or ceremonially-charged foods in Moche contexts (e.g., Donnan 1976; Hastorf 2003b:549). Additionally, these taxa have been recovered from Wari-affiliated sites as offerings for the dead and domestic refuse (Goldstein et al. 2009; Moseley et al. 2005; Tung 2007:260). Published data from the Wari heartland site of Conchopata, however, reveals a conspicuous absence of these species (see Sayre and Whitehead 2018). Nonetheless, it is possible that the association between peanut and capsicum and Unit 26 represents a ritual use context. Due to the lack of analyzed ritual contexts in this dissertation, further research is required to define quotidian vs. ritual foodstuffs at Wari sites before this pattern can be confirmed.

Further, Unit 26 is shown to be somewhat related to the elite compound (Figure 5.14). I have also previously shown that Unit 26 may represent a location of maize processing and cooking as well as an outlier for capsicum, a pattern that the correspondence analysis supports. Taken together, the association between Unit 26 with maize, peanuts, and capsicum suggests that this may represent a unique context of food preparation or cooking, possibly related to elite foodways. But do these data suggest that these plants were used in ritual activities associated with the temple annex?

Unit 24 Room A, a domestic context considered to be part of a non-elite patio group, is associated with cactus, amaranth, and zapallo seeds. Cactus (and perhaps amaranth) is a locally available wild resource that residents gathered, while zapallo was a cultivated product (see Chapter IV). It is interesting that cactus fruit is closely associated with this midden/domestic context, as I have shown wild fruit remains to have been limited to cactus fruit while the only cultivated fruit seeds recovered from the site were aguaymanto. If Unit

24 Room A is indeed a domestic midden/residential context, this may signal that the occupants may have had access to limited fruit resources in the area.

Unit 24 Room A and Unit 24 Rooms B and C are closely associated with quinoa. A determination of whether the quinoa represents wild or domesticated varieties has yet to be carried out, although a cursory examination suggests both wild and domesticated varieties are present in the assemblage. In addition, Unit 24 Rooms B and C also cluster with *Portulaca*, an herbaceous green with many uses (see Chapter IV). I have shown that maize (and possibly beans) are associated with the Wari elites and/or feasting activities at Cerro Baúl. Based on current interpretations of Unit 24 Rooms B and C as a workshop and domestic space, the association between quinoa and *Portulaca* implies these taxa may have connections to lower-status foodways. The connection between quinoa and *Portulaca* will be explored further in Chapter VI.

Quilcapampa

Turning to the results of correspondence analysis of Quilcapampa botanic remains, I graphed the component scores from the first run of correspondence analysis (Figure 5.15) (see Appendix VIII for plant counts used in Quilcapampa CA). Similar to Cerro Baúl, molle is located near the expected value (center) indicating molle occurs throughout all analyzed units at Quilcapampa. The clustering of Units 16, 22, 25, and 28 around zero, shows the widespread and dense presence of molle is skewing other relationships between the plant taxa and archaeological units.

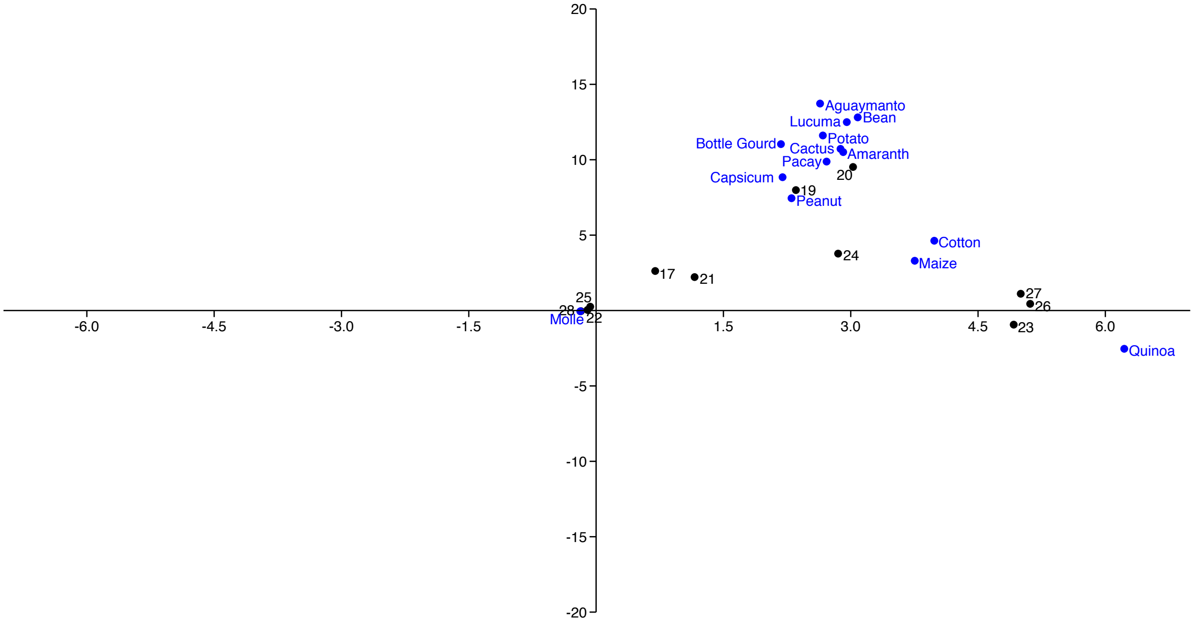

Figure 5.15 Plotted Component Scores from Quilcapampa Plant Taxa (First Run)

In order to reveal more decisive patterns, I removed molle from the correspondence analysis and conducted a second run. The results show a much different representation of the relationships between the plant taxa and the units (Figure 5.16).

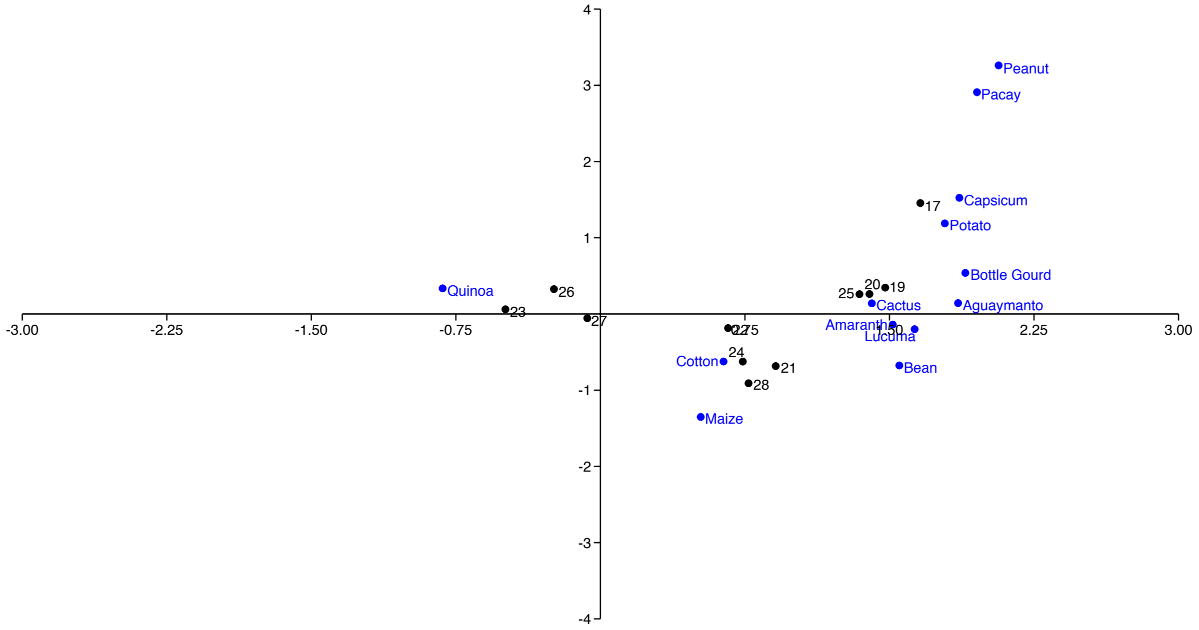

Figure 5.16 Plotted Component Scores from Quilcapampa Plant Taxa (Second Run)

The results of the correspondence analysis show that maize and cotton remains cluster with Units 21, 22, 24, and 28. Although I have presented above that Unit 19 has the highest mean density of maize remains at the site, the results displayed here suggest these taxa are most associated with the aforementioned units. The association of cotton seeds with these areas is equally noteworthy as it possibly indicates that weaving, an essential domestic craft, took place in these spaces alongside food-related activities. Ethnographic and ethnohistoric evidence suggests cooking, brewing *chicha*, and weaving are female-oriented tasks (see Gero 1992; Hastorf and Johannessen 1993; Morris 1979:28; Valdez et al. 2010:28; Weismantel 1988). Therefore, I suggest that these units may represent locations of female activities.

It is perhaps more difficult to interpret the association of quinoa with Units 23, 24, and 27. What would a strong connection with quinoa, but a lack of association with other plant remains and/or archeological units, tell us about the organization of food-related activities in these contexts? A total of 23,871 quinoa seeds were recovered from Unit 23

Locus 2213, 2214, and 2215, much higher than any other excavated unit. The large abundance of quinoa pulled Unit 23 away from other plant remains; I have previously shown Unit 23 to have high mean densities of all five taxa analyzed in this chapter. This points to Unit 23 as having functioned as a location for processing and/or cooking large amounts of plant foods (a kitchen), including much higher levels of quinoa than other units. The presence of a hearth (Unit 23 Locus 2213), faunal remains, lithics, and the remains of plants in association with broken domestic pottery (Unit 23 Locus 2214 and 2215) also supports this interpretation. Unit 24 is a patio which served as a location of quinoa processing and/or discard. Unit 27 has an unclear functional category. Further research on the architectural space and associated artifacts will further elucidate the function of these units.

The third cluster shows Units 19, 20, and 25 to be related based on their associated botanic assemblages. In particular, I find cactus, lucuma, common bean, amaranth, bottle gourd, and aguaymanto remains to be most associated with these contexts. This is interesting given that these plants, which presumably represent common components of domestic foodways, are pulled away from staples, such as maize and quinoa, in the correspondence analysis. As mentioned above, Units 19 and 20 are adjacent passageways connecting rooms at the site; the clustering of the units based on plant remains is not surprising given their proximity. Unit 25, located approximately 25 meters from these units, is interpreted as a food-processing context based on the high density and abundance of botanic and faunal remains. I interpret the lack of association between these units and maize, alongside the clustering of the aforementioned plant food remains, to indicate that different types of food activities related to cooking or discard, rather than processing, took place in these contexts.

The results of the correspondence analysis indicate potato, capsicum, peanut, and pacay are closely associated with Unit 17. This is not surprising given that two *batánes* were recovered in association with large amounts of plant remains directly outside Unit 17 (along the edge of the unit wall) in the patio (Figure 5.17). The location of two large *batánes* in the plaza implies that the area was a location for processing plant remains. Furthermore, the lack of association between Unit 17 and maize is noteworthy. The *batánes* could have been used to process a number of plants yet maize is notably underrepresented in the unit. While maize was recovered here, the results of the correspondence analysis suggest that processing and/or cooking of maize occurred more intensely in other areas of the site.

Figure 5.17 *Batánes* surrounded by a small stone wall located in the plaza directly outside Unit 17 (seen behind the *batánes*) (Photo Credit: Jordan Farfán Lopez)

Discussion

Taking these patterns together, what can we say about the organization of foodways at Cerro Baúl and Quilcapampa? While these sites are certainty distinct in terms of their functions and associations with Wari and local communities, I have identified mutual patterns at the sites allowing for a discussion of Wari cuisine.

Molle is arguably the most significant, albeit contested, taxon associated with Wari cuisine. Based on their analysis of botanical remains from the summit of Cerro Baúl, Goldstein and colleagues (2009:157) suggest *chicha de molle* was an element of Wari elite identity. This pattern has since been revised, based on the recovery of molle from the site of Cerro Mejía (Biwer and Nash 2017; Nash 2012a; Whitehead and Biwer 2012) and Cerro Trapiche (Green and Goldstein 2010), revealing molle was available to a wider range of socioeconomic groups within the Empire than previously understood. While molle (and *chicha de molle*) was available to multiple socioeconomic classes at Cerro Baúl, elites nonetheless would have controlled access and brewing activities to support their elevated status (see Hayden 2001). Further, scholars have noted the presence of molle at other Wari sites, including Conchopata in Ayacucho (Sayre et al. 2012; Sayre and Whitehead 2017) and Beringa in the Majes Valley (Tung 2007:260), suggesting the connection between Wari and molle extends outside Moquegua.

The identified patterns of recovery illustrate molle was ubiquitous at Cerro Baúl, yet spatial variation exists in terms of molle density. I have demonstrated that the elite compound (Unit 9 and 41) and brewery food processing room (Unit 42) are statistical outliers in terms of molle density. The brewery was not only a location for brewing *chicha* but also appears to have been used to prepare other foods for meals and/or commensal feasts, though many of the plants recovered from Unit 42 (e.g., maize, peanuts, quinoa) can also be used to prepare *chicha*. Residents of other areas of the site had access to molle for household brewing (and presumably consumption) but in lower quantities in comparison to their elite counterparts.

The recovery of large amounts of molle from Quilcapampa offers supplementary evidence adding to the growing connection between Wari and molle. The majority of molle recovered from Quilcapampa show signs of being processed, not unlike the molle recovered from Conchopata and Cerro Baúl, indicating it had been soaked and/or boiled and possibly pressed/squeezed to remove the sugars for fermentation (see Chapter IV). Therefore, we can support the hypothesis that *chicha* made with molle and/or other ingredients was brewed at Quilcapampa. The recovery of large amounts of molle at Quilcapampa, in addition to those identified at Hatun Cotuyoc, add to the growing body of literature investigating the ties between Wari and *chicha de molle.*

Similar to Cerro Baúl, molle was ubiquitous at Quilcapampa yet its distribution was uneven. I have identified one unit in particular at Quilcapampa, Unit 28, that has significantly more molle than others. In addition, the results of the kernel-to-cupule ratio analysis indicate Unit 24 was heavily associated with processing maize. Taken together, I suggest this area of the site was heavily involved in both processing and cooking food as well as brewing *chicha.* The lack of high densities of grinding stones, hearths, large boiling and fermentation vessels, etc., that would provide evidence for a dedicated location of *chicha* production at Quilcapampa (see Biwer and VanDerwarker 2015; Jennings and Valdez 2018; Parker and McCool 2015; Valdez 2006), implies *chicha* brewing may have been relegated to the household level. This is a departure from the brewery uncovered at Cerro Baúl.

Nevertheless, I have shown that the production of *chicha de molle* for both daily (and possibly for special events/feasts) likely occurred at Quilcapampa in broadly similar ways as at Cerro Baúl.

Recently, Jennings and Valdez (2018) have called into question Wari preference for *chicha de molle.* The authors argue that while *chicha de molle* brewing did occur at Wari sites, the large amounts of molle remains at these locals do not necessarily indicate Wari *preference* for *chicha de molle* over other *chichas* (e.g., maize, peanut). As an alternative hypothesis for explaining the large number of molle seeds that appear at Wari sites, Jennings and Valdez (*ibid*) suggest molle drupes may have been collected for use as fuel. The authors further suggest (2018:310) that the lack of ability to consume molle seeds could have resulted in the incremental accumulation of these seeds at Wari (or Wari-affiliated) sites and thus skewing interpretations of molle presence and use. Jennings and Valdez (*ibid*) also point out that the equipment needed to brew, including groundstones and fermenting jars, can indicate more generalized *chicha* (e.g., maize or other) production and do not necessarily reflect preferential brewing of *chicha de molle*.

While I agree with Jennings and Valdez (2018) that the equipment needed to brew *chichas* is very general, I believe the suggestion that molle drupes were collected solely for the purpose of using them as fuel for fires is questionable. First, the majority of molle drupes recovered from Quilcapampa and Cerro Baúl are desiccated, suggesting molle was not often burned at the site. While carbonization would result in the loss of some of the drupes, molle is dense enough that I would expect to find higher frequencies of carbonized molle seeds if indeed they were used as fuel. Further, the identification of large pits of molle at Wari sites calls into question the primary use of molle drupes as fuel; why would large pits of desiccated molle be recovered from Wari sites (and local indigenous sites) if the primary purpose was to burn them in hearths? It is more likely that molle drupes were used to brew *chicha,* either being soaked or boiled, after which the remains were discarded or used a fill, though some remains could certainly have been used for fuel similar to nutshell after the nutmeat is removed, or simply burned alongside other refuse.

I also call into question the argument that Jennings and Valdez (2018) put forward regarding the role of molle in Wari cuisine. Hastorf (2017:67) defines cuisine as, "a unique and consistent set of ingredients, cooking techniques, and flavor principles, carrying psychological, social, and religious attitudes toward food, eating practices, and meals" (see Chapter II). Further, the gastronomic preferences and habits of communities can be used as a means for defining ethnicity (e.g., Douglas 1984; Goody 1982). For example, there are many references to alcohol as a marker of identity and ethnicity in Andean ethnography and ethnohistorical documents (see Allen 1988; Cobo 1964; Garcilaso de la Vega 1966 [1609]; Guaman Poma 1980 [1615]). Based on: 1) the occurrence of molle at multiple provincial Wari sites; 2) molle often being the densest and most ubiquitous taxon recovered from provincial Wari sites; and 3) evidence of processed (soaked/boiled) unburned molle at these sites, I maintain *chicha de molle* was a significant part of Wari cuisine and a defining aspect of Wari ethnic identity (sensu Goldstein et al. 2009; Sayre et al 2012). It is possible that *chicha de molle* was not the preferred, or even exclusively produced, *chicha* of the Wari Empire; scholars (see Goldstein et al. 2009; Jennings and Valdez 2018; Sayre et al. 2012; Valdez 2006) have pointed out that that other ingredients could have been used by Wari peoples to produce *chicha*. The evidence presented here, however, supports a profound connection between Wari provincial sites and *chicha de molle*.

The organization of maize processing and distribution at Cerro Baúl and Quilcapampa provide insight into Wari provincial foodways. According to published stable isotope data from Ayacucho, maize was a staple for Wari peoples yet there are no apparent differences in maize consumption based on gender (Finucane et al. 2006) or socioeconomic status (Finucane 2009); maize was a staple food for all socioeconomic statuses and both sexes in the heartland. Recent stable isotope analysis human bone and tooth enamel from Hatun Cotuyoc in Cusco also reveal a focus on C_4 plants (i.e., maize) as well as terrestrial meats (Turner et al. 2018). Furthermore, the analysis of macrobotanical remains from Conchopata reveals maize to be evenly distributed between domestic and ceremonial contexts, which Sayre and Whitehead (2017:134) suggest reflects maize consumption in the form of solid food as well as *chicha*.

Wari cemeteries have yet to be identified at Cerro Baúl and Quilcapampa, and too few Middle Horizon human burials have been recovered to conduct stable isotope analysis. The macrobotanical data from Cerro Baúl, however, indicate that access to maize was not uniform, but instead was based on socioeconomic status. Indeed, maize is ubiquitous at Cerro Baúl, suggesting most residents had access to some maize, yet the grain is most associated with the elite food processing context (Unit 41, or also perhaps Unit 25 [see Nash 2010]), elite domestic contexts (Unit 9), and Unit 7 (possibly associated with Unit 9). There is additional evidence for differences in food based on socioeconomic status at Cerro Baúl. Indeed, deFrance (2014) found that the occupants of Unit 9 had a more diverse diet than other members of the colony. Taken together, the available macrobotanical evidence indicates elites had greater access to, or control of, maize resources at Cerro Baúl and that plant foods contributed to social distinctions at the site in similar ways as animal foods did.

While maize was a staple for Wari populations at these sites, the differences in the organization and distribution of maize at Cerro Baúl and Quilcapampa suggest slightly different approaches to agricultural production and political organization at the sites. Most residents at Quilcapampa appear to have engaged in a similar suite of maize-based activities to a greater extent than the residents of the Cerro Baúl colony. Further, unlike Cerro Baúl elites who received shelled maize, the residents of Quilcapampa appear to have regularly taken part in both the processing and cooking of maize in the same locations. Units 21, 23, 24, and 25 appear to have been strongly associated with both processing and cooking maize. Maize was found to cluster with several domestic units, yet the kernel to cupule ratios show that no one space had more (shelled) maize kernels than others.

It is unclear at this point if there are identifying differences in status between the residences at Quilcapampa in terms of food. It appears that maize was not used to support the status of local elites at Quilcapampa in the same way it was at Cerro Baúl, pointing to opposing strategies for defining social, economic, and political stratification at the sites. Similar to Hastorf's (1990) case study of Sausa agricultural production before and after Inka conquest of the region, control over maize production and distribution, among other plants, appears to have been a defining characteristic of Wari elite status at Cerro Baúl. In contrast, the residents of Quilcapampa appear to have placed less emphasis on control over maize production as a marker of status. Instead, Quilcapampa households both processed and cooked maize, and differences in maize presence between households were not present; no loci were identified as outliers in terms of maize density.

The identified differences in maize use and distribution at Cerro Baúl and Quilcapampa may be due to differences in site function. Quilcapampa is a small site built during the early 9th century and likely served as a waystation along a Wari road (Jennings et al. 2018; Williams 2017). In comparison, Cerro Baúl is an administrative site constructed during the early 7th century with heavy investment in agricultural production and distinct signs of differences in socioeconomic status between households (e.g., Mosley et al. 2005; Nash 2011; Nash and deFrance 2019; Nash and Williams 2009; Williams 2001, 2006; Williams and Nash 2002, Williams et al. 2008). Therefore, the differences in maize-based activities between the sites may speak to variations in maize use throughout the Wari Empire more so than highlighting opposing strategies for supporting socioeconomic status.

Quinoa was common in Wari provincial foodways. At Cerro Baúl, the results of the ubiquity analysis indicate that it is widespread (70% ubiquity) yet there are no statistical outliers present suggesting no one context is more associated with quinoa than others. At Quilcapampa, quinoa has a 43% ubiquity index with no statistical outliers present in the dataset. The highest concentration of quinoa is in Unit 23, which is interpreted as a domestic space that may be associated with high-status residents. On the other hand, based on the results of correspondence analysis at Cerro Baúl I found quinoa not to be associated with the patio group (Unit 9 and 41) but instead with the domestic space/workshop (Unit 24 Rooms B and C) used by lower status residents.

Consequently, the patterns of quinoa recovery at the two sites are at odds. At Cerro Baúl quinoa is not associated with the elite patio group. While it is likely that most residences on the summit of Cerro Baúl were occupied by higher-status individuals as compared to Cerro Mejía or Cerro Petroglifo, we cannot assume that all residents at the summit were equal in terms of social status; perhaps the residents of Unit 24 Rooms B and C were higher status, but not high enough to have access to elite foods, such as maize, beans, and *Capsicum*? It is also possible the residents were artisans or servants. At Quilcapampa, however, quinoa has a more mixed representation. Correspondence analysis reveals that quinoa was associated with cooking activities in Unit 23, which I tentatively interpret as a kitchen context, as well as Units 24 and 27.

I have also identified common beans as a recurring plant food included in Wari provincial foodways. Common bean is not widely distributed, however, at Cerro Baúl. Instead, beans are most associated with the brewery food processing room (Unit 42). Beans are not overly present in other units and have a low ubiquity. Similar to Cerro Baúl, beans are not widely distributed at Quilcapampa and have a similarly low ubiquity, signifying a lack of widespread distribution and use. Beans were most associated with Units 19, 20, and 25. Units 19 and 20 are interpreted as corridors between plazas and rooms, suggesting the botanical refuse accumulation (e.g., ají, cotton, maize, molle, squash, quinoa) here may have been deposited as a result of domestic discard of cooking activities associated with Units 18 and 21. Unit 25 is a domestic space with large amounts of botanic remains and a hearth, indicating beans were available to the occupants.

Overall, the available data are unclear as to the role and use of beans in Wari provincial foodways. Due to beans having a low likelihood of making it into the archaeological record because the bean cotyledon is consumed, we have an incomplete view of Wari cooking practices involving beans. Nevertheless, common bean may represent an element of Wari provincial cuisine but are perhaps are not widely used throughout the site but instead limited to certain contexts. The association between beans and the brewery suggests a feasting/special function of beans at Cerro Baúl. Perhaps further excavations at Wari sites, both provincial and in Ayacucho, will provide further resolution.

Comparing Cerro Baúl and Quilcapampa *Capsicum* recovery appears to vary. At Cerro Baúl, capsicum is most associated with a non-elite domestic (Unit 24 Room A) and a (likely) ritual context (Unit 26), whereas the plant is more widely distributed at Quilcapampa. The difference in *Capsicum* distribution could be the result of environmental differences witnessed between the Upper Moquegua Valley and the Siguas Valley. As I have previously indicated in Chapter IV, ají generally grows best at an altitude of 0-1500 masl, but can be grown up to 2,000 masl. Located at approximately 2,600 masl, Cerro Baúl is above the prime growing zone for capsicum, which likely made the cultivation of the plant difficult for Wari farmers in Moquegua. Thus, it is possible that only small amounts of ají were produced in the Upper Moquegua Valley as a result of the altitude of the site. As such, Cerro Baúl residents had more restricted access to ají, though access to the cultigen was apparently not regulated along socioeconomic lines. Indeed, Unit 24 Room A is interpreted as a non-elite space, though the unit is directly adjacent to the elite Unit 9 patio group. At Quilcapampa, which is approximately 1,600 masl, capsicum was much easier to cultivate making it more widely available to Wari colonists with lack of association with a particular socioeconomic class similar to Cerro Baúl.

Now that I have explored patterns in the plant assemblages from two Wari provincial sites in the next chapter I turn my attention to how foodways of indigenous groups compare to those of the nearby Wari colonial installations. During the Middle Horizon period of contact between Wari colonists and the indigenous people, many ideas, behaviors, preferences, and values must have been introduced, exchanged, and/or rejected by both sides of the exchange. I consider the identified patterns of Cerro Baúl foodways to those of the indigenous Huaracane at Yahuay Alta, which was occupied prior to and during Wari incursion into the Moquegua Valley. My investigation focuses on how food can be used as a means for identifying the nature of culture contact when evidence from other material classes are scant.

CHAPTER VI

DRINKING TOGETHER: CULTURE CONTACT AND FOODWAYS ON THE FRONTIER OF THE WARI EMPIRE

This chapter focuses on the social consequences of Wari incursion into the Moquegua Valley at the beginning of the 7th century A.D. by examining how a local Huaracane community and Wari colonists responded to their newfound sphere of interaction. I begin with a review of archaeological research on cultural interactions that took place during the Middle Horizon between Wari and Huaracane groups in Moquegua. I then present paleoethnobotanical data collected from Yahuay Alta, expanding on my previous presentation of data in Chapter IV, to establish what is known concerning the state of Huaracane foodways before and during the Middle Horizon. I consider changes in cuisine during the Middle Horizon in Wari and Huaracane sites to have been the result of culture contact between these groups on the frontier of the Wari Empire.

Culture Contact During the Middle Horizon in the Moquegua Valley

As introduced in Chapter III, the Middle Horizon Moquegua Valley was inhabited by no fewer than three distinct cultural groups, including the immigrant Wari and Tiwanaku communities and the indigenous Huaracane. When Wari and Tiwanaku colonists entered the Moquegua Valley around A.D. 600, they did not encounter a landscape devoid of humans. The middle Moquegua Valley had been occupied since at least 385 B.C. by peoples belonging to the Huaracane Culture (see Costion 2009, 2013; Goldstein 2000, 2005). These floodplain agriculturalists resided in the middle Moquegua Valley until half-way through the Middle Horizon (~A.D. 850), after which they abandoned their sites (Costion 2009, 2013;

Green and Goldstein 2010), possibly due to flooding (Goldstein and Magilligan 2011). It is unclear where the Huaracane peoples went, though it is possible that they either: 1) joined Wari and/or Tiwanaku colonies, or 2) journeyed into the highlands.

Analysis of foodways offers a lens through which we may interpret the expression of ethnic identity, thereby providing evidence for recognizing and investigating the nature of contact. Green and Goldstein (2010:27), presenting the results of the excavation of Cerro Trapiche, note the presence of large amounts of molle and a proposed location for brewing *chicha* that includes multiple hearths, *batánes*, and pot rests used to prop up large vessels for boiling/soaking grains and fruits for the production of alcoholic beverages. Molle, as I have already shown, is a typical part of Wari provincial foodways and ethnic identity. The presence of molle, and a possible brewing facility, at Cerro Trapiche is not surprising given my analysis of plant remains from other Wari provincial sites. It does, however, raise questions concerning how the Huaracane experienced and negotiated this aspect of Wari cuisine. Indeed, Huaracane peoples who co-resided with Wari colonists at Cerro Trapiche almost certainly imbibed *chicha de molle,* but was the practice of brewing *chicha de molle* adopted by other Huaracane communities? If so, what was the role of molle in Huaracane foodways?

The nearby site of Yahuay Alta, a local Huaracane site located in the Middle Moquegua Valley, provides potential for the study of the role of molle on the Wari-Huaracane frontier and allows for a unique opportunity to investigate culture contact through food (see Chapter III for a more in-depth site description and regional background). Moving beyond the basic results of paleoethnobotanical analysis at Yahuay Alta presented in Chapter IV, the following section provides a more in-depth investigation of the spatial distribution of molle. First, I present patterns of molle recovery at Yahuay Alta, identifying: 1) molle ubiquity and density; and 2) the architecture with which molle is most associated (i.e., public or private). Next, I compare molle distribution at Yahuay Alta and Cerro Baúl to compare and contrast Huaracane and Wari use of molle. Finally, I use correspondence analysis to evaluate associations of plant remains and space to explore if and how Wari colonists at Cerro Baúl adopted aspects of indigenous Huaracane cuisine.

Spatial Analysis of Macrobotanical Remains

Focusing on *Schinus molle* remains, a combined total of 198,329 drupes were recovered from soil samples and hand-collected materials at Yahuay Alta. Similar to those recovered from Wari contexts, most molle recovered from Yahuay Alta shows signs of boiling/soaking and pressing/squeezing to remove sugars and oils (instead of for use as fuel/etc. [see Chapter IV]). In terms of distribution, molle was absent from Units 1, 2, and 4 – the Late Formative contexts that pre-date Wari incursion (Figure 6.1). In contrast, molle was recovered from Units 3, 5, 7, and 8, all of which date to the early Middle Horizon; Molle was absent from Unit 6, which also dates to the Middle Horizon. Consequently, it is clear that molle was not utilized by the Huaracane during the late Formative Period, but instead appears only during the Middle Horizon. The correspondence of Huaracane adoption and use of molle for brewing *chicha* with the arrival of Wari in the Moquegua Valley is not merely a coincidence.

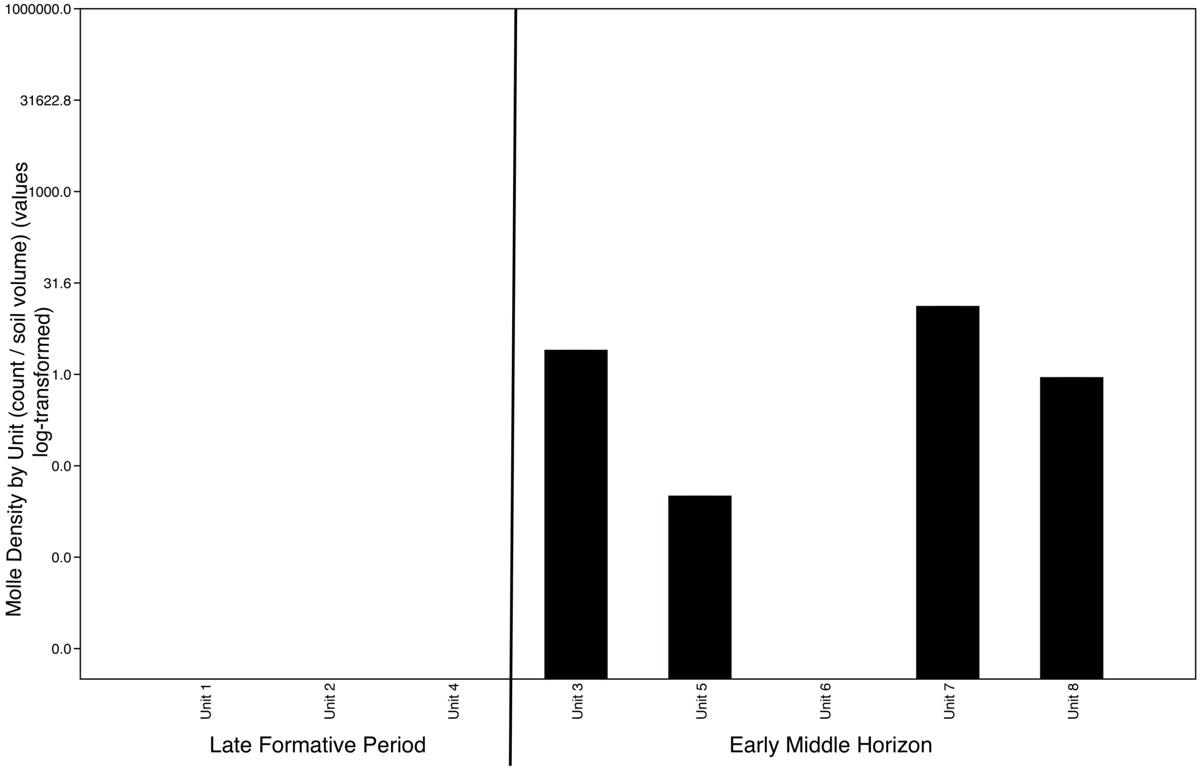

Figure 6.1 Molle Density by Unit at Yahuay Alta

Of all contexts, Unit 3 at Yahuay Alta has the highest molle ubiquity score (52%) (Table 6.1). Based on the large size of the well-built stone structure, evidence that the residents had differential access to chert, and the presence of *Pasta Biotite* (a paste that may have been adopted by Huaracane residents after contact with Wari colonists), Costion (2009:120) hypothesizes Unit 3 was likely a residence of members of an elevated social status as compared to the other units. Unit 8 had the second highest molle ubiquity (40%). All other units, including Units 5 and 7, exhibited lower ubiquity scores. Based on these results, I conclude that molle drupes were not widely distributed at Yahuay Alta, but instead appear to have been used and/or discarded in particular areas.

Table 6.1 Molle Density and Ubiquity at Yahuay Alta

Unit	Period	Context	Molle Density	Molle Ubiquity (%)
1	Late Formative Period	Domestic	0	0
2	Late Formative Period	Domestic	0	0
4	Late Formative Period	Domestic	0	0
3	Early Middle Horizon	Domestic	2.47	52
5	Early Middle Horizon	Domestic	0.01	3
6	Early Middle Horizon	Domestic	0	0
7	Early Middle Horizon	Monumental	12.98	18
8	Early Middle Horizon	Public/Domestic	0.88	40

In terms of density, molle density is highest in Unit 7 (12.98) (Table 6.1). This is interesting considering that Unit 7 had the second-lowest ubiquity at the site. The high abundance of molle is due to the recovery of several pits which collectively contained 161,671 hand-collected seeds (Figure 6.2).[14] In addition, evidence for food processing activities in this unit includes *manos* found in high numbers, including on and around the platform mound in general (Costion 2009:Figure 4.76). Therefore, while molle was not ubiquitous in Unit 7, there is evidence that molle use was most intense in the unit. Unit 7 also contained a unique botanical assemblage, including remains of squash and peanuts, that were not found in other units at the site, possibly adding to the connection between food and the structure.

Unit 3 was found to have the second highest molle density at the site (2.47). Only 88 molle seeds were hand-collected and 168 recovered from soil samples from Unit 3, representing a much lower abundance than in Unit 7. Given the high ubiquity and low density, I argue Unit 3 represents a distinct context of molle use separate from Unit 7, possibly representing use of molle for seasoning foods, household cleaning, or making small

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[14] Molle from these features were not included in the density calculation because they were not recovered from flotation samples

batches of *chicha de molle* brewed by elites for private consumption and/or aggrandizing activities hosted in their private dwellings.

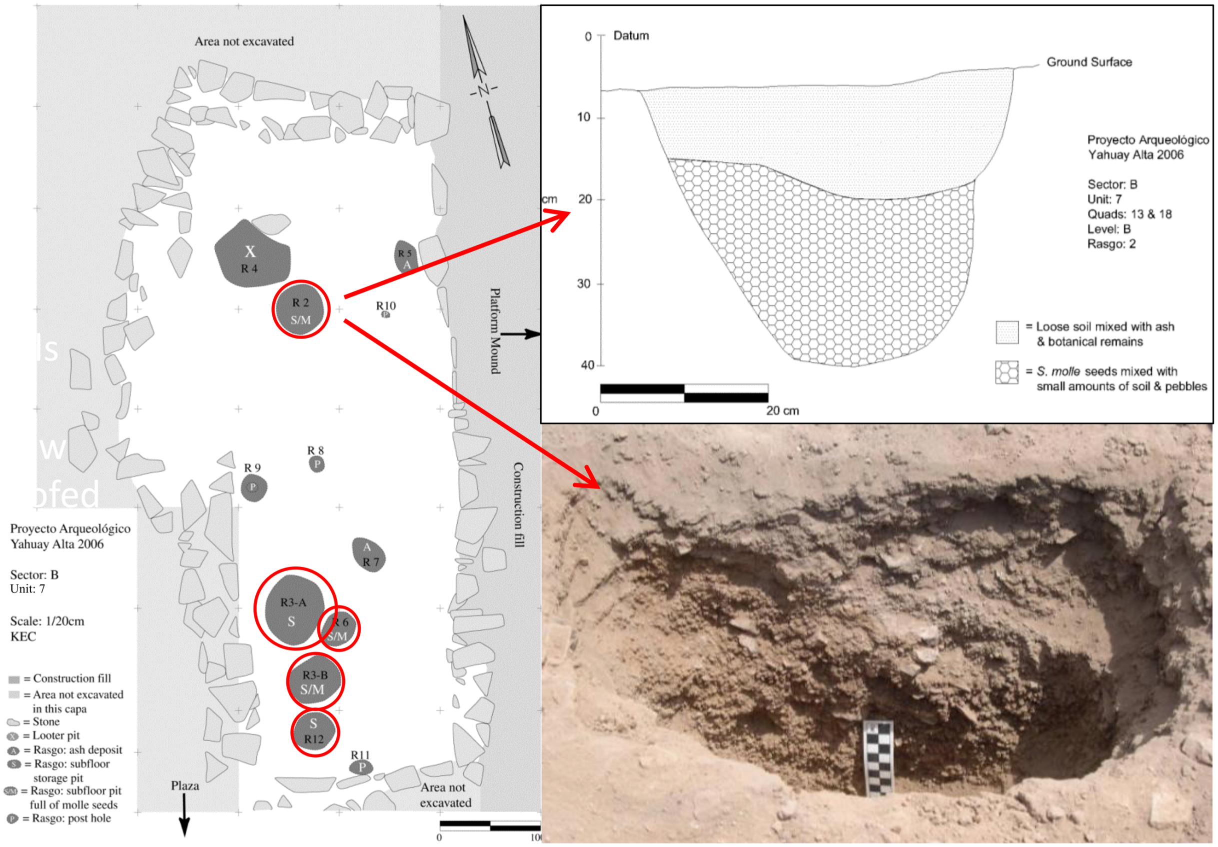

Figure 6.2 Molle Pits Uncovered in Unit 7 (adapted from Costion 2013:Figure 11) (Photo Credit: Kirk Costion)

Comparing public vs. domestic contexts, molle density is statistically higher in the public sphere (Figure 6.3). Unit 7 has a statistically higher density of molle than other units at the site, revealing a clear division in the distribution and intensity of molle use between social contexts at Yahuay Alta. There are two features in Unit 3 that are in line with the mean densities recovered in Unit 7, but they represent statistical outliers.

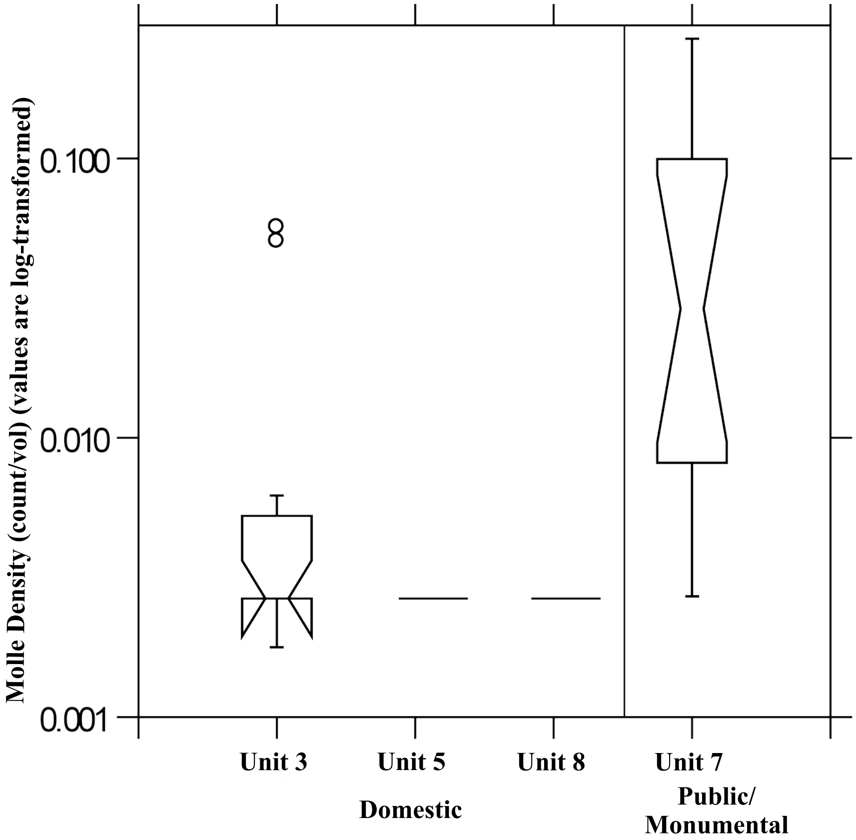

Figure 6.3 Comnparison of Molle Recovery from Domestic and Public/Monumental Contexts at Yahuay Alta

In sum, three patterns of molle recovery at Yahuay Alta become clear: 1) molle is present in four units at Yahuay Alta dating to the early Middle Horizon, but absent in earlier Formative Period contexts; 2) molle ubiquity is relatively low throughout the site, but molle density is extremely high in Unit 7*;* and 3) *chicha de molle* production is most associated with monumental public space. Dividing the excavated units into public/monumental and private/domestic contexts I found molle density to be highest in public space, most notably Unit 7 (Table 6.1). This centrally-located mound space occupies a prominent position at the site and would have been visible and accessible to general residents. Further, *chicha de molle* production likely took place in Unit 7, evidenced by the large amounts of dregs discarded in trash pits as well as the presence of *manos* and the large *olla* shaped impression in this unit noted during excavation (Costion 2009:222). Together, these patterns indicate *chicha de molle* was provided to participants at public rituals, gatherings, or feasts. The overall low density of molle in households at Yahuay Alta suggests that processing associated with *chicha de molle* was quite limited in domestic contexts, perhaps to the elite. Regardless, household use of molle appears to be very limited.

In contrast to the patterns identified at Yahuay Alta, tens of thousands of molle drupes litter virtually every archaeological context on the summit of Cerro Baúl. Previous research at Cerro Baúl organized the distribution into four modalities (Goldstein et al. 2009). Modality 1 includes any structures with more than 1,000 molle seeds. At Cerro Baúl, this includes the elite compound (Units 9, 25, and 41) and the brewery (Units 1 and 42) (Goldstein et al. 2009:152-153; Moseley et al. 2005). The brewers working in Units 1 and 42 provisioned the residents of Cerro Baúl with libations for state-sponsored public rituals as well as a final feast to mark the closing of the structure (Goldstein et al. 2009:154; Moseley et al. 2005). Modality 2 includes side rooms of the palace complex and is interpreted as low-level production of molle for daily consumption. Molle recovered from these modalities range between 200 to 500 seeds per single feature (Goldstein et al. 2009:154). Finally, modality 3 (<300 molle seeds) and modality 4 (<100 molle seeds) are found more widely throughout the site, including the D-shape Temple Annex (Unit 26), storerooms, and other domestic units (Goldstein et al. 2009:155-156). Modality 4 contexts may be linked to ritual openings or closings of the room, or perhaps more widespread production and use of *chicha de molle.* In addition, molle drupes were also recovered from non-elite domestic contexts on the slopes of Cerro Mejia (Biwer and Nash 2017; Nash 2015; Whitehead and Biwer 2012). These molle drupes fall into the category of Modality 3, having less then 300 seeds but more than 100 per unit. Much of these contexts represent activity spaces (floors), fill, midden refuse, or molle pits.

Calculating the mean density of molle by sample recovered from Cerro Baúl and plotting them on a heat density map reveals several patterns (Figure 6.4). First, Unit 42 has the highest average molle density (1.66), followed by Units 41(1.21) and 26 (1.17). Units 7 (.17) and 9 (.12) were similar found to have the same mean molle densities. Unit 24 Rooms A, B, and C have the lowest average molle density (0.93).

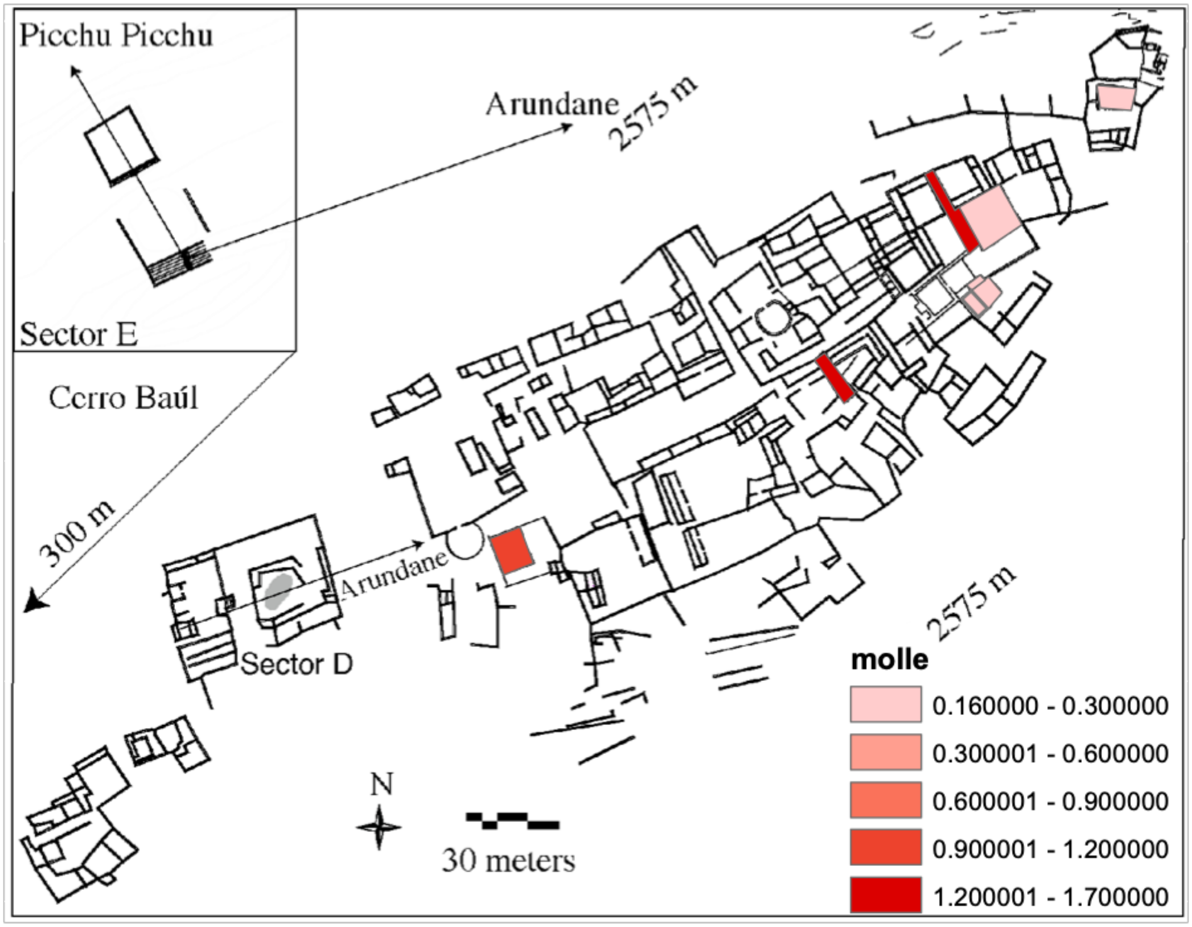

Figure 6.4 Mean Molle Density for Cerro Baúl Units (adapted from Williams and Nash 2006:Figure 3)

Drawing on descriptions of Cerro Baúl units from the previous chapter, two patterns are noteworthy. First, molle is present in both elite and non-elite contexts, revealing residents of multiple socioeconomic classes and identities had access to molle for *chicha* production. For example, the inhabitants of Units 7 and 24 (non-elite domestic) and Units 9 and 41 (elite domestic), who occupied distinct social and political categories, all had access to molle. Second, molle use was similar in domestic and non-domestic structures. The brewery Unit 42 was definitively a non-domestic context of use. Site residents did not live in this structure but instead worked there to prepare large amounts of *chicha,* as well as meals, for feasts/public displays. In a similar fashion, I found Unit 41 (elite compound), a domestic context, to have a high mean molle density. While other domestic units, such as Units 7 and 24 Room B and C, indeed have lower mean molle densities in comparison to Unit 41, the low end of the mean molle density spectrum for the site is still relatively high compared to other plant taxa (see Chapter IV). Consequently, I contend that while intensity of molle use varied by context, it was nevertheless associated with both domestic and non-domestic structures in both elite and non-elite settings.

Turning to molle use at Yahuay Alta, Figure 6.5 displays the results of mean molle density for Yahuay Alta units. The highest mean molle density is found to be in Unit 7 (.14), the room directly adjacent to the platform mound. Unit 3 had the second highest mean molle density (0.013) followed by Units 8 (0.004) and 5 (0.001).

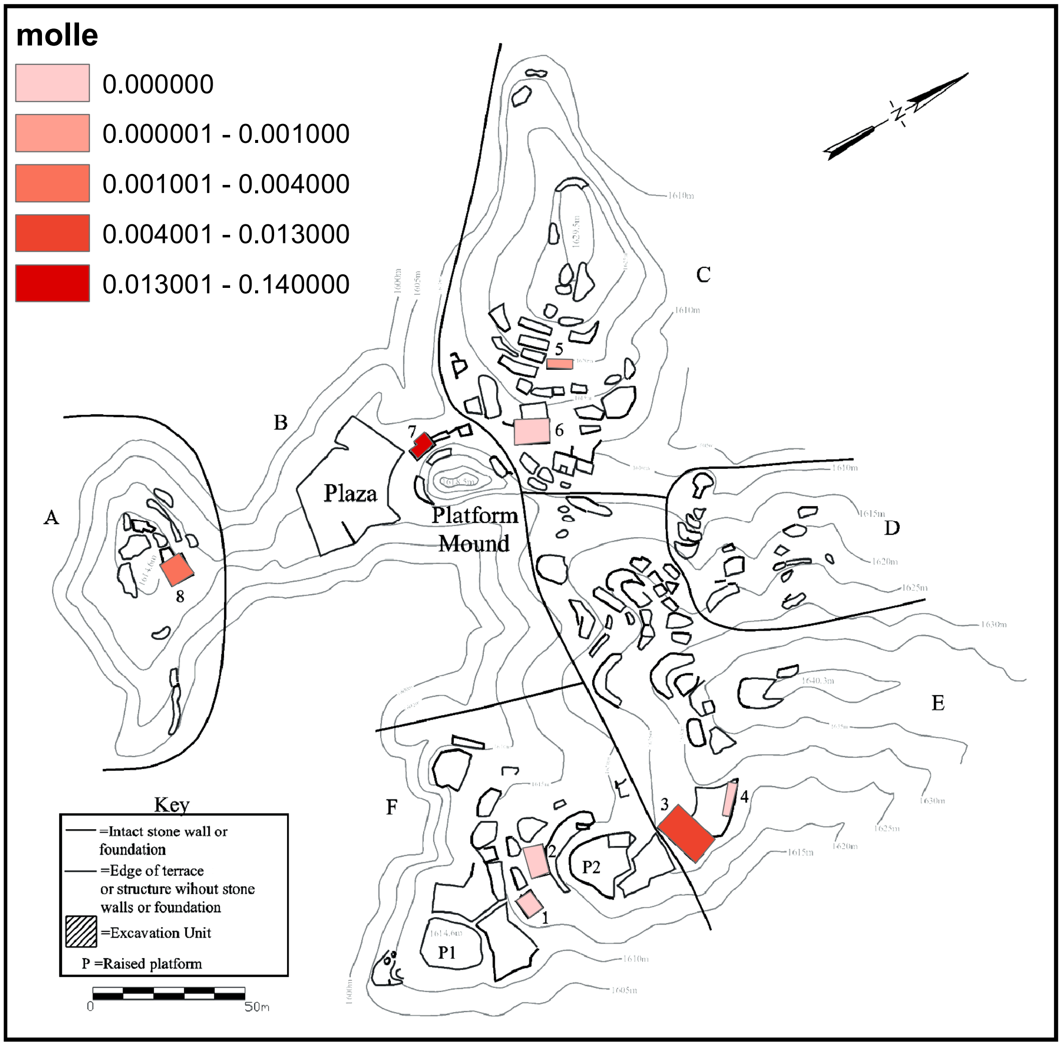

Figure 6.5 Mean Molle Density for Yahuay Alta Units

Molle is most associated with public architecture at Yahuay Alta (e.g., Unit 7). Unit 7, a room adjacent to the platform mound, has the highest mean molle density at the site. In addition, Unit 8, interpreted as a possible domestic structure related to public gatherings, has the third highest mean molle density at the site. Comparing the public architectural features to private domestic contexts, it is clear that private domestic contexts exhibit considerably lower mean molle densities. For example, Unit 3, interpreted as an elite domestic structure, has the second highest mean molle density (.013), but is far lower than Unit 7 (.14) in comparison. Further, molle is virtually absent in non-elite domestic contexts entirely; Unit 5

(.001) is the only other domestic context where molle is present and is well below the other units in terms of mean molle density.

Multivariate Analysis

As discussed in Chapter V, correspondence analysis is a useful analytical method for determining statistical relationships within and between both plant taxa and contexts. I used correspondence analysis on plant data collected from Cerro Baúl and Yahuay Alta to determine if any like patterns exist between plant remains at the sites. First, I present the results of correspondence analysis from Yahuay Alta and examine the clusters of plant and archaeological units. Next, I return the results of the 2nd run of correspondence analysis of the Cerro Baúl data presented in the previous chapter. Comparing the results, I investigate the possibility of culture contact between Wari colonists and local indigenous Huaracane at Yahuay Alta through foodways.

The first run of correspondence analysis, using data solely from Middle Horizon Yahuay Alta units, shows molle to be clustered at the central tendency (0, 0) alongside cucurbits, *Prosopis* sp., and *Cassia* sp. (Figure 6.6) (see Appendix IX for plant counts used in Yahuay Alta CA). Units 3, 7, and 8 all cluster with these taxa. The remaining taxa, clustered with Units 5 and 6, are pulled to the right. Based on the result of the correspondence analysis, it would appear that molle, squash, *Prosopis* sp., and *Cassia* sp. are common throughout the sampled units while the remaining taxa are statistically different. However, as I have already shown, molle is most dense in Unit 7 and is much less common in other units at Yahuay Alta. Because the correspondence analysis only considers presence/absence and not quantities, it cannot take issues of differential abundance into account. Thus, to deal with the molle skewing the patterns, I removed it and produced another plot.

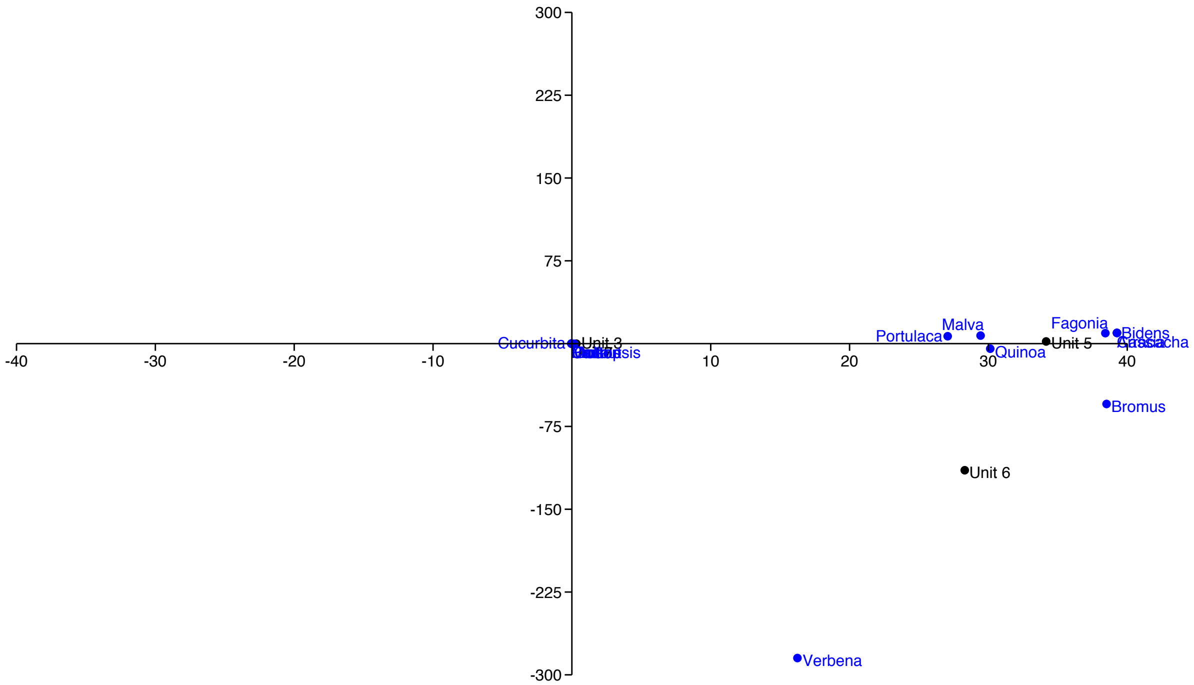

Figure 6.6 Plotted Component Scores of Yahuay Alta Plant Taxa (First Run)

The second correspondence analysis separates Unit 7 is pulled away from all other units; this unit is associated with cucurbits, *Prosopis* sp., and *Cassia* sp., suggesting that this context is unique in terms of plant use (Figure 6.7). Units 6 and 8 are found to be associated with *Portulaca* sp., Malva sp., and quinoa. Unit 5 clusters with a number of taxa, including *Bromus* sp., *Fagonia* sp., *Bidens* sp., and arracacha. Interestingly, Unit 3 is pulled away from the other units due to cotton seeds; cotton is found to not be associated with any other plant. Verbena appears near the expected value (0, 0), suggesting it is common at the site.

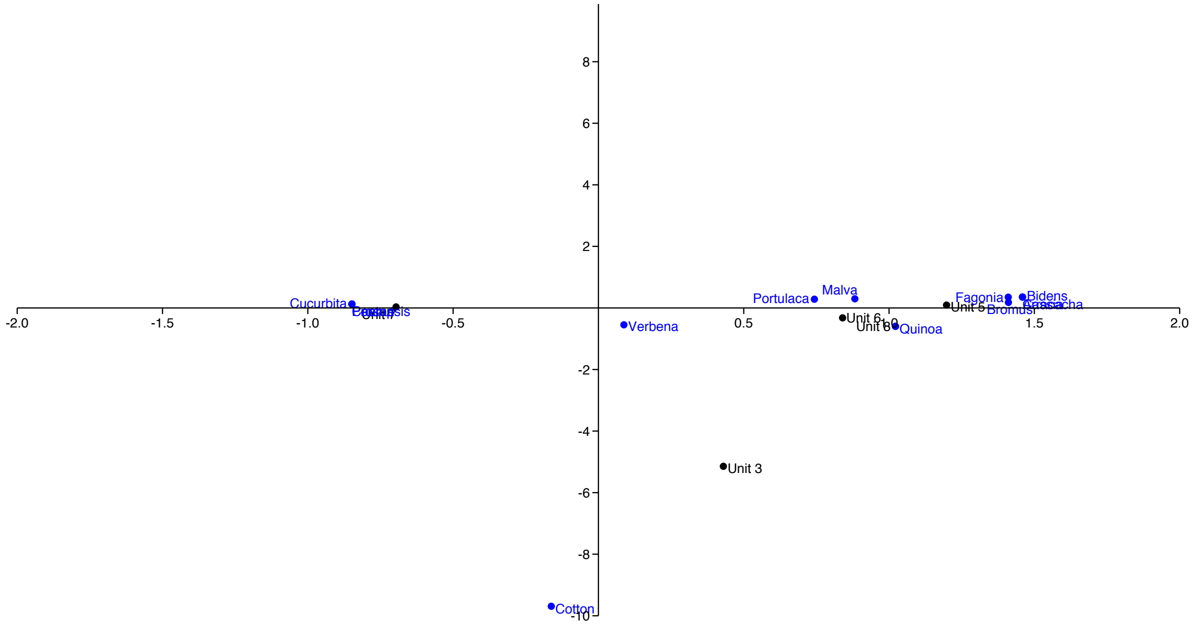

Figure 6.7 Plotted Component Scores of Yahuay Alta Plant Taxa (Second Run)

What do these patterns mean in terms of the organization of foodways at Yahuay Alta? The association of Unit 7 with cucurbits, *Prosopis* sp., and *Cassia* sp., as well as molle, is interesting. Perhaps molle, squash, and tree legumes (i.e., *Prosopis* sp., and *Cassia* sp.) were important in commensal politics at the site. Aggrandizing Huaracane elites could have served squash and legumes alongside *chicha de molle* during feasts or public gatherings to bolster their status (*sensu* Costion 2013; Green and Goldstein 2012:33). Conversely, the Unit 6 and 8 households are most associated with quinoa, *Malva* sp., and *Portulaca* sp., suggesting these species were part of daily foodways or food activities. The proximity of Unit 5, which is clustered with *Fagonia* sp., *Bromus* sp., *Bidens* sp., and arracacha, to Units 6 and 8 suggests these plants were also part of domestic activities because they are situated near the other domestic structures. It is not surprising that quinoa and arracacha are clustered in these domestic contexts as they are common in Andean cuisine in the Moquegua region today and are even served together as *bolitas de arracacha* (arracacha balls).

Returning to the results of the second correspondence analysis run on the Cerro Baúl plant remains (Chapter V), a noteworthy pattern emerges. I found Unit 24 Rooms B and C to cluster with both quinoa and *Portulaca* sp. (Figure 6.8). Quinoa and *Portulaca* sp. were also found to cluster with domestic units at Yahuay Alta Units 6 and 8. This similar patterning is interesting, as it suggests that there may be a link in the foodways of Yahuay Alta Units 6 and 8 and Cerro Baúl Unit 24 Rooms B and C.

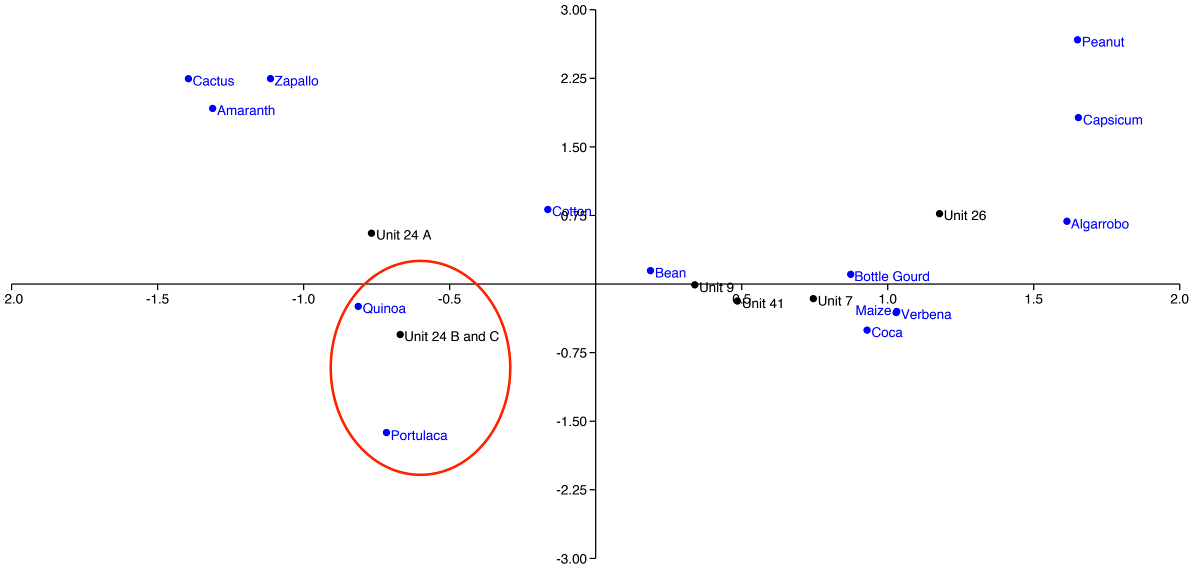

Figure 6.8 Plotted Component Scores of Cerro Baúl Plant Taxa (Second Run)

Portulaca sp. and quinoa are commonly used for a variety of purposes in the Andes (see Chapter IV). Furthermore, *Portulaca* sp. seeds have been identified at other Wari sites, such as Conchopata (Sayre and Whitehead 2017:Table 6.1). Thus, it is possible that the co-occurrence of these taxa with domestic space represents an element of broader Andean foodways. While *Portulaca* sp. and quinoa are present at Conchopata, however, it is uncertain at this point if they would cluster together using correspondence analysis. Nevertheless, this pattern may represent something more unique.

The clustering of *Portulaca* sp. and quinoa at Cerro Baúl and Yahuay Alta can also be explained as shared foodways between Huaracane and Wari as a result of culture contact. The Wari residents of Unit 26 Rooms B and C could have adopted certain aspects of Huaracane cuisine involving these taxa. Might this adoption be the result of a lack of traditional Wari foods at the colony? There are many foods not found in high abundance at Cerro Baúl, such as fruits, that are found at other Wari sites. Perhaps Cerro Baúl residents supplemented their diets with newly adopted foods that they learned about through interactions with indigenous Moqueguanos.

On the other hand, it is also possible that Huaracane people were living on Cerro Baúl alongside their Wari neighbors. While Huaracane presence is likely minimal at Cerro Baúl, Huaracane communities have been reported on the flanks of the site (Owen and Goldstein 2001). In addition, the potential for Cerro Baúl as a cosmopolitan site has been hypothesized (e.g., Williams et al. 2001). Nash (2015) has presented the possibility of intermarriage between Wari residents of Cerro Baúl and their Tiwanaku neighbors. There is some indication that ceramics from the Cerro Baúl brewery have Tiwanaku elements (Sharratt et al. 2009) and perhaps emulated Tiwanaku ritual *incensario* designs (Nash 2015:192). In addition, Nash (2015:195) hypothesizes the lack of evidence for conflict between the Wari and Tiwanaku communities indicates that intermarriage between the communities was important for maintaining peace on the borderland.

Perhaps the Huaracane and Wari were involved in reciprocal marriage alliances. Gaining and maintaining favor with indigenous peoples on the frontier was likely important to Wari colonists living so far from the Wari heartland. It is also possible that Huaracane peoples were simply living and/or working at Cerro Baúl. Given that most Huaracane sites were abandoned during the middle of the 9th century A.D., some Huaracane may have relocated to Cerro Baúl. This pattern is preliminary and must be tested further, including the addition of supplementary foodways data from Wari sites in the provinces, before we can confirm if, how, and why elements of Huaracane cuisine were present on Cerro Baúl.

Discussion

The molle recovered from Yahuay Alta reveals that upon Wari incursion into the Moquegua Valley, the Huaracane community at Yahuay Alta began to brew *chicha de molle*, a beverage associated with the Wari. While molle could have been used for other purposes (e.g., *chicha,* medicine, food seasoning, textile dye), the large amount of molle, evidence of soaking/boiling and/or pressing/squeezing of the drupes to extract fermentable sugars, and recovery of molle in large pits with additional evidence for special/desirable food products, together suggest that molle was used for *chicha* production at Yahuay Alta.

The adoption of *chicha de molle* brewing practices by Middle Horizon Huaracane residents at Yahuay Alta, but the absence of molle from prior Late Formative contexts, highlights a case of culture contact whereby the ideas and/or traditions of the colonizer were integrated into those of the indigenous group. These newly adopted foodways were not, however, adopted wholesale. Instead, the Huaracane of Yahuay Alta integrated the Wari practice of *chicha de molle* brewing into their foodways but did so along the lines of their own cultural preferences and norms. The Wari pattern of brewing *chicha de molle* results in high ubiquity and density of molle remains in private contexts and public structures (i.e., the brewery); molle seeds are present in virtually all contexts at Wari sites of Cerro Baúl and Quilcapampa and is the most ubiquitous plant recovered from Hatun Cotuyoc.

In contrast, *chicha de molle* brewing at Yahuay Alta was primarily associated with public monumental space where residents could have participated in ceremonies, rituals, and/or feasts where they consumed *chicha de molle*. While there is some evidence to suggest that aggrandizing elites in this indigenous community may have used molle in the home as a means to bolster their status (e.g., Unit 3), these densities are far lower than those identified in the public sphere.

Consequently, the differences in molle recovery at Yahuay Alta provide meaningful insight into the complex cultural negotiations that took place as a result of culture contact between Wari and Huaracane during the Middle Horizon. After the arrival of Wari colonists, and the subsequent establishment of the Cerro Baúl colony, the non-local practice of brewing *chicha de molle* was introduced to the Huaracane, possibly through interactions with Wari colonists at Cerro Trapiche (see Green and Costion 2017; Green and Goldstein 2010) and was subsequently incorporated into local food-related activities. Huaracane *chicha de molle* brewing does not simply represent the emulation Wari brewing practices by the colonized. Instead, Huaracane people adopted and integrated *chicha de molle* into an existing sphere of public activities and rituals.

Because other more conspicuous displays of power and wealth were likely discouraged within Huaracane communities (e.g., Costion 2009, 2013), feasting with *chicha de molle* may have given Huaracane aggrandizers a socially acceptable way to gain and display status and prestige (e.g. Dietler and Hayden 2001). Green and Goldstein (2010:33) have suggested that "local elites may have used the arrival of Wari newcomers to renegotiate their own position in the local political power structure through feasting events at Cerro Trapiche" (see also Costion 2013); indeed, *chicha de molle* may very well signal an

Huaracane alliance with the Wari colonial enclave. In this way, *chicha de molle* may have represented an opportunity for aggrandizing Huaracane elites to compete for prestige and social status at Yahuay Alta and develop relationships (or possibly compete) with Wari colonists for access to local labor and resources. The process for brewing *chicha de molle* (see Jennings and Valdez 2018), which is less labor-intensive than maize-based chicha, and the need for greater community participation in the harvesting of molle (see Goldstein and Coleman 2004; Jennings and Valdez 2018) likely made the production of this beverage especially attractive to Huaracane aggrandizers.

The culinary encounter in the Middle Horizon Moquegua Valley was not a unilateral exchange of indigenous communities adopting cultural practices of the colonizer; it is likely that the Wari colony did not have the power (or the desire) to create widespread change in the valley. I have identified provocative evidence at Cerro Baúl that Wari colonists may have adopted some aspects of cuisine, including not only the food itself but the process for cooking it, of the indigenous Huaracane. The clustering of quinoa and *Portulaca* sp. at both Yahuay Alta and Cerro Baúl provides tantalizing evidence that Wari residents may have cooked and prepared these taxa in a similar way/location as their Huaracane neighbors, or perhaps a Huaracane family lived on Cerro Baúl and continued to prepare their traditional foods at the Wari colony. However, this interpretation is preliminary at this point. I have already pointed out that Quilcapampa and Hatun Cotuyoc lack *Portulaca* sp. entirely. While it was identified at Conchopata by Sayre and Whitehead (2017), it is unclear if there is any statistical association between the plants there to indicate if they also represent elements of Wari cuisine. Further research is required to explore the possibility of either Wari adoption of Huaracane cuisine or the possibility of Huaracane living at Cerro Baúl.

While we do not have written records regarding Wari history or cultural traditions, the widespread importance of *chicha* in ritual, spectacle, labor payment, and daily consumption is known to have been extremely important to the Inca Empire approximately 400 years later (e.g., Bray 2003, 2009; Cummins 2002; Guaman Poma de Ayala 1980 [1615]; Morris 1979; Murra 1960; Valdez 2006). I suggest that Wari peoples could have utilized *chicha* in similar ways as the Inca. The Wari Empire is theorized to have spent a great deal of resources on feasts and public spectacles (see Cook and Glowacki 2003; Moseley et al. 2005; Nash 2011, 2012a). In contrast, traditionally the Huaracane do not seem to have had a tradition of *chicha de molle* production at the household level, suggesting a limited scope in terms of use or incorporation into indigenous Huaracane foodways. Thus, while the Huaracane adopted the food practices of the colonizer, they did so on their terms. On a frontier far from the Wari capital in Ayacucho, Wari colonists may lacked the authority, power, or inclination to force widespread change within local communities, but culture contact and colonial entanglements nonetheless occurred.

CHAPTER VII

CLEARING THE TABLE: CONCLUDING THOUGHTS

Among the most multifaceted and dynamic of South American societies, the Wari Empire provides one of the first examples of a polity to emerge, expand, and fall in the Andes. During its 400-year reign from approximately A.D. 600 to 1,000, the Wari Empire and the political, economic, and social forces that organized and maintained it, gained influence over a vast territory of what is now Peru. As Wari influence spread, either directly through the actions of colonists or through trade networks by which Wari material culture and ideas spread, Wari people experienced a sense of cultural diversity like never before.

This dissertation began by asking how archaeologists may reconstruct the cuisine of an empire which left no known written records; however, a consideration of cuisine cannot be made solely from the perspective of the colonizer. As a metropolitan empire, encompassing vast territories of multiscaler interactions with disparate ethnic groups, Wari potentially influenced (and was influenced by) the cuisine of indigenous groups and adopted local flavors. As I and others have demonstrated, indigenous groups and colonial Wari communities were variably implicated by colonial entanglements during Wari expansion. My approach to characterizing the nature of Wari imperialism considers these complex negotiations through the lens of household foodways and daily practice in the provinces. What kinds of culinary connections can be discerned through archaeobotanical data at Wari provincial sites? What similarities and differences exist between the Wari provincial sites and how can we explain these patterns? How did locals and imperial agents negotiate the colonial experience along the borderlands of the empire? In the case of Wari, I argue that several patterns of plant activities may be used to characterize cuisine and unique social and environmental conditions in each provincial region that resulted in regionally-specific variations in foodways.

In this chapter, I summarize the patterns from data presented in Chapters VI, V, and VI and provide an updated perspective on what we know about the foodways of Wari sites in the provinces, Wari interactions with indigenous groups, and future directions for the study of prehistoric cuisine and culture contact through the lens of foodways. The research presented here addresses these issues specifically for the Wari provincial sites in south-central Peru, including the Moquegua, Siguas, and Cusco Valleys. First, I discuss the comparison of plant recovery from the Wari sites focusing on plant taxa that are shared between the three analyzed sites and those that are unique to an individual site. I then summarize the spatial organization of foodways from Cerro Baúl and Quilcapampa to explore how foodways may relate to socioeconomic status, political economy, and identity of Wari colonists at the sites. Finally, I compare the patterns of plant remains from Cerro Baúl to those of Yahuay Alta, an indigenous Huaracane site located in the Moquegua Valley, to evaluate culture contact and colonial entanglement through foodways.

Wari Provincial Cuisine: Summary of Patterns

The analysis of plant remains recovered from soil samples from Wari provincial sites revealed that Wari colonists relied on a range of plant foods, including field cultigens, tree crops, fruits, and wild/miscellaneous resources. Of the plant taxa identified at the Wari sites in this dissertation, eight appeared at all three sites, including: ají, cactus, common bean, Cyperaceae, kiwicha, maize, molle, and quinoa. In addition, achira, aguaymanto, bottle gourd, coca, cotton, peanut, and zapallo were present at Quilcapampa and Cerro Baúl but not recovered from Hatun Cotuyoc, possibly due to issues of preservation.

Research on Wari foodways has intensified in recent years, prompted largely by the growing recognition of Wari feasting practices and political economy related to *chicha de molle* (e.g., Biwer and VanDerwarker 2015; Goldstein et al. 2009; Goldstein and Coleman 2004; Green and Goldstein 2010; Jennings and Valdez 2018; A. Mayer et al/ 2016; Moseley et al. 2005; Nash 2012a; Sayre et al. 2012; Valdez 2012). As I have demonstrated in this dissertation, the relationship between Wari provincial sites and molle drupes is compelling. Molle seeds are reported from the Wari sites of Conchopata (Sayre and Whitehead 2018), Beringa (Tung 2007), Cerro Trapiche (Green and Goldstein 2010), Cerro Mejía (Nash 2010, 2011, 2012a) and Cerro Baúl (Goldstein et al. 2009; Moseley et al. 2005). The addition of Quilcapampa and Hatun Cotuyoc to this list further emphasizes the importance of molle, and thus *chicha de molle,* in the foodways of Wari sites in both the heartland and in the provinces. Molle was the most ubiquitous plant recovered from Cerro Baúl and Quilcapampa and was the third most ubiquitous plant at Hatun Cotuyoc. The molle seeds recovered from these sites provide evidence of being used for brewing as demonstrated by the lobed features and lack of resin on the drupes; the molle was soaked in water and then pressed and/or squeezed, possibly using a basket or woven bag, pushing the drupes together creating the malformed lobed appearance (see Kramer 1957:322).

Overall, the patterns presented in this dissertation reveal that *chicha de molle* was a common element within both public and domestic contexts at Wari provincial sites. Given the importance of commensal feasting in the formation and maintenance of social status and political alliances in Andean states (e.g., D’Altroy and Hastorf 2001; Cook and Glowacki

2003; Goldstein 2003; Hastorf 1991; Hastorf and Johannessen 1993; Janusek 2004, 2008; Moseley et al. 2005; Nash 2010, 2011, 2012a; Nash and deFrance 2019; among others), and that fact that the Wari colonists from the study sites all lived within prime molle growing zones, it is likely that *chicha de molle* served as a common thread linking colonial identity, both elite and non-elite, with different Wari provincial sites. In this way, *chicha* would have been produced regularly within these households with all or most members of the community participating in its consumption. It is important to note that the boiling room of the *chicha* brewery, which may be a statistical outlier, was not analyzed as part of this dataset. A comparison between the molle data from the households and the brewery in its entirety would further clarify molle patterning and *chicha* production activities at Cerro Baúl and possibly demonstrate a difference in the scale of production between domestic contexts and a dedicated state-run feasting facility.

The Cerro Baúl elite compound was one such location of domestic food preparation and possible *chicha de molle* brewing. Residents of the patio group could have brewed *chicha* at home and served it within the domestic sphere (Unit 9) or in the front meeting space (Unit 25). To date, it is unclear if there are brewing contexts in the Unit 9 patio group or attached structures that make up the compound. The molle remains in Unit 9 may represent discard activities or perhaps the residues of brewing. However, no statistical outliers were identified in this dataset suggesting that none of the included features have molle densities outside the norm for the assemblage. Overall, molle is ubiquitous across the site with most units presenting large densities of the seed. The presence of molle throughout Cerro Baúl, as well as molle from Wari households on the slopes of adjacent Cerro Mejia, suggests that *chicha de molle* was not limited to the Wari elite but was broadly consumed as a component of colony-wide foodways.

At Quilcapampa, molle was found to have similar ubiquity and density as at Cerro Baúl. There was also a molle pit included in this sample that was a statistical outlier. This pit is located between several likely domestic structures within the central portion of the domestic sector of the site (Unit 28). The pit is similar to those found at both Cerro Baúl and Yahuay Alta in terms of the quantity of molle and the lack of other taxa found inside; the contents of the pits were almost completely molle. The majority of molle recovered from Quilcapampa was desiccated and appeared in the lobed form that indicates it was *processed*. The relative lack of carbonized molle (save for those recovered from Unit 17, which could represent a burning episode related to the ritual closing of the unit) indicates that molle was not typically used as a fuel (see Jennings and Valdez 2018). Instead, the data indicate molle was used in multiple contexts for brewing activities.

While molle was recovered from Hatun Cotuyoc, I was not able to analyze the spatial patterns of the plant at the site due to the overall low density of recovered plant remains. Nonetheless, the molle recovered from Hatun Cotuyoc also shows the characteristic *processed* form identified at Cerro Baúl, Yahuay Alta, and Quilcapampa. Molle ubiquities and densities are low at the site, yet its presence suggests its inclusion as part of Wari foodways in this region as well. An interesting observation is that when I visited the sites of Huaro and Pikillaqta in 2015 molle trees were common in and around the surrounding area. While using the presence of modern plants to reconstruct past environments is not ideal, and indeed is fraught with issues, the correlation is nonetheless curious. As the tree is one of the longest-lived in the genus (Goldstein and Coleman 2004:524) with a possible age range of

100-300 years it is possible that these molle trees present around the sites today are descended from Wari molle trees.

My research supports the interpretations of previous studies that have suggested maize was a staple of the Wari Empire (see Cook and Glowacki 2003; Finucane 2009; Finucane et al. 2006; Schreiber 1992; Turner et al. 2018). Maize is ubiquitous at both Cerro Baúl (55%) and Quilcapampa (64%) indicating its widespread use. Further, maize was the third densest plant recovered from Cerro Baúl (8.73) and Quilcapampa (38.57), indicating the grain as a heavily utilized food resource. Maize was also present at Hatun Cotuyoc, which is not surprising given the aforementioned stable isotope study which indicates the residents consumed a maize heavy diet (see Turner et al. 2018).

Stable isotope research has demonstrated that maize was indeed an important component of Wari diet in Ayacucho well before the rise of Wari (Finucane 2009; Finucane et al 2006). Finucane (2009:541; see also Finucane et al. 2006) reports the results of his isotopic analysis of human bone from the region which indicate that by at least ~800 B.C. maize was the preeminent crop in the region and could have been an impetus for the development of sociopolitical complexity and feasting in the region (see Anders 1986; Cook and Glowacki 2003; Valdez 2006). Grinding stones, used to grind maize into flour for stews, *chicha,* and other uses, are noted at the site of Conchopata supporting the importance of maize in the region (Bencic 2001; Pozzi-Escot 1991).

Macrobotanical remains from the heartland support the pattern of a maize heavy Wari diet. Anders (1986) also notes the presence of maize at Azangaro. Reporting on the analysis of macrobotanical remains from Conchopata, Sayre and Whitehead (2017:133) indicate maize was common and abundant at both ritual and domestic contexts at the site. Further, similar to the pattern I found at Quilcapampa, the authors note that maize was likely brought on the cob to the site for processing as opposed to shelling the maize in the field prior to transport to the site for cooking and/or storage. In the Cotahuasi Valley at the site of Tenehaha, a small mortuary center whose residents were likely influenced by Wari, maize and quinoa are reported to have been staples (A. Mayer et al. 2016). A. Mayer et al. (*ibid*) report the presence of sprouted maize indicative of soaking the grain to begin to process of converting starches into sugars for brewing *chicha* (Biwer and VanDerwarker 2015). These food remains are interpreted as the residues of meals rather than offerings to the dead, thus presenting an interesting case of foodways for a population in contact with Wari. Additionally, molle seeds are present in relatively high frequencies at the site, further indicating a connection with Wari. Further, maize appears to have been a common element in Wari diet at the sites of Cerro Trapiche in Moquegua (Green and Goldstein 2010), Beringa in the Majes Valley (Tung 2007), and sites in the Chuquibamba Valley (Coleman Goldstein 2010).

Turner et al. (2018) report that the residents of Hatun Cotuyoc ate a C_4 (i.e., maize) and terrestrial meat heavy diet. This recent study supports the findings from Ayacucho (Finucane 2009; Finucane et al. 2006) that maize was a common element of Wari cuisine both in the heartland as well as in the provinces. Further, Buzon et al. (2012) notes that changes the possibility of the rise of maize in the diet of the local indigenous Nasca population of La Tiza. Indeed, a high maize diet appears to have been supported or intensified upon the arrival of Wari into the region. Other noted changes include the movement of non-local individuals into the region, likely from Ayacucho, changes in tomb structures and the presence of new forms of grave goods (Buzon et al. 2012:2632-2634).

Kellner and Schoeninger's (2008) analysis of human bone collagen indicates that Wari influence on local diets was variable. Indeed, some local indigenous individuals (possibly elites) consumed more maize than others in the Las Trancas valley. However, the authors argues that in general little changed in terms of local indigenous diet as a result of Wari incursion. Kellner and Schoeninger (*ibid*) propose that Wari interests in the Las Trancas Valley were focused on resources other than maize, such as potatoes, quinoa, or huarango (Kellner and Schoeninger 2008:239) suggesting that the continued, or possibly increased, consumption of maize by a select few local indigenous persons may reflect preferential access to resources by local elites who politically allied themselves with Wari. Further, Tung and Knudson (2017) also found that no significant changes occurred in terms of diet amongst the residents of Beringa in the Majes Valley who continued to consume a diet of mainly C_3 plants.

Similar to the colonial situations in Cusco and Moquegua, some of the indigenous local elites of Nasca may have gained regular or increased access to maize, exotic trade goods, or *chicha* as a result of cooperating with Wari colonists or mobilizing labor tasks for Wari colonial projects. Wari may not have needed to manage the labor of most/all of the Nasca population which would likely be evidenced by an increase in maize consumption as a result of laborers receiving *chicha* from their patrons in exchange for their labor. Instead, Wari colonists may have interfaced with local elites to mobilize labor or pacify local populations. Regardless, maize appears to have remained an important part of Wari colonialism and foodways.

But what of the other plant remains recovered from Wari and/or Wari-affiliated sites in the provinces? The importance of tubers has been emphasized in some studies of Wari foodways, though it is often hindered due to preservation issues. Sayre and Whitehead (2017:131-132) note the presence of high frequencies of parenchymal tissues, which they interpret to most likely be potato, in multiple contexts at Conchopata. At Tenehaha, A. Mayer et al. (2016:Table 1) note that parenchyma tissue has a 34% ubiquity at the site suggesting that tubers were likely important to local foodways. Muñoz Rojas (2012:Table 8.1) notes the presence of achira, yuca, and sweet potato at La Real in the Majes Valley. Yuca and sweet potato were also recovered from Beringa (Tung 2007:260). Beyond these instances, little is known of the importance of tubers in the diet of Wari or Wari-affiliated persons. The recovery of an achira seed from Quilcapampa and the identification of achira, yuca, potato, and sweet potato starch grains from groundstone and ceramics from Cerro Baúl and Quilcapampa suggest that tubers were also an important part of Wari diet. The lack of identifiable macro tuber remains at a majority of Andean sites complicates the analysis of tubers in Wari foodways. It is for this reason that I have incorporated microbotanical analysis of starch grains and phytoliths into my paleoethnobotanical study of Wari provincial foodways. Microbotanical remains are much more likely to preserve in the archaeological record and, as I have shown, are relatively abundant on artifacts, easily extractable. Further microbotanical research must be conducted to parse out the varieties and roles of tubers in Wari foodways.

Ají was found to be present at Wari provincial sites analyzed here; Cerro Baúl, Quilcapampa, and Hatun Cotuyoc provided evidence for use of the plant. These findings are interesting considering that ají remains are rare at previously reported Wari sites. For example, Sayre and Whitehead (2017:Table 6.1) report a single *Capsicum* seed recovered from Conchopata. Beyond these examples, little is known about ají presence of use at Wari sites. Indeed, it is notably absent from the assemblages at several Wari sites, including Beringa, Conchopata, La Real, and Tenehaha (see A. Mayer et al. 2016; Muñoz Rojas 2012; Sayre and Whitehead 2017; Tung 2007). While issues of preservation may be related to the lack of ají recovery from sites such as Tenehaha, which is at a higher elevation compared to the aforementioned sites, the recovery of other well-preserved plants from Conchopata and Beringa suggest a lack of use of the plant in some areas.

My analysis of Cerro Baúl plants indicates ají use was not ubiquitous (14%) but had the seventh highest density of plant species recovered (1.47) suggesting use of peppers was somewhat common but not widespread, possibly relegated to domestic cooking contexts. Two structures, Unit 24 Room A and Unit 26, were identified as statistical outliers for mean density of ají remains. The presence of ají as a statistical outlier in Unit 24 Room A, a domestic room within a non-elite patio group (adjacent to the palace where large amounts of domestic refuse (perhaps from the palace), suggests the residents were processing large amounts of the plant for meals. As I discussed in Chapter IV, Cerro Baúl is located above what is considered to be the prime growing zone for ají; the implication is that production of the crop was possibly difficult (but not impossible) perhaps resulting in a somewhat limited supply for the Moquegua colony. However, if this non-elite context is an outlier for ají remains, then access to the spicy plant may not have been a means to signal status differences between Wari residents as it has been reported in other areas of Peru. For example, ají has been associated with elites in many regions of Peru, such as in the Jequetepeque Valley on the North Coast where the analysis of plant remains from a series of households in and around Pacatnamu showed that elites and weavers had privileged access to peppers (see Gumerman 1991, 1994). Ají is also noted as a preferred food associated with elite feasting contexts at Panquilma along Peru's Central Coast (López-Hurtado 2011). If access or use of ají was part of status-based foodways, then I would expect the elite patio group (Unit 9) or associated structures (Unit 25, Unit 40 Rooms A and C, and Unit 41) to have an outlier present in the dataset.

The presence of statistically higher densities of ají in the Temple Annex (a compound that is directly adjacent to a D-shape temple on the summit of Cerro Baúl) may speak to the possible ritual use of peppers. The results of the principal components analysis support this association, indicating that *Capsicum* clusters with peanuts and algarrobo in this context. Large amounts of botanical materials, one of the few human burials identified at the site, obsidian, and a Nasca-style drum were also recovered from this context (Goldstein et al. 2009:155; Williams and Ruales 2004). Peppers are known to have a special significance in the Americas and are often ritually charged foods (see Hastorf 1998, 2006:118). For example, carbonized ají seeds have been recovered from ceremonial hearths at the Formative Period site La Galgada in northern Peru; Grieder et al. (1988) interpreted these seeds as offerings to the ancestors or spiritual deities. The recovery of these items in the Temple Annex and the proximity to the D-shaped temple suggests a ritual function of this space, perhaps as a storage area or staging area for temple activities (see Goldstein et al. 2009:155; Williams and Ruales 2004). Thus, what emerges here are possible differences in use contexts for ají at Cerro Baúl with a possible association with ají and ritual contexts and a more quotidian use of ají in contexts outside of the most elite areas of the site.

At Quilcapampa ají is both ubiquitous with consistently low densities throughout the site contexts. The highest density for ají comes from a possible kitchen (Unit 23) located in the central portion of the site that also yielded high densities of maize and beans. It is unclear at this point if this possible kitchen and associated structures represent an elite household, an area for feasting preparation, or another type of compound. Further, there have not been any structures identified at Quilcapampa that appear to be ritual in nature, such as a D-shaped structure. Nevertheless, while any link between elite/ritual contexts and ají at Wari sites is speculative at this point, the patterns are compelling and deserve further investigation.

Common bean was recovered from Beringa (Tung 2007:260), Cerro Trapiche (Green 2015), and in limited amounts at Conchopata (Sayre and Whitehead 2017), all of which come from domestic contexts. The presence of common bean at both Cerro Baúl and Quilcapampa is interesting; common bean does not exhibit high ubiquity at the sites, was not recovered microbotanically, and is generally recovered in low frequencies at both sites. At Cerro Baúl, beans exhibited 11% ubiquity, low frequency, and were found to be outliers in Unit 42. The presence of greater amounts of beans in the brewery patio group compared to the rest of the site suggests a feasting role of beans at the site. At Quilcapampa, a similar pattern emerges; beans have low ubiquity (8%), low frequency, and are most associated with the Unit 21 which is directly adjacent to a possible kitchen context and may represent cooking or discard activities that took place in this compound. This indicates the plant was a part of daily foodways at Wari/Wari-affiliated sites in the provinces, though the low densities and distribution of common bean at the sites reveals a more selective or low-intensity use of beans by Wari colonists.

Cerro Baúl and Quilcapampa compare well to Conchopata in terms of limited evidence of intensive use of common beans. Indeed, Sayre and Whitehead (2017) found a single common bean remains and several other *Phaseolus* sp. from Conchopata. Why would this be? I have suggested that the lack of beans could be the result of the cotyledon being the consumed portion of the plant and thus may be underrepresented in the plant assemblage. In this way beans are different from other plants that are consumed in their entirety such as maize which produces cupules, cobs, and embryos as remnants of the processing, cooking, and discard activities. It is possible, however, that the use of beans by Wari colonists in the provinces was limited to certain contexts. Therefore, I contend that the plant made up at least a portion of Wari foodways in the provinces, but its use appears to have been variable and somewhat limited. Further exploration of patterns of common bean recovery are thus warranted, including a comparison of common bean recovery from provincial and heartland sites, in order to ascertain the contexts of use for this important crop.

Finally, peanut remains represent an understudied (but likely important) component of Wari diet. Indeed, peanut shells or seeds have been recovered from Beringa (Tung 2007), Cerro Trapiche (Green 2015), and La Real (Muñoz Rojas 2012), but is absent from Conchopata (Sayre and Whitehead 2017). The presence of peanut remains at both Cerro Baúl and Quilcapampa, though in low frequency and ubiquity, nevertheless point to the use of the legume in the provinces. Based on previous research noting the presence of peanuts coupled with my own analysis, I suggest peanuts are likely an important part of Wari foodways. I suspect that while peanut remains were not present at Hatun Cotuyoc, they could have been grown or imported into the region.

Interestingly, peanut starch grains were not present on any of the sampled ceramics or groundstone artifacts from any of the study sites. If peanut remains are present at the sites, yet we have no evidence for peanut processing or cooking, how were they used by the residents of the sites? The peanuts could have been roasted/cooked and consumed without further processing, which may result in the recovery of the shells and a lack of starch grains on food processing equipment. It is also possible that our relatively small sample size was not great enough to detect the plant. Nevertheless, the presence of peanuts at multiple Wari provincial sites suggests that peanuts were regularly used by Wari colonists and were part of Wari cuisine.

Overall, the above patterns suggest that there is a defining provincial Wari cuisine. Cultivated plants appear to make up the bulk of Wari foodways in the provinces. Several plant species commonly occur at Wari provincial sites and there are also similarities in their distribution and use at the Wari sites. There are several cultivated plants (and possibly more) that routinely appear at Wari provincial sites suggesting they make up provincial foodways. There are differences in the available of plants, including fruits, likely due to environmental conditions. Further, differences in the site types may have contributed to the identified differences in patterns of plant use. Nevertheless, I have shown that there are a group of shared foodways activities that are shared between Wari provincial sites.

Status-Based Differences Between Structures as Seen Through Archaeobotanical Data

Overall, differences in maize processing activities appear to correlate with socioeconomic status at Cerro Baúl. The residents of the Cerro Baúl patio group were likely provisioned with maize kernels that were removed from the cob. While the data analyzed here do not necessarily indicate that the occupants of the patio group had greater access/control of maize, as the difference in maize density between the units was not statistically significant, the three outliers for maize density at the site were found in the elite patio group compound suggesting atypical contexts of maize use. Nonetheless, the provisioning of shelled maize to elites is noteworthy. There are similar accounts of provisioning elite maize in the Southeastern United States. For example, maize was found to have been processed by removing the kernels from the cob at rural non-elite sites and then transported to the high-status Moundville site for consumption by elites (see Scarry and Steponaitis 1997; Welch and Scarry 1995). A similar practice may have occurred at Cerro Baúl where Wari elites in the patio group received preferential treatment regarding maize, perhaps as tribute. This provisioning of shelled maize would have saved the residents/staff the time required to process the maize before use in cooking or brewing.

At Quilcapampa I identified several structures located in the central portion of the site with higher densities of maize than the surrounding sites. The occupants of these structures likely engaged in both processing and cooking activities as indicated by both high and low kernel-to-cupule ratios exhibited by multiple loci in the same unit. It is possible the centrally-located units at Quilcapampa (e.g., Unit 21, 22, and 23) were the residences of individuals or families with elevated status who were not provisioned with shelled maize as at Cerro Baúl. Instead, the residents of the centrally-located units processed their maize similarly to other residents of the site. Further, it appears as if maize was processed and cooked in the same locations at Quilcapampa. If differences in maize-based activities was an indicator of social status at Wari sites, then it does not seem that food-based status differences were as stringent at Quilcapampa compared to Cerro Baúl. Indeed, most of the five identified plant species that appear at all three of the sampled Wari sites have more equal distribution at Quilcapampa than Cerro Baúl.

The finding that maize processing and cooking occurred in the same locations throughout the residential portion of Quilcapampa suggests that none of the site residents received the same type of treatment afforded to the Cerro Baúl elite. This may be due to a lack of high-level administrative elites at the site, possibly indicating the nature of the site was fundamentally different from Cerro Baúl or other Wari sites considered to have been administrative centers. Other Wari sites, such as Cerro Mejía in Moquegua (Nash 2002, 2010, 2011, 2012a, 2012b), have limited evidence for high-level elites at the site. Perhaps the analysis of other archaeological data, such as architecture, ceramics, faunal remains, metals, and/or other material classes, will shed more light on patterns of social inequality at the site and the variability of maize-based foodways patterns at Wari provincial sites.

Evidence for Long-Distance Trade of Plant Resources

The movement of both people and goods reached new heights during the Middle Horizon with Wari agents and/or local middle men facilitating migration and trade from Chile, to Bolivia, to northern Peru, and beyond (e.g., Burger et al. 2000; Isbell 2010; Jennings 2006; Knudson and Tung 2011; Lau 2010; Schreiber 2005; Tung 2012). Although it is currently debated as to who controlled what goods and how it was accomplished, it is clear that Wari maintained regular access to exotic goods and maintained a prominent position in the movement of these commodities. Based on current evidence, it appears that Wari did not control the *extraction* of exotic materials but instead may have brokered trading relationships with other Middle Horizon groups. These exotics include luxury goods such as: obsidian (Burger et al. 2000); metals (Bauer and Jones 2003; Lau 2010); mineral pigments (Cook 2004; Tung 2012; Vaughn et al. 2007); semi-precious stones including chrysacolla, sodalite and lazurite (Anders 1986; Berg 2012; McEwan 1996, 2005; Nash 2002); and spondylus (Glowacki and Malpass 2003; Lau 2010).

We know relatively little, however, about the movement of plant remains, such as coca leaves/seeds and vilca seeds, in the Wari Empire. Coca leaves have been recovered from archaeological sites dating from ~6,050 B.C. at sites in Peru's Ñanchoc Valley yet are often absent/occur in small amounts in contexts dating prior to the Late Intermediate Period (see Chapter IV). This lacuna is likely due to poor preservation and the fact that people chewed and then discarded the leaves after use making their recovery unlikely. Valdez (et al. 2015) notes that coca leaves are absent from Ayacucho contexts during both the Early Intermediate Period and the early Middle Horizon. Coca leaves first appear in Ayacucho during the Middle Horizon subsequent to Wari incursion into the Nasca region where they gained access to the coast-adapted *E. novogrnatense* var. *truxillense* (Trujillo coca) (*ibid*).

Wari may not have had access to coca leaves prior to their arrival in the Nasca region; indeed, coca leaves have been identified in contexts since at least the late Nasca Period when Nasca artisans produced effigy vessels depicting bulging cheeks interpreted to represent coca chewing (see Silverman and Proulx 2002:55). Coca leaves/seeds are noted in limited contexts at other Wari sites, including Middle Horizon Wari contexts in the Ica Valley (Beresford-Jones 2011:97), from the site of Convento in the northern Ayacucho Valley dating to the late Early Intermediate Period and Middle Horizon (Valdez et al. 2015), and at the Wari site Conchopata (Sayre and Whitehead 2018). Are these all the same coca species? Were Wari people growing coca or were they acquiring it through trade?

The coca seeds recovered from Quilcapampa and Cerro Baúl provide evidence that the sites' residents were either engaged in coca production or that they had access to both coca leaves and seeds through trade. It is possible that the residents of Quilcapampa cultivated their own coca as the site is within the elevational growing zone for the plant.

Cerro Baúl on the other hand is above the coca growing zone, necessitating the importation of leaves (with the seeds as riders) from the Peruvian coast (possibly from Ilo area [see Knudson and Buisktra 2007; Owen 2009]), through Wari trade routes, or from Bolivia via their Tiwanaku neighbors in Moquegua (Goldstein 2005) is also possible. This sacred plant, loaded with spiritual and medicinal value (Allen 1988), and control of this resource would have been an important aspect of Wari political economy. For example, coca seeds were only recovered from the elite patio group at Cerro Baúl (Unit 41 Room A and Unit 9 Room G) and a possible food preparation area located in the central area of Quilcapampa (Unit 23). Perhaps coca's limited distribution is a result of tight control over the plant, though taphonomic processes could certainly have played a role in the limited recovery of the seeds and leaves.

Much less research has been conducted concerning vilca (*Anadenanthera colubrina*) in the Andes. Knobloch (2000:392-396) identified vilca in Wari iconography but the macrobotanical identification of vilca has not previously been made (Figure 7.1) (see Chapter IV) leaving many questions as to the nature of Wari vilca use. Knobloch (*ibid*) suggests that the seeds were an additive to *chicha* where it would act as a hallucinogen when consumed with the drink. My recovery of vilca mixed with domestic refuse, including maize and molle, could support the hypothesis that the seeds were destined to be added to *chicha*, but it is also possible that vilca was smoked or ingested as a snuff (see Bélisle 2019). The presence of the plant also points to a trade connection with the *selva* as the plant cannot be grown in the Siguas Valley where Quilcapampa is located due to the aridity of the valley. At this point it is uncertain where the seed was grown. The closest natural habitat to Quilcapampa are more tropical area in and around Ayacucho or Cusco where the vilca tree still grows and is collected (Weberbauer 1945). I suggest the presence of vilca possibly demonstrates a trade connection to Wari Ayacucho heartland, either directly or indirectly through middlemen.

Figure 7.1 Vilca seed Recovered from Quilcapampa (Photo Credit: Matthew Biwer)

Food Production and Processing Practices

One of the more surprising elements of this research was the recovery of well-preserved macrobotanical potato parenchymal tissue from the site of Quilcapampa. The potato remains, possibly *chuño* (freeze-dried potatoes), are noteworthy because the recovery of macro specimens of potatoes from archaeological sites is extremely rare due taphonomic processes (e.g., Ugent et al. 1982); potatoes are more commonly recovered in the form of starch grains from ceramics, lithics, or soils (e.g., Duke et al. 2018; Perry et al. 2006). Our understanding of potatoes as a component of Wari diet (or ancient Andean diet in general) is largely confined to stable isotope analysis (e.g., Buzon et al. 2012; Finucane et al. 2006), yet this method of analysis can only differentiate between C_3 and C_4 rich diets. Therefore, the recovery of macro- and microbotanical potato remains represents a rare opportunity to evaluate the use and role of tubers in Wari foodways.

The potato remains, recovered from floor and midden contexts at Quilcapampa, indicate the residents either grew potatoes locally or traded with other groups to acquire them. Potatoes are often associated with highland cuisine in the Andes, yet they can be grown at most elevations from the coast to the highlands. The evidence presented here, including elevated ubiquity and density values, suggests that potatoes were an important element of daily foodways at the site. The absence of identifiable potato starch grains (or macro remains) from Cerro Baúl is noteworthy. Instead, yuca starch grains (also recovered in seed form from Quilcapampa) were identified from the Cerro Baúl samples. It is possible that the lack of potato starch grains at Cerro Baúl is a product of sampling bias as the Cerro Baúl residues derive solely from lithics, whereas the Quilcapampa samples were taken from ceramics as well. This discrepancy in the artifact types sampled could point to different processing activities (cooking vs. processing) rather than presence vs. absence of the relevant plant taxa; perhaps potatoes were not processed using groundstone. Additional analysis of starch grains from Cerro Baúl ceramics is needed to investigate the role of potatoes in local foodways.

Culture Contact, Entanglement, and Cuisine on the Wari Colonial Frontier: Concluding Thoughts

One of the principal questions with which this dissertation grapples is the ways in which foodways are a lens through which to investigate culture contact and colonial entanglements in the past. To address this question, I analyzed plant remains from the Huaracane site of Yahuay Alta in the Moquegua Valley to compare and contrast local Huaracane foodways with those of the Wari colonists in the region. The samples date before and during Wari incursion to ensure a pre-Wari baseline is present to compare the Middle Horizon plant remains. In total, six plant species unique to this non-Wari local site were identified. Overall, Huaracane foodways were focused on C_3 plants that could be grown locally. Some of these species include cultigens like arracacha, bottle gourd, cotton, peanut, squash, and quinoa. In addition, potato and squash (e.g.,) starch grains were identified from *manos* recovered from excavations. Maize was not present macrobotanically but was identified via microbotanical analysis. While maize could be grown in the middle Moquegua Valley, the residents of the site apparently did not rely on the grain (see also Goldstein 2000, 2003; Sandness 1992), but instead favored tubers, squash/gourd, legumes, and gathered cactus fruit.

The most intriguing plant recovered from Yahuay Alta is molle. Analysis of soil samples from Late Formative period contexts (pre-Wari) at the site reveals a complete absence of molle seeds, versus the later Middle Horizon contexts with 1,127 molle seeds recovered from soil samples and 197,202 seeds recovered by hand from the excavation screen. Therefore, it seems that molle may have first been introduced to the Huaracane during the Middle Horizon by their new Wari neighbors. The lack of (macrobotanical) maize in Middle Horizon contexts suggests *chicha de molle* may have been the main variety of *chicha* produced at Yahuay Alta. The presence of molle at Yahuay Alta is thus significant as it represents material evidence of culture contact between Wari colonists and the indigenous

Huaracane. With so little known about Wari-Huaracane interaction on the frontier, how might the introduction of molle remains used for brewing inform on colonial entanglement?

I have argued that the Wari pattern of *chicha de molle* use is characterized by brewing (and likely consumption) in both public and household contexts of both elites and non-elites throughout the Wari provinces. Molle dregs (from brewing) appear at all three Wari sites included in this dissertation (as well as other Wari provincial sites [e.g., Edwards and Schreiber 2014; Green and Goldstein 2010; Tung 2007:260]). Furthermore, molle drupes are ubiquitous and consistently produce the highest ubiquity and density values at many provincial Wari sites, suggesting that brewing, storage, and/or consumption of the chicha was widespread. The presence of a *chicha* brewery on Cerro Baúl's summit is unique as no other investigated sites to date have an identifiable brewing context to the same scale. However, Nash (2002, 2011, 2012a, 2012b) has noted the presence of four hearths in Unit 145 on the summit of Cerro Mejía which may represent boiling activities for producing *chicha.* The significance of the Wari brewery in Moquegua is compounded by the fact that the brewery is located at the summit of Cerro Baúl possibly connecting the production of *chicha* with spiritual power of Cerro Baúl. This association between brewing and location likely provided a means for both tying Wari colonists to the local landscape and producing ritually-charged *chicha* for ceremonial and daily consumption.

The Huaracane pattern of *chicha de molle* brewing at Yahuay Alta differs from the Wari pattern in several key ways. Molle has a low ubiquity at Yahuay Alta and is present in only one household; the other Middle Horizon households lacked molle entirely. Instead, the majority of molle recovered from Yahuay Alta was recovered from pits and floor surfaces from a structure (Unit 7) adjacent to the central mound complex. These pits, which almost exclusively contained molle, have been identified at several Wari provincial sites suggesting a distinct pattern of discard. The similarity of the pits at Yahuay Alta to those found at other Wari sites and the change in seed shape provides convincing evidence that not only was molle adopted by the Huaracane but that it was used for brewing. However, the low ubiquity and association with the central mound complex at Yahuay Alta suggests a very different pattern of molle use compared to patterns at provincial Wari sites.

Instead of the widespread use of molle in public and private domestic contexts, it appears that Huaracane peoples primarily brewed molle *chicha* for use in public ceremonies or spectacles. The evidence of this adoption of the *chicha*-based practices by local indigenous people is significant not only because it signals food as a form of culture contact, but it also provides insight into the nature of Wari-Huaracane interaction. Far from the wholesale adoption of Wari exotic practices and material culture, Huaracane peoples apparently rebuffed Wari influence in (most) ways, with only selective adoption of certain food and food practices. It has been proposed, based on the general lack of grinding stones and other equipment necessary for creating *chicha,* that the Huaracane did not brew maize *chicha* (Costion et al. 2014). Instead, the Huaracane integrated brewing into a familiar setting at the central mound complex at Yahuay Alta. It was there that Huaracane (elites) integrated *chicha de molle* existing public ritual practices, using it in ways that made sense within their own cultural practices. The Huaracane did not brew (or likely consume) the beverage in great quantities in their homes (for either daily consumption or for private feasts) but instead strategically deploying its use within public settings.

Overall, these data suggest that significant changes in Huaracane political economy occurred after the arrival of Wari colonists in Moquegua. *Chicha de molle* brewing and consumption at Wari Cerro Baúl was ubiquitous while Huaracane Yahuay Alta peoples integrated the practice in a more limited way into their existing political structure. Perhaps Huaracane elites found *chicha de molle* to have been a valuable tool to strengthen community cohesion (e.g., Dietler 1996, 2006, 2007; Dietler and Hayden 2001), especially in the face of the arrival of both Wari and Tiwanaku colonists who may have challenged Huaracane elite authority and/or disrupted some aspects of Huaracane lifeways. The ethnographic literature indicates that reciprocity is the backbone of the traditional Andean economy wherein hosts must provide feasts as part of delayed reciprocal labor exchanges between community members (e.g., Allen 1988; Hastorf and Johannessen 1993; Isbell 1978:167-177; Murra 1960; Weismantel 1988:187). Combining *chicha de molle* and feasting might have been a strategy for Wari to curry favor with locals in an attempt to pacify anxiety related to their presence on the frontier; as a means to pay locals for labor in Wari fields and/or construction projects; and/or to demonstrate Wari power by indebting laborers with the sheer quantity of food and *chicha* they provided at feasts (see Bray 2003; Hastorf and Johannessen 1993; Moore 1989:685; Morris 1979:32; Rosenswig 2007; Swenson 2006). As a means to cope with their changing social, economic, and political systems, Huaracane elites would have adopted *chicha de molle* as a way to bolster their status, compete with Wari and Tiwanaku for labor and power, maintain Huaracane solidarity vis-à-vis the incursion of foreigners, or perhaps overtly align themselves with Wari by adopting an aspect of Wari cuisine (i.e. *chicha de molle*).

Interestingly, *Portulaca* (purslane) and quinoa were found to cluster around a domestic context at both Cerro Baúl and Yahuay Alta. Although *Portulaca* and quinoa seeds are by no means unique to Moquegua, these plants do not cluster together at Quilcapampa, suggesting the pattern may be limited to the Moquegua region. The association of these plants with a domestic context at each Moquegua site could signal the Wari adoption of Huaracane foodways and/or the presence of a Huaracane person/household on Cerro Baúl. The idea of marriage exchange and/or multiethnic communities is not new to Wari studies (e.g., Isbell and McEwan 1991; Jennings 2010; Nash 2015), so it is plausible that either scenario could be the case. Wari colonists could have adopted aspects of the local cuisine, preparing these foods in ways similar to their indigenous neighbors. On the other hand, a Huaracane person could have taken up residence at Cerro Baúl after the abandonment of their Huaracane settlements during the mid-Middle Horizon (see Green and Goldstein (2010:31). While this interpretation is speculative, the scenario is certainly possible.

As a unique zone of exchange, invention, and fluid boundaries, the frontier allows greater room for innovation and thresholds for what is socially acceptable, permitting a greater diversity of behaviors and exchange of cultural practices. A consideration of frontiers and borderlands also provides a useful exercise by considering that adoption, rejection, and or change in colonial entanglements. Wari colonists on the Moquegua frontier did not (or chose to not) create wide sweeping changes or disruptions in the lives of the indigenous Huaracane. The pattern is similar to Nasca (Kellner and Schoeninger 2008) or Cusco (Turner et al. 2018) where Wari was found to not have dramatically increased maize consumption in local diet suggesting little changed in terms of the foodways of local peoples.

The Huaracane did, however, selectively adopt the practice of brewing *chicha de molle* from their Wari neighbors. This case study provides a critical perspective on culture contact and colonialism using post-colonial theory to address the role of locals and foreignness in the dialectical process of colonial entanglement. Furthermore, I also highlight the utility of plant remains in scenarios of culture contact and colonial entanglement, a dataset that is most often excluded from such investigations in favor of more “traditional” approaches to the archaeological study culture contact, such as ceramics, architecture, or luxury goods (e.g., metal, shell, foreign raw materials). Foodways have much to offer investigations of ancient cultural interactions, and it is my hope that such an approach will become more popular as a means to characterize culture contact, colonial negotiations, and studies of ethnic interaction in the past.

Final Thoughts and Future Directions

This dissertation represents the starting point for further investigations into *culinary encounters* and culture contact in the Andes and elsewhere. Focusing on the Wari Empire, I would like to see the addition of more samples from the domestic components of Wari provincial sites added to this dataset. This dissertation only considers provincial Wari foodways from the south-central Peruvian Andes. The addition of Wari colonial sites from other parts of the Empire, most notably northern Peru, would greatly aid in characterizing similarities and differences in Wari provincial cuisine. Further, my current view of Wari cuisine is restricted to the provinces, yet we have little idea of what foodways were like at the capital site of Huari. An investigation of Wari cuisine at the site of Huari in Ayacucho is critical if we wish to understand the origins and development of Wari cuisine in the heartland as well as in the provinces.

Further research is also needed on plant residues from local indigenous sites in the vicinity of Wari colonial sites in order to characterize the nature of contact between locals and Wari colonists in more regions. The continued analysis of molle use in multiple local indigenous contexts, both prior to, during, and after the Middle Horizon is necessary if we hope to understand the use of *chicha de molle* in Wari contexts and characterize the phenomenon regionally and temporally. Perhaps there were lasting impacts on Andean communities after the Wari Empire where *chicha* brewing was emphasized in new or similar ways. Still, we know little of non-Wari use of *chicha de molle*, something that is certainly an issue when reconstructing Wari provincial cuisine. I have argued that *chicha de molle* is a Wari phenomenon in the sense that the practice was extensive at many Wari colonial sites in south-central Peru. Nevertheless, other ethnic groups certainly could (and likely did) use molle before, during, and after the Middle Horizon for similar or other purposes. We must investigate non-Wari contexts of molle use to further investigate its role in Andean prehistory.

The study of hallucinogenic substances in the Wari Empire has received attention using artifact, ethnographic, and iconographic data (e.g., Bélisle 2019; Glowacki 2005; Knobloch 2000; Valdez et al. 2015), yet little focus has been given to the use and spread of hallucinogenic/mind-altering substances using archaeobotanical data likely due to the rarity of the species in archaeological sites. Thus, the recovery of two species of mind-altering plants from Cerro Baúl and Quilcapampa, including coca and vilca, offer more questions than answers. For example, we know relatively little of the spread of coca throughout Peru in prehistory. It has been suggested that coca spread into the Nasca region relatively late in Peruvian prehistory (around the Early Intermediate Period) and was subsequently introduced to the highlands (around Ayacucho) only after Wari incursion into the region at the beginning of the Middle Horizon (Valdez et al. 2015). How does the lack of coca presence in other parts of the south-central Peru compare to other parts of the country? Furthermore, did Wari colonists obtain their coca from the same source or were their different sources available depending on seasonality and provenience?

In addition, other than a consideration of vilca in Wari iconography and as a possible *chicha* additive (Knobloch 2000), its use has not been widely considered in the Wari provinces. Recently, however, Bélisle (2019) has reported on the recovery of paraphernalia for ingesting hallucinogens from the site of Ak'awillay in the Cusco region. There, she found snuff tubes and tablets in public and domestic contexts; one third of the paraphernalia were associated with domestic contexts including house floors, patios, and nearby middens suggesting a mixed ritual and profane use of vilca (Bélisle 2019:11). The recovery of vilca seeds in domestic refuse at Quilcapampa suggests a more mundane function of the plant, though a ritual use is also plausible. Paleoethnobotanical and isotopic investigations of these plants are warranted in order to clarify patterns of production, distribution, and use before, during, and after Wari to recognize the ceremonial and secular uses of these important plants in Andean prehistory.

To close, while the food we consume most certainly becomes a part of our physicality, the addition of *how* we eat adds a much-needed social dimension to studies of food. While one of the most enduring problems for the study of ancient empires is that the material correlates indicative of imperial integration are often difficult to identify and define in the archaeological record, the patterning of food-based practices offers much to the identification of the nature of colonial encounters and culture contact scenarios. Archaeologists are well-suited to investigate the cuisine of ancient cultures and address how food habits were part of long- and short-term negotiations in colonial contexts, borderlands, and frontiers of the past, and how these perspectives may help inform issues of ethnicity and cultural exchanges in the present. Foodways data are a valuable (mostly) untapped source of evidence that has much potential to inform investigations of culture contact and colonial entanglement in the past.

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APPENDIX I

PROVENIENCE INFORMARTION AND BASIC MEASURES OF FLOTATION SAMPLES

Site	Sample Number	Unit	Layer	Grid	Level	Feature	Vol. (L)	Total Plant Weight (g)	Wood Weight (g)
Cerro Baúl	1	41B	D2	112		18	1	4.02	3.81
Cerro Baúl	2	41B	D	112			1	7.93	7.78
Cerro Baúl	3	41B	D2	112		18	1	7.35	5.38
Cerro Baúl	4	41B	D2	112		18	1	3.9	3.01
Cerro Baúl	5	41B	D2	112		18	1	1.37	1.22
Cerro Baúl	6	41B	E	112		18	1	10.09	7.07
Cerro Baúl	7	41C	D	178			1	8.93	8.59
Cerro Baúl	8	41C	D	161		5	1	3.02	2.69
Cerro Baúl	9	41C	B3	180		2	1	0.03	0.01
Cerro Baúl	10	41C	B4	181		2	1	0.13	0.01
Cerro Baúl	11	7F	C	82			1	6.71	1.14
Cerro Baúl	12	7F	C	72			1	0.5	0.39
Cerro Baúl	13	7G	C	41			1	2.4	1.64
Cerro Baúl	14	7F	C	52			1	0.22	0.19
Cerro Baúl	15	7F	C	81			1	0.73	0.64
Cerro Baúl	16	7F	C	71			1	6.25	0.22
Cerro Baúl	17	7F	C	61			1	0.98	0.45
Cerro Baúl	18	7G	D	51			1	1.64	0.42
Cerro Baúl	19	7G	C	51		3	1	5.19	5.26
Cerro Baúl	20	7F	C	62			1	3.69	0.69
Cerro Baúl	21	7F	C	72			1	0.8	0.21
Cerro Baúl	22	7F		81		1	1	1.17	0.89
Cerro Baúl	23	7F	C	71			1	0.61	0.15
Cerro Baúl	24	7G	D	51			1	0.12	0.12
Cerro Baúl	25	7F	C	61		4?	1	6.26	6.27
Cerro Baúl	26	9A	B2	67		5	1	1.98	0.52
Cerro Baúl	27	9B	C3	188		9	1	3.5	2.92
Cerro Baúl	28	41A	D	43		4	1	5.74	2.95
Cerro Baúl	29	41A	D	43		4	1	5.19	0.58

Cerro Baúl	30	9F	F		4	1	1.4	1.31
Cerro Baúl	31	9F1	C	232		1	1.65	1.67
Cerro Baúl	32	9F1	C	216		1	0.46	0.49
Cerro Baúl	33	25	B	42		1	0.07	0.05
Cerro Baúl	34	9F			4	1	1.38	1.25
Cerro Baúl	35	9F1	C	202		1	0.78	0.8
Cerro Baúl	36	25	B	25		1	0.05	0.03
Cerro Baúl	37	9F1	C	213		1	0.09	0.08
Cerro Baúl	38	9G	C	146		1	3.3	2.89
Cerro Baúl	39	9F1	E	218		1	3.03	1.86
Cerro Baúl	40	9F2		24		1	1.28	1.13
Cerro Baúl	41	9F1	C	201		1	1.17	0.98
Cerro Baúl	42	9F2	C	219		1	0.71	0.69
Cerro Baúl	43	9F1	C	215		1	0.11	0.11
Cerro Baúl	44	9E	C	177		1	1.08	1.08
Cerro Baúl	45	9F2	C	236		1	0.6	0.45
Cerro Baúl	46	9F1	C	218		1	0.72	0.7
Cerro Baúl	47	9F2	C	252		1	0.78	0.64
Cerro Baúl	48	9G	C	210		1	0.26	0.23
Cerro Baúl	49	9G	C	195		1	0.19	0.17
Cerro Baúl	50	9F1	C	230		1	0.18	0.16
Cerro Baúl	51	9F1	C	249		1	0.14	0.12
Cerro Baúl	52	9G	C	194		1	0.02	0.02
Cerro Baúl	53	9F2	C	220		1	0.62	0.43
Cerro Baúl	54	9F			5 AND 3	1	1.4	1.28
Cerro Baúl	55	24A	D	18		1	0.6	0.58
Cerro Baúl	56	24A	D	15	4	1	2.96	2.98
Cerro Baúl	57	24A	D	15		1	1.4	0.92
Cerro Baúl	58	24A	D	16		1	3.17	2.85
Cerro Baúl	59	24C	C	11		1	6.3	6.38
Cerro Baúl	60	24C	C	24		1	14.13	10.36
Cerro Baúl	61	24C	C	28		1	0.43	0.41
Cerro Baúl	62	24C	C	21		1	7.3	7.22
Cerro Baúl	63	24C	C	4		1	2.95	2.98
Cerro Baúl	64	24C	C	23		1	0.01	0
Cerro Baúl	65	24C	C	5		1	0.1	0.06
Cerro Baúl	66	42A	D	41	8	1	14.66	9.26
Cerro Baúl	67	24C	C	5		1	0.1	0.06
Cerro Baúl	68	24C	C	10		1	0.73	0.71
Cerro Baúl	69	24C	D1	33	11	1	0.2	0.15

Cerro Baúl	70	24C	D3	23	5	1	0.86	0.81
Cerro Baúl	71	24C	D3	23	5	1	0.12	0.09
Cerro Baúl	72	25A	B	62		1	0.03	0.01
Cerro Baúl	73	24A	B	5		1	0.66	0.32
Cerro Baúl	74	25A	B	77		1	0.26	0.19
Cerro Baúl	75	24A	E1	18	12	1	0.38	0
Cerro Baúl	76	25A	B	62	2	1	0.06	0.01
Cerro Baúl	77	25A3	B	121		1	0.25	0.15
Cerro Baúl	78	25A2	AB	78		1	0.48	0.28
Cerro Baúl	79	25A	B	30		1	0.15	0.12
Cerro Baúl	80	25A	B	53		1	0.07	0.07
Cerro Baúl	81	25A	B	65		1	0.04	0.05
Cerro Baúl	82	24B	C	35		1	0.04	0.03
Cerro Baúl	83	24B	C	13		1	0.22	0.24
Cerro Baúl	84	24B	C	33E		1	0.08	0.06
Cerro Baúl	85	24B	C	11		1	0.19	0.17
Cerro Baúl	86	24B	C	25E		1	0.06	0.02
Cerro Baúl	87	24B	C	20		1	0.34	0.34
Cerro Baúl	88	24B	C	9		1	0.08	0.04
Cerro Baúl	89	24B	C	10		1	0.21	0.18
Cerro Baúl	90	24B	C	25W		1	0.25	0.1
Cerro Baúl	91	24B	C	43		1	0.01	0.01
Cerro Baúl	92	24B	C	42		1	0.01	0.01
Cerro Baúl	93	24A	E3	15	4B	1	51.32	50.18
Cerro Baúl	94	24A	E2	6		1	1.31	0.81
Cerro Baúl	95	24A	E2	2	3	1	0.04	0.45
Cerro Baúl	96	24A	E1	2	3	1	4.64	0.82
Cerro Baúl	97	24A	E1	15	4B	1	9.98	4.4
Cerro Baúl	98	41E	E	77	3	1	5.75	3.39
Cerro Baúl	99	41E	E	77	3	1	5.05	3.94
Cerro Baúl	100	41E	E	77	3	1	9.37	6.86
Cerro Baúl	101	24A	6	9		1	0.46	0.06
Cerro Baúl	102	24B	D4	43	5	1	0.89	0.65
Cerro Baúl	103	24B	D	15	4	1	0.54	0.51
Cerro Baúl	104	24B	D	15		1	1.53	0.73
Cerro Baúl	105	41A	D	60	6	1	3.72	1.14
Cerro Baúl	106	41A	D	61	4	1	3.02	0.5
Cerro Baúl	107	41B	D2	112	18	1	2.48	1.5
Cerro Baúl	108	26A	I	12	5	1	4.54	2.98
Cerro Baúl	109	26A1	I	12	5	1	5.57	4.07

Cerro Baúl	110	26A1	I	19-20		7	1	3.86	3.65
Cerro Baúl	111	26A1	H	2		2	1	5.63	0.57
Cerro Baúl	112	26A2	I	7			1	3.42	3.21
Cerro Baúl	113	42A	D	48			1	3.64	1.1
Cerro Baúl	114	42A	D	48		7	1	4.09	1.3
Cerro Baúl	115	42A	D	45			1	5.35	1.53
Cerro Baúl	116	42A	D	49		22	1	6.22	2.53
Cerro Baúl	117	42A	D	41			1	10.82	5.23

Site	**Sample Number**	**Unit**	**Capa**	**Grid**	**Level**	**Feature**	**Vol. (L)**	**Wood Weight (g)**
Yahuay Alta	01-016-008	1	A	16	2	2	2	0
Yahuay Alta	01-016-012	1	A	16	2	2	2	0.01
Yahuay Alta	01-017-002	1	A	17	2	2	2	0.01
Yahuay Alta	01-023-001	1	A	23	2	2	2	0.03
Yahuay Alta	01-023-002	1	A	23	2	2	2	0.01
Yahuay Alta	02-011-006	2	C	11		9	1	1.61
Yahuay Alta	02-012-007	2	C	12		9	1	0.01
Yahuay Alta	02-022-012	2	C	22		9	1	0.02
Yahuay Alta	03-053-011	3	A	53		1	1	1.23
Yahuay Alta	03-054-011	3	A	54		1	1	0.2
Yahuay Alta	03-055-009	3	B	55		7	1	0.98
Yahuay Alta	03-056-009	3	B	56		8	1	0.05
Yahuay Alta	03-058-013	3	B	58		12	1	0.09
Yahuay Alta	03-059-012	3	B	59		14	1	0.53
Yahuay Alta	03-060-009	3	B	60		15	1	0.15
Yahuay Alta	03-069-009	3	A	69		1	1	0.28
Yahuay Alta	03-070-011	3	A	70		1	1	0.5
Yahuay Alta	03-071-009	3	A	71		3	1	0.27
Yahuay Alta	03-073-012	3	B	73		11	1	4.19
Yahuay Alta	03-074-012	3	B	74		13	1	0.42
Yahuay Alta	03-075-015	3	B	75		16	1	1.25
Yahuay Alta	03-076-009	3	B	76		17	1	0.7
Yahuay Alta	03-077-006	3	B	77		27	1	0.05
Yahuay Alta	03-089-008	3	B	89		25	1	0.02
Yahuay Alta	03-090-008	3	B	90, 91, 106, 107		26	1	0.04
Yahuay Alta	03-091-009	3	B	91		18	1	0.16

Yahuay Alta	03-091-015	3	B	91		19	1	0.47
Yahuay Alta	03-092-009	3	B	92		19	1	0.35
Yahuay Alta	04-025-007	4	A	25		1	2	0.12
Yahuay Alta	04-025-008	4	A	25		1	2	0.13
Yahuay Alta	04-025-009	4	A	25		1	2	0.56
Yahuay Alta	05-004-003	5	B	4		1	1	0
Yahuay Alta	05-007-003	5	B	7		1	1	0
Yahuay Alta	05-011-004	5	B	11		4	2	0
Yahuay Alta	05-016-002	5	B	16, 17		2	2	1.11
Yahuay Alta	05-020-005	5	B	21,21		3	2	0.01
Yahuay Alta	06-002-006	6	B	2		15	1	0.65
Yahuay Alta	06-003-015	6	C	3		17	1	0.12
Yahuay Alta	06-004-012	6	C	4		18	1	0.01
Yahuay Alta	06-033-006	6	B	33, 41		13	1	0.02
Yahuay Alta	06-041-006	6	B	41, 49		12	1	0.47
Yahuay Alta	06-046-009	6	B	46		9	1	0.08
Yahuay Alta	06-067-004	6	A	67	1	1	1	2.19
Yahuay Alta	06-075-006	6	A	75	1	1	1	0.55
Yahuay Alta	06-075-008	6	A	75	2	2	1	0
Yahuay Alta	06-075-014	6	A	75	3	2	1	0
Yahuay Alta	06-079-008	6	B	79		4	1	0.55
Yahuay Alta	06-079-010	6	B	79		5	1	0.01
Yahuay Alta	07-013-007	7	B	13		2	1	1.82
Yahuay Alta	07-018-011	7	B	18		2	1	1.48
Yahuay Alta	07-027-014	7	C	27		3A	1	0.29
Yahuay Alta	07-028-012	7	C	28		7	1	0.05
Yahuay Alta	07-031-017	7	C	31		3A	1	0.3
Yahuay Alta	07-031-018	7	C	31	1	3B	1	0.03
Yahuay Alta	07-032-013	7	C	32	1	6	1	0.48
Yahuay Alta	07-035-013	7	C	35		12	1	0.16
Yahuay Alta	08-035-011	8	C	35		24	1	0.01
Yahuay Alta	08-036-009	8	C	36		25	1	0.02
Yahuay Alta	08-037-014	8	C	37		28	1	0.02
Yahuay Alta	08-041-014	8	C	41		12	1	0.04
Yahuay Alta	08-042-011	8	C	42		13	1	0.05
Yahuay Alta	08-043-010	8	C	43		16	1	0.1
Yahuay Alta	08-044-014	8	C	44		20	1	0.13
Yahuay Alta	08-045-014	8	B	45		1	1	0.23
Yahuay Alta	08-049-014	8	C	49		11	1	0.04
Yahuay Alta	08-052-018	8	C	52		19	1	0.12

Site	Sample	Unit	Locus	N de EA	Grid	Level	Vol. (L)	Total Plant Weight (g)	Wood Weight (g)
Quilcapampa	1	17	1608	17			5	26.08	9.64
Quilcapampa	2	25	2414	29	5		5	20.06	7.62
Quilcapampa	3	17	1610	17			5	11.13	2.52
Quilcapampa	4	17	1611	17			5	21.2	0.26
Quilcapampa	5	17	1613	17			5	36.4	4.69
Quilcapampa	6	25	2415	29	B-C, E		5	79.31	1.57
Quilcapampa	7	21	2022	25			5	34.92	0.35
Quilcapampa	8	21	2021	25			5	4.85	0.11
Quilcapampa	9	21	2024	25			5	6.84	0.19
Quilcapampa	10	21	2022	25			5	21.01	0.36
Quilcapampa	11	21	2021	25			5	6.1	0.03
Quilcapampa	12	17	1625	17			5	39.7	0.49
Quilcapampa	13	17	1636	17.2			5	0.01	0
Quilcapampa	14	26	1636	26			5	2.87	0.1
Quilcapampa	15	22	2104	26			5	9.03	2.68
Quilcapampa	16	19	1808	13			5	11.01	0.26
Quilcapampa	17	25	2419	29			5	11.57	7.12
Quilcapampa	18	22	2104	26			5	8.74	5.19
Quilcapampa	19	20	1905	3			5	4.81	2.02
Quilcapampa	20	23	2214	23	T, U, X, Y		5	23.2	4.59
Quilcapampa	21	23	2213	23	V, W, Z, A		5	15.85	8.45
Quilcapampa	22	22	2110	26			5	6.12	16
Quilcapampa	23	22	2111	26			5	2.03	0.1
Quilcapampa	24	25	2414	29	L		5	13.48	11.89
Quilcapampa	25	23	2213	23	V, W, Z, A		5	21.46	7.64
Quilcapampa	26	21	2020	21			5	0	0
Quilcapampa	27	25	2421	29			5	42.4	18.15
Quilcapampa	28	17	1638	17.2			5	0	0
Quilcapampa	29	24	2308	28.2			5	27.5	3.05
Quilcapampa	30	24	2303	28.2			5	6.92	3.3
Quilcapampa	31	28	2701	27	O		5	25.5	1.41

Quilcapampa	32	28	2708	27	AT	5	4.23	1.2
Quilcapampa	33	22	2102	26		5	8.62	0.12
Quilcapampa	34	17	1609	17	P	5	11.37	3.45
Quilcapampa	35	24	2312	28.1		5	30.12	6.01
Quilcapampa	36	28	2707	27	AC, AD	30	0	0
Quilcapampa	266	2	105	120	J	5	0.24	0.24
Quilcapampa	738	4	306	28		5	0.06	0.02
Quilcapampa	739	4		28		5	0	0.7
Quilcapampa	740	3	208	27		5	0.24	0.18
Quilcapampa	758	3		27		5	0	0
Quilcapampa	947	2	505	6	I, J, K	5	132.6	0.11
Quilcapampa	948	6	506	2	I	5	31.53	0.05
Quilcapampa	949	6		2	J, K	5	165.8	0.09
Quilcapampa	966	4	344	28	R	5	1.85	1.71
Quilcapampa	969	4	305	28		5	0.08	0.03
Quilcapampa	971	4	308	28		5	0.5	0.46
Quilcapampa	972	4	310	28		5	0.17	0.14
Quilcapampa	973	4	312	28		5	0	0
Quilcapampa	974	4	317	28	P-Q	5	2.84	2.84
Quilcapampa	977	4	325	28	P	5	0.02	0
Quilcapampa	990	6	503	2	F	5	0	0
Quilcapampa	991	6	503	2	G	5	2.77	0.01
Quilcapampa	992	6	503	2	K	5	9.23	0.01
Quilcapampa	993	6	503	2	K-L	5	7.89	0.03
Quilcapampa	994	6	505	2	F-G	5	1.77	0
Quilcapampa	995	6	506	2	I	5	3.58	0.01
Quilcapampa	996	6	505	2	K	5	1.87	0
Quilcapampa	997	6		2		5	20.52	0
Quilcapampa	998	6	507	2	K	5	10.45	0
Quilcapampa	1002	6	509	2	J	5	0.5	0.25
Quilcapampa	1004	6	512	2		5	0.01	0
Quilcapampa	1005	6	513	2	K	5	0.01	0
Quilcapampa	1006	6	515	21	A	5	0.3	0.28
Quilcapampa	1007	6	515	21	B	5	0.02	0.01
Quilcapampa	1008	6	515	21	C	5	0.15	0.01
Quilcapampa	1009	6	516	22	P	5	0.22	0.21
Quilcapampa	2344	16	1606	5		5	0.63	0
Quilcapampa	2345	16	1510	5		5	12.9	3.78
Quilcapampa	2346	16	1512	5		5	41.94	11.93
Quilcapampa	2394	22		26				

Quilcapampa	2395	23	2209	23	D		5	20.8	0
Quilcapampa	2396	23	2215	23	Y		5	33.56	0.82
Quilcapampa	2412	27	2604	38			5	0.15	0.05
Quilcapampa	2434	33	3207	11	B		5	1.76	0
Quilcapampa		2	104	120			5	0	0
Quilcapampa		6		2	J, K		5	165.8	0.09

Site	**Sample**	**Unit**	**Layer**	**Grid**	**Level**	**Feature**	**Vol. (L)**	**Total Plant Weight (g)**	**Madera (g)**
Hatun Cotuyoc	1	1D		205		2	10	36.22	18.11
Hatun Cotuyoc	2	1		6-10	2	30	10	0.92	0.46
Hatun Cotuyoc	3	2 Rec 1		3			10	5.08	2.43
Hatun Cotuyoc	4	2 Rec 1				11	10	2.27	2.27
Hatun Cotuyoc	5	2		6			10	0.33	0.33
Hatun Cotuyoc	6	1		6		3013	10	0.1	0.05
Hatun Cotuyoc	7	1		7		46	10	0.04	0
Hatun Cotuyoc	8	1 Area F		3/4		24	10	0	0
Hatun Cotuyoc	9	1		8		31	10	1.92	0.96
Hatun Cotuyoc	10	1 Area D		2	1	17	10	0	0
Hatun Cotuyoc	11	1		2/5		2	10	0.09	0
Hatun Cotuyoc	12	1		13	1	48	10	0.01	0
Hatun Cotuyoc	13	1 Area D		6/2	1	2	10	0.01	0
Hatun Cotuyoc	14	2 Area D			3		10	0.01	0
Hatun Cotuyoc	15	1 Area F		13	2	59	10	0.01	0
Hatun Cotuyoc	16	1 Area F		13	2	59	10	0.01	0
Hatun Cotuyoc	17	1 Area D		205		2	10	4.54	2.27
Hatun Cotuyoc	18	1 Area F		12	2	48	10	0.88	0.44
Hatun Cotuyoc	19	1 Area F		8/10		60	10	3.1	3.1
Hatun Cotuyoc	20	1 Area F		9/8			10	0.22	0.11
Hatun Cotuyoc	21	2 Area D				12	10	0.36	0.18
Hatun Cotuyoc	22	1 Area F		7			10	0.05	0.05
Hatun Cotuyoc	23	1 Area D		3/4			10	0.08	0.08
Hatun Cotuyoc	24	2 Area D		2	1		10	0.14	0.06
Hatun Cotuyoc	25	1 Area D		205	6	1	10	0.06	0.06
Hatun Cotuyoc	26	1 Area F		13			10	0.08	0.04
Hatun Cotuyoc	27	1 Area F		6			10	0.07	0.03
Hatun Cotuyoc	28	1 Area F		6			10	0.06	0.03
Hatun Cotuyoc	29	1		3/4	2		10	0.02	0.01
Hatun Cotuyoc	30						10	0.02	0.01
Hatun Cotuyoc	31	1 Area D		4			10	0.08	0.04

Hatun Cotuyoc	32	1 Area F		2		R11	10	0.01	0
Hatun Cotuyoc	33	1 Area F		2		R9	10	0	0
Hatun Cotuyoc	34	1 Area F	R1	1			10	0.01	0
Hatun Cotuyoc	35	1 Area F	R12	3			10	0.01	0
Hatun Cotuyoc	36	1 Area F	R6		3		10	0	0
Hatun Cotuyoc	37	1 Area F		1			10	0.07	0.07
Hatun Cotuyoc	38	1 Area E	3				10	0.08	0.04
Hatun Cotuyoc	39	1 Area E	6				10	0.34	0.3
Hatun Cotuyoc	40	1 Area D		1	2	I	10	0.01	0
Hatun Cotuyoc	41	1 Area E	3				10	0.04	0.01
Hatun Cotuyoc	42	1		3	1	12	10	0.18	0.09
Hatun Cotuyoc	43	1 Area D	3		1		10	0.02	0.01
Hatun Cotuyoc	44	1 Area D		1	2	1	10	0.4	0.19
Hatun Cotuyoc	45	1 Area D			2	1	10	0	0
Hatun Cotuyoc	46	1 Area F	R10	2			10	0.05	0
Hatun Cotuyoc	47	1 Area D	I		2		10	0.05	0.01
Hatun Cotuyoc	48	1 Area D	2		1		10	0.08	0.04

APPENDIX II

INVENTORY OF PLANTS RECOVERED FROM CERRO BAUL

Sample	Unit	Layer	Grid	Feature	Taxonomic Identification	Common Name	Count	Weight
1	41 B	D2	112	18	*Chenopodium quinoa*	Quinoa	1	0.01
1	41 B	D2	112	18	*Schinus molle*	Molle Carbonized Processed	46	0.14
1	41 B	D2	112	18	*Schinus molle*	Molle Desiccated Processed	9	0.04
1	41 B	D2	112	18	*Schinus molle*	Molle Stem	38	0.01
1	41 B	D2	112	18	*Zea mays*	Maize Cob Desiccated	1	0.01
1	41 B	D2	112	18	*Zea mays*	Maize Cupule Desiccated	28	0.06
1	41 B	D2	112	18	UID		6	0.02
2	41 B	D	114		*Chenopodium quinoa*	Quinoa	4	0.01
2	41 B	D	115		*Haageocereus* sp.	Cactus	1	0.01
2	41 B	D	116		*Schinus molle*	Molle Desiccated Processed	1	0.01
2	41 B	D	112		*Zea mays*	Maize Cob Desiccated	1	0.12
2	41 B	D	113		*Zea mays*	Maize Cupule Desiccated	6	0.11
3	41 B	D2	112	18	Cactaceae	Cactus Family	1	0.01
3	41 B	D2	112	18	*Chenopodium quinoa*	Quinoa	8	0.01
3	41 B	D2	112	18	*Echinocereus* sp.	Cactus	1	0.01
3	41 B	D2	112	18	*Fagonia chilensis*		1	0.01
3	41 B	D2	112	18	*Lagenaria* sp.	Bottle Gourd Seed	4	0.13
3	41 B	D2	112	18	*Lagenaria* sp.	Gourd Rind	2	0.01
3	41 B	D2	112	18	*Schinus molle*	Molle Carbonized Processed	10	0.01
3	41 B	D2	112	18	*Schinus molle*	Molle Desiccated Processed	301	1.23
3	41 B	D2	112	18	*Schinus molle*	Molle Stem	21	0.01
3	41 B	D2	112	18	*Zea mays*	Maize Cupule Desiccated	2	0.02
3	41 B	D2	112	18	UID		4	0.05
4	41 B	D2	112	18	*Chenopodium quinoa*	Quinoa	2	0.01
4	41 B	D2	112	18	*Echinocereus* sp.	Cactus	1	0.01
4	41 B	D2	112	18	*Schinus molle*	Molle Carbonized Processed	78	0.14
4	41 B	D2	112	18	*Schinus molle*	Molle Stem	1	0.01
4	41 B	D2	112	18	*Zea mays*	Maize Cupule Desiccated	27	0.11
4	41 B	D2	112	18	*Zea mays*	Maize Embryo	3	0.01
4	41 B	D2	112	18	UID		11	0.01
5	41 B	D2	112	18	Cactaceae	Cactus Family	1	0.01
5	41 B	D2	112	18	*Lagenaria* sp. cf.	Gourd Rind cf.	1	0.01

5	41 B	D2	112	18	*Schinus molle*	Molle Carbonized Processed	26	0.02
5	41 B	D2	112	18	*Schinus molle*	Molle Stem	2	0.01
5	41 B	D2	112	18	*Zea mays*	Maize Embryo	4	0.02
5	41 B	D2	112	18	*Zea mays*	Maize Kernel Desiccated	16	0.05
5	41 B	D2	112	18	UID		7	0.01
6	41 B	E	112	18	*Schinus molle*	Molle Carbonized Processed	5	0.01
6	41 B	E	112	18	*Schinus molle*	Molle Desiccated Processed	274	0.63
6	41 B	E	112	18	*Zea mays*	Maize Cob Desiccated	2	0.01
6	41 B	E	112	18	*Zea mays*	Maize Cupule Desiccated	1	0.01
6	41 B	E	112	18	*Zea mays*	Maize Embryo	2	0.01
6	41 B	E	112	18	*Zea mays*	Maize Kernel Desiccated	36	0.1
6	41 B	E	112	18	UID		3	0.01
6	41 B	E	112	18		Unidentifiable	14	0.02
7	41 C	D	178		*Lagenaria* sp.	Bottle Gourd Seed	3	0.01
7	41 C	D	178		*Schinus molle*	Molle Carbonized Non-Processed	1	0.02
7	41 C	D	178		*Schinus molle*	Molle Carbonized Processed	3	0.01
7	41 C	D	178		*Schinus molle*	Molle Desiccated Processed	92	0.37
7	41 C	D	178		*Schinus molle*	Molle Stem	60	0.02
7	41 C	D	178		UID		1	0.01
7	41 C	D	178			Unidentifiable	3	0.01
8	41 C	D	161	5	*Chenopodium quinoa*	Quinoa	1	0.01
8	41 C	D	161	5	*Cucurbita maxima*	Zapallo	3	0.01
8	41 C	D	161	5	*Lagenaria* sp.	Gourd Rind	1	0.14
8	41 C	D	161	5	*Schinus molle*	Molle Desiccated Processed	10	0.09
8	41 C	D	161	5	*Zea mays*	Maize Cupule Desiccated	1	0.01
8	41 C	D	161	5	*Zea mays*	Maize Kernel Desiccated	1	0.04
8	41 C	D	161	5	UID		7	0.09
9	41 C	B3	180	2	*Chenopodium quinoa*	Quinoa	26	0.01
9	41 C	B3	180	2	UID		2	0.01
10	41 C	B4	181	2	*Chenopodium quinoa*	Quinoa	17	0.01
10	41 C	B4	181	2	*Echinocereus* sp.	Cactus	1	0.01
10	41 C	B4	181	2	*Lagenaria* sp.	Bottle Gourd Seed	1	0.03
10	41 C	B4	181	2	*Malvastrum* sp.		1	0.01
10	41 C	B4	181	2	*Schinus molle*	Molle Stem	1	0.01
10	41 C	B4	181	2	*Zea mays*	Maize Cupule Desiccated	1	0.01
10	41 C	B4	181	2	*Zea mays*	Maize Kernel Carbonized	3	0.04
10	41 C	B4	181	2	UID		1	0.02
11	7 F	C	82		*Schinus molle*	Molle Carbonized Processed	8	0.04
11	7 F	C	82		*Schinus molle*	Molle Desiccated Processed	424	5.29
11	7 F	C	82		*Schinus molle*	Molle Stem	1	0.01

12	7 F	C	72		*Schinus molle*	Molle Carbonized Processed	6	0.01
12	7 F	C	72		UID		2	0.01
13	7 G	C	41		*Chenopodium quinoa* cf.	Quinoa cf.	1	0.01
13	7 G	C	41		*Schinus molle*	Molle Carbonized Processed	7	0.01
13	7 G	C	41		*Zea mays*	Maize Cob Carbonized	4	0.01
13	7 G	C	41			Unidentifiable	13	0.04
14	7 F	C	52		*Schinus molle*	Molle Desiccated Processed	1	0.01
14	7 F	C	52		UID		1	0.01
15	7 F	C	81		*Phaseolus vulgaris*	Common Bean	1	0.04
15	7 F	C	81		*Schinus molle*	Molle Carbonized Processed	10	0.03
15	7 F	C	81		*Schinus molle*	Molle Desiccated Processed	2	0.02
15	7 F	C	81		*Zea mays*	Maize Kernel Carbonized	1	0.01
15	7 F	C	81		UID		1	0.01
16	7 F	C	71		*Schinus molle*	Molle Carbonized Processed	415	1.84
16	7 F	C	71		*Schinus molle*	Molle Desiccated Processed	38	0.32
16	7 F	C	71		*Schinus molle*	Molle Stem	1	0.01
16	7 F	C	71			Unidentifiable	2	0.01
17	7 F	C	61		*Phaseolus vulgaris*	Common Bean	3	0.13
17	7 F	C	61		*Schinus molle*	Molle Carbonized Processed	16	0.07
17	7 F	C	61		*Schinus molle*	Molle Desiccated Non-Processed	1	0.01
17	7 F	C	61		*Schinus molle*	Molle Desiccated Processed	25	0.18
17	7 F	C	61		*Zea mays*	Maize Kernel Carbonized	2	0.01
18	7 G	D	51		*Capsicum* sp.	Ají Seed	1	0.01
18	7 G	D	51		*Schinus molle*	Molle Carbonized Processed	30	0.13
18	7 G	D	51		*Zea mays*	Maize Kernel Carbonized	7	0.05
18	7 G	D	51		UID		1	0.01
19	7 G	C	51	3	*Schinus molle*	Molle Carbonized Processed	2	0.01
20	7 F	C	62		*Schinus molle*	Molle Carbonized Processed	9	0.05
20	7 F	C	62		*Schinus molle*	Molle Desiccated Processed	180	2.44
21	7 F	C	72		*Chenopodium quinoa*	Quinoa	2	0.01
21	7 F	C	72		*Schinus molle*	Molle Carbonized Processed	59	0.32
21	7 F	C	72		*Schinus molle*	Molle Desiccated Processed	2	0.01
21	7 F	C	72		*Zea mays*	Maize Cob Carbonized	1	0.01
21	7 F	C	72		*Zea mays*	Maize Cupule Carbonized	1	0.01
21	7 F	C	72		*Zea mays*	Maize Kernel Carbonized	1	0.01
22	7 F		81	1	*Schinus molle*	Molle Carbonized Processed	16	0.07
22	7 F		81	1	*Schinus molle*	Molle Desiccated Processed	12	0.11
22	7 F		81	1	*Zea mays*	Maize Cupule Carbonized	3	0.04
23	7 F	C	71		*Chenopodium quinoa*	Quinoa	1	0.01

23	7 F	C	71		*Schinus molle*	Molle Carbonized Processed	53	0.2
23	7 F	C	71		*Zea mays*	Maize Kernel Carbonized	1	0.01
23	7 F	C	71		UID		3	0.05
24	7 G	D	51		*Zea mays* cf.	Maize Kernel cf.	2	0.01
25	7 F	C	61	4	*Schinus molle*	Molle Carbonized Processed	1	0.01
26	9 A	B2	67	5	*Schinus molle*	Molle Desiccated Processed	1	0.01
26	9 A	B2	67	5	*Zea mays*	Maize Kernel Desiccated	2	0.01
27	9 B	C3	188	9	*Lagenaria* sp.	Bottle Gourd Seed	2	0.01
27	9 B	C3	188	9	*Schinus molle*	Molle Carbonized Processed	3	0.01
27	9 B	C3	188	9	*Schinus molle*	Molle Desiccated Processed	12	0.08
27	9 B	C3	188	9	*Zea mays*	Maize Cob Carbonized	2	0.17
27	9 B	C3	188	9	*Zea mays*	Maize Kernel Carbonized	4	0.08
27	9 B	C3	188	9	UID		1	0.01
28	41 A	D	43	4	*Amaranthus* sp.	Kiwicha	2	0.01
28	41 A	D	43	4	*Armatocereus* sp.	Cactus	1	0.01
28	41 A	D	43	4	*Capsicum* sp.	Ají Seed	7	0.01
28	41 A	D	43	4	Cenchrus sp.		1	0.01
28	41 A	D	43	4	*Chenopodium quinoa*	Quinoa	11	0.01
28	41 A	D	43	4	*Echinocereus* sp.	Cactus	2	0.01
28	41 A	D	43	4	*Gossypium barbadense*	Cotton Seed	1	0.01
28	41 A	D	43	4	*Gossypium barbadense* cf.	Cotton Seed cf.	3	0.01
28	41 A	D	43	4	*Lagenaria* sp.	Bottle Gourd Seed	56	0.31
28	41 A	D	43	4	*Prosopis* sp.	Algarrobo	2	0.07
28	41 A	D	43	4	*Schinus molle*	Molle Carbonized Processed	7	0.06
28	41 A	D	43	4	*Schinus molle*	Molle Desiccated Processed	172	1.78
28	41 A	D	43	4	*Schinus molle*	Molle Stem	6	0.01
28	41 A	D	43	4	*Verbena* sp.		2	0.01
28	41 A	D	43	4	*Zea mays*	Maize Cupule Carbonized	4	0.09
28	41 A	D	43	4	*Zea mays*	Maize Cupule Desiccated	1	0.01
28	41 A	D	43	4	*Zea mays*	Maize Kernel Carbonized	8	0.2
28	41 A	D	43	4	UID		7	0.09
28	41 A	D	43	4	UID Seed		1	0.01
28	41 A	D	43	4	Unidentifiable		1	0.01
29	41 A	D	43	4	*Amaranthus* sp.	Kiwicha	17	0.01
29	41 A	D	43	4	*Atriplex* sp.		10	0.01
29	41 A	D	43	4	*Capsicum* sp.	Ají Seed	22	0.01
29	41 A	D	43	4	*Chenopodium quinoa*	Quinoa	8	0.01
29	41 A	D	43	4	Cyperaceae	Sedge Family	1	0.01
29	41 A	D	43	4	*Erythroxylum coca*	Coca	1	0.01

29	41 A	D	43	4	*Gossypium barbadense*	Cotton Seed	2	0.01
29	41 A	D	43	4	*Haageocereus* sp.	Cactus	3	0.01
29	41 A	D	43	4	*Lagenaria* sp.	Bottle Gourd Seed	20	0.1
29	41 A	D	43	4	*Lagenaria* sp.	Gourd Rind	2	0.01
29	41 A	D	43	4	*Portulaca* sp.		50	0.01
29	41 A	D	43	4	*Prosopis* sp.	Algarrobo	1	0.01
29	41 A	D	43	4	*Schinus molle*	Molle Carbonized Processed	6	0.03
29	41 A	D	43	4	*Schinus molle*	Molle Desiccated Processed	351	3.44
29	41 A	D	43	4	*Verbena* sp.		15	0.01
29	41 A	D	43	4	*Zea mays*	Maize Embryo	3	0.01
29	41 A	D	43	4	*Zea mays*	Maize Kernel Carbonized	11	0.03
29	41 A	D	43	4	UID		5	0.04
29	41 A	D	43	4	UID Seed		5	0.01
30	9 F	F		4	*Schinus molle*	Molle Carbonized Processed	3	0.01
30	9 F	F		4	*Zea mays*	Maize Cupule Carbonized	2	0.04
30	9 F	F		4	*Zea mays*	Maize Kernel Carbonized	2	0.06
30	9 F	F		4	UID Seed		1	0.01
31	9 F1	C	232		*Schinus molle*	Molle Carbonized Processed	2	0.01
31	9 F1	C	232		*Schinus molle*	Molle Desiccated Processed	1	0.01
31	9 F1	C	232		*Zea mays*	Maize Cupule Carbonized	1	0.01
32	9 F1	c	216		*Zea mays*	Maize Kernel Carbonized	3	0.02
33	25	B	42		*Chenopodium quinoa*	Quinoa	2	0.01
33	25	B	42		*Opuntia* sp. cf.	Cactus cf.	1	0.01
33	25	B	42		*Schinus molle*	Molle Carbonized Processed	1	0.01
34	9F			4	*Chenopodium quinoa*	Quinoa	1	0.01
34	9F			4	*Schinus molle*	Molle Carbonized Processed	1	0.01
34	9F			4	*Zea mays*	Maize Kernel Carbonized	2	0.01
35	9 F1	C	202		*Chenopodium quinoa*	Quinoa	4	0.01
35	9 F1	C	202		*Schinus molle*	Molle Carbonized Processed	1	0.01
35	9 F1	C	202		*Schinus molle*	Molle Stem	1	0.01
35	9 F1	C	202		UID		2	0.02
36	25	B	25		*Chenopodium quinoa*	Quinoa	15	0.01
36	25	B	25		*Echinocactus* sp. cf.	Cactus cf.	1	0.01
36	25	B	25		*Schinus molle*	Molle Carbonized Processed	3	0.01
36	25	B	25		*Schinus molle*	Molle Desiccated Processed	3	0.01
37	9F1	C	213		*Chenopodium quinoa*	Quinoa	3	0.01
37	9F1	C	213		*Schinus molle*	Molle Carbonized Processed	1	0.01
37	9F1	C	213		*Schinus molle*	Molle Desiccated Processed	3	0.01
38	9G	C	146		*Amaranthus* sp.	Kiwicha	4	0.01
38	9G	C	146		*Chenopodium quinoa*	Quinoa	1	0.01

38	9G	C	146	*Cucurbita maxima*	Zapallo	1	0.02
38	9G	C	146	*Gossypium barbadense* cf.	Cotton Seed cf.	1	0.01
38	9G	C	146	*Lagenaria* sp.	Bottle Gourd Seed	1	0.07
38	9G	C	146	*Schinus molle*	Molle Carbonized Processed	6	0.04
38	9G	C	146	*Schinus molle*	Molle Desiccated Processed	12	0.06
38	9G	C	146	Unidentifiable		17	0.14
39	9F1	E	218	*Chenopodium quinoa*	Quinoa	42	0.01
39	9F1	E	218	*Physalis peruviana* cf.	Aguaymanto cf.	4	0.01
39	9F1	E	218	*Schinus molle*	Molle Carbonized Processed	128	0.44
39	9F1	E	218	*Schinus molle*	Molle Desiccated Processed	39	0.14
39	9F1	E	218	*Schinus molle*	Molle Stem	14	0.03
39	9F1	E	218	*Zea mays*	Maize Cupule Carbonized	1	0.01
39	9F1	E	218	*Zea mays*	Maize Embryo	11	0.06
39	9F1	E	218	*Zea mays*	Maize Kernel Carbonized	46	0.32
39	9F1	E	218	*Zea mays* cf.	Maize Embryo cf.	1	0.01
39	9F1	E	218	UID		14	0.06
40	9F2		24	*Chenopodium quinoa*	Quinoa	2	0.01
40	9F2		24	*Echinocereus* sp.	Cactus	1	0.01
40	9F2		24	*Lagenaria* sp.	Bottle Gourd Seed	3	0.01
40	9F2		24	*Schinus molle*	Molle Carbonized Processed	4	0.01
40	9F2		24	*Schinus molle*	Molle Desiccated Processed	9	0.03
40	9F2		24	*Zea mays*	Maize Kernel Carbonized	1	0.05
41	9F1	C	201	*Chenopodium quinoa*	Quinoa	1	0.01
41	9F1	C	201	*Schinus molle*	Molle Carbonized Processed	7	0.01
41	9F1	C	201	*Schinus molle*	Molle Carbonized Processed	1	0.02
42	9F2	C	219	*Chenopodium quinoa*	Quinoa	3	0.01
42	9F2	C	219	*Schinus molle*	Molle Desiccated Processed	5	0.01
42	9F2	C	219	*Verbena* sp.		1	0.01
42	9F2	C	219	*Zea mays*	Maize Kernel Carbonized	1	0.01
42	9F2	C	219		Unidentifiable	1	0.01
43	9F1	C	215	*Chenopodium quinoa*	Quinoa	2	0.01
44	9E	C	177	*Chenopodium quinoa*	Quinoa	5	0.01
44	9E	C	177	*Schinus molle*	Molle Carbonized Processed	8	0.01
44	9F2	C	216	*Schinus molle*	Molle Carbonized Processed	5	0.01
44	9E	C	177	*Schinus molle*	Molle Desiccated Processed	3	0.01
44	9E	C	177		Unidentifiable	1	0.01
45	9F2	C	236	*Chenopodium/Amaranthus*	Quinoa/Kiwicha	1	0.01
45	9F2	C	236	*Schinus molle*	Molle Desiccated Processed	8	0.06
45	9F3	C	217	UID Seed		1	0.01

46	9F1	C	218	*Chenopodium quinoa*	Quinoa	6	0.01
46	9F1	C	218	Fabaceae	Bean Family	1	0.01
46	9F4	C	218	*Malvastrum* sp.		1	0.01
46	9F1	C	218	*Phaseolus vulgaris*	Common Bean	1	0.01
46	9F1	C	218	*Schinus molle*	Molle Carbonized Processed	5	0.01
46	9F1	C	218	*Zea mays*	Maize Kernel Desiccated	1	0.01
46	9F1	C	218	UID		1	0.01
47	9F2	C	252	*Chenopodium quinoa*	Quinoa	3	0.01
47	9F2	C	252	*Schinus molle*	Molle Carbonized Processed	1	0.01
47	9F2	C	252	*Schinus molle*	Molle Desiccated Processed	34	0.13
47	9F2	C	252	*Schinus molle*	Molle Stem	2	0.01
47	9F2	C	252	*Verbena* sp.		5	0.01
47	9F5	C	219	*Verbena* sp.		1	0.01
48	9G	C	210	*Chenopodium quinoa*	Quinoa	4	0.01
48	9G	C	210	*Haageocereus* sp.	Cactus	1	0.01
48	9G	C	210	*Lagenaria* sp.	Bottle Gourd Seed	3	0.01
48	9G	C	210	*Schinus molle*	Molle Desiccated Processed	10	0.01
49	9G	C	195	*Echinocereus* sp.	Cactus	1	0.01
49	9G	C	195	*Erythroxylum coca*	Coca	1	0.01
49	9G	C	195	*Schinus molle*	Molle Desiccated Processed	2	0.01
49	9G	C	195	*Zea mays*	Maize Kernel Carbonized	1	0.01
50	9F1	C	230	*Haageocereus* sp.	Cactus	1	0.01
50	9F1	C	230	*Lagenaria* sp.	Bottle Gourd Seed	2	0.01
50	9F1	C	230	*Schinus molle*	Molle Desiccated Processed	2	0.01
50	9F1	C	230	UID Seed		1	0.01
51	9F1	C	249	*Armatocereus* sp.	Cactus	1	0.01
51	9F1	C	249	*Schinus molle*	Molle Carbonized Processed	2	0.01
51	9F1	C	249	*Schinus molle*	Molle Desiccated Processed	1	0.01
51	9F1	C	249	*Zea mays*	Maize Cob Carbonized	1	0.01
52	9G	C	194	Cactaceae	Cactus Family	4	0.01
52	9G	C	194	*Capsicum* sp.	Ají Seed	4	0.01
52	9G	C	194	*Chenopodium quinoa*	Quinoa	12	0.01
52	9G	C	194	*Lagenaria* sp.	Bottle Gourd Seed	2	0.01
52	9G	C	194	*Schinus molle*	Molle Stem	1	0.01
52	9G	C	194	UID Seed		3	0.01
53	9F2	C	220	Cactaceae	Cactus Family	2	0.01
53	9F2	C	220	*Cucurbita maxima*	Zapallo	5	0.06
53	9F2	C	220	*Lagenaria* sp.	Bottle Gourd Seed	2	0.01
53	9F2	C	220	*Lagenaria* sp.	Gourd Rind	1	0.01
53	9F2	C	220	*Schinus molle*	Molle Carbonized Processed	1	0.01

53	9F2	C	220		*Schinus molle*	Molle Desiccated Processed	5	0.03
53	9F2	C	220		UID		2	0.01
54	9F			5/3	*Cucurbita maxima*	Zapallo	1	0.01
54	9F			5/3	*Lagenaria* sp.	Bottle Gourd Seed	1	0.01
54	9F			5/3	*Schinus molle*	Molle Carbonized Processed	1	0.01
54	9F			5/3	*Zea mays*	Maize Cob Carbonized	2	0.04
54	9F			5/3	*Zea mays*	Maize Embryo	1	0.01
54	9F			5/3	*Zea mays*	Maize Kernel Carbonized	6	0.06
55	24A	D	18		*Chenopodium quinoa*	Quinoa	1	0.01
55	24A	D	18		*Lagenaria* sp. cf.	Gourd Rind cf.	1	0.01
55	24A	D	18		*Schinus molle*	Molle Carbonized Processed	1	0.01
55	24A	D	18		*Schinus molle*	Molle Desiccated Processed	1	0.01
56	24A	D	15	4	*Chenopodium quinoa*	Quinoa	4	0.01
56	24A	D	15	4	*Zea mays*	Maize Embryo	1	0.01
57	24A	D	15		*Chenopodium quinoa*	Quinoa	2	0.01
57	24A	D	15		*Schinus molle*	Molle Carbonized Processed	6	0.02
57	24A	D	15		UID		1	0.01
58	24A	D	16		*Chenopodium quinoa*	Quinoa	38	0.01
58	24A	D	16		*Cucurbita maxima* cf.	Zapallo cf.	1	0.01
58	24A	D	16		*Schinus molle*	Molle Carbonized Processed	36	0.12
58	24A	D	16		*Schinus molle*	Molle Desiccated Processed	7	0.01
58	24A	D	16		*Schinus molle*	Molle Stem	10	0.01
58	24A	D	16		UID		3	0.01
58	24A	D	16		Unidentifiable		15	0.05
59	24C	C	11		*Chenopodium quinoa*	Quinoa	9	0.01
59	24C	C	11		*Schinus molle*	Molle Carbonized Processed	3	0.01
59	24C	C	11		*Schinus molle*	Molle Desiccated Processed	1	0.01
59	24C	C	11		*Zea mays*	Maize Cupule Carbonized	1	0.01
59	24C	C	11		*Zea mays*	Maize Kernel Carbonized	2	0.01
60	24C	C	24		*Chenopodium quinoa*	Quinoa	20	0.01
60	24C	C	24		*Malvastrum* sp.		1	0.01
60	24C	C	24		*Schinus molle*	Molle Carbonized Processed	3	0.01
60	24C	C	24		*Schinus molle*	Molle Stem	1	0.01
60	24C	C	24		*Zea mays*	Maize Embryo	1	0.01
61	24C	C	28		*Chenopodium quinoa*	Quinoa	7	0.01
62	24C	C	21		*Chenopodium quinoa*	Quinoa	24	0.01
62	24C	C	21		*Lepidium* sp.		1	0.01
62	24C	C	21		*Portulaca* sp.		1	0.01
62	24C	C	21		*Schinus molle*	Molle Desiccated Processed	2	0.01
62	24C	C	21		*Zea mays*	Maize Kernel Carbonized	1	0.04

63	24C	C	4		*Chenopodium quinoa*	Quinoa	10	0.01
63	24C	C	4		*Schinus molle*	Molle Carbonized Processed	1	0.01
64	24C	C	23		*Chenopodium quinoa*	Quinoa	12	0.01
64	24C	C	23		*Echinopsis* sp.	Cactus	1	0.01
64	24C	C	23		*Schinus molle*	Molle Carbonized Processed	2	0.01
65	24C	C	5		*Arachis hypogaea*	Peanut	1	0.02
65	24C	C	5		*Armatocereus* sp.	Cactus	1	0.01
65	24C	C	5		*Chenopodium quinoa*	Quinoa	44	0.02
65	24C	C	5		*Malvastrum* sp.		1	0.01
65	24C	C	5		Poaceae	Grass Family	2	0.01
65	24C	C	5		*Schinus molle*	Molle Carbonized Processed	32	0.1
65	24C	C	5		*Schinus molle*	Molle Stem	76	0.02
65	24C	C	5		*Zea mays*	Maize Cupule Carbonized	1	0.01
65	24C	C	5		Unidentifiable		3	0.01
66	42A	D	41	8	*Arachis hypogaea*	Peanut	4	0.01
66	42A	D	41	8	*Capsicum* sp.	Ají Seed	3	0.01
66	42A	D	41	8	Fabaceae	Bean Family	23	0.31
66	42A	D	41	8	*Gossypium barbadense*	Cotton Seed	17	0.31
66	42A	D	41	8	*Lagenaria* sp.	Gourd Rind	21	0.29
66	42A	D	41	8	*Phaseolus vulgaris*	Common Bean	140	2.82
66	42A	D	41	8	*Phaseolus vulgaris*	Common Bean	6	0.31
66	42A	D	41	8	*Schinus molle*	Molle Carbonized Processed	4	0.07
66	42A	D	41	8	*Schinus molle*	Molle Desiccated Processed	71	0.88
66	42A	D	41	8	*Schinus molle*	Molle Stem	1	0.01
66	42A	D	41	8	*Zea mays*	Maize Cupule Carbonized	3	0.01
66	42A	D	41	8	*Zea mays*	Maize Kernel Carbonized	6	0.08
66	42A	D	41	8	UID		29	0.14
67	24C	C	5		*Arachis hypogaea*	Peanut	1	0.02
67	24C	C	5		*Chenopodium quinoa*	Quinoa	3	0.01
67	24C	C	5		*Portulaca* sp.		1	0.01
68	24C	C	10		*Chenopodium quinoa*	Quinoa	9	0.01
68	24C	C	10		*Malvastrum* sp.		1	0.01
68	24C	C	10		*Schinus molle*	Molle Carbonized Processed	8	0.04
69	24C	D1	33	11	*Echinocereus* sp.	Cactus	1	0.01
69	24C	D1	33	11	*Fagonia chilensis*		2	0.01
69	24C	D1	33	11	*Schinus molle*	Molle Carbonized Processed	17	0.04
69	24C	D1	33	11	*Schinus molle*	Molle Stem	3	0.01
69	24C	D1	33	11	*Zea mays*	Maize Kernel Carbonized	1	0.01
69	24C	D1	33	11	UID		1	0.01
70	24C	D3	23	5	*Chenopodium quinoa*	Quinoa	34	0.01

70	24C	D3	23	5	*Physalis peruviana*	Aguaymanto	1	0.01
70	24C	D3	23	5	*Schinus molle*	Molle Carbonized Processed	7	0.04
70	24C	D3	23	5	*Schinus molle*	Molle Desiccated Processed	1	0.01
70	24C	D3	23	5	*Zea mays*	Maize Kernel Carbonized	5	0.02
70	24C	D3	23	5		Unidentifiable	3	0.01
71	24C	D3	23	5	Cactaceae	Cactus Family	2	0.01
71	24C	D3	23	5	*Chenopodium quinoa*	Quinoa	12	0.01
71	24C	D3	23	5	*Schinus molle*	Molle Carbonized Processed	3	0.01
71	24C	D3	23	5	*Zea mays*	Maize Cupule Carbonized	1	0.01
71	24C	D3	23	5	UID		3	0.01
72	25A	B	62		*Chenopodium quinoa*	Quinoa	25	0.01
72	25A	B	62		*Physalis peruviana*	Aguaymanto	1	0.01
72	25A	B	62		*Schinus molle*	Molle Carbonized Processed	1	0.01
73	24A	B	5		*Amaranthus* sp.	Kiwicha	11	0.01
73	24A	B	5		Cactaceae cf.	Cactus Family cf.	1	0.01
73	24A	B	5		*Chenopodium quinoa*	Quinoa	188	0.04
73	24A	B	5		Papaveraceae	*Papaver* sp. cf.	1	0.01
73	24A	B	5		*Physalis peruviana*	Aguaymanto	10	0.01
73	24A	B	5		Poaceae	Grass Family	1	0.01
73	24A	B	5		*Portulaca* sp.		3	0.01
73	24A	B	5		*Schinus molle*	Molle Carbonized Processed	218	0.25
73	24A	B	5		*Schinus molle*	Molle Stem	2	0.01
73	24A	B	5		*Zea mays*	Maize Cupule Carbonized	2	0.01
73	24A	B	5		*Zea mays*	Maize Kernel Carbonized	2	0.01
73	24A	B	5		UID Seed		12	0.01
73	24A	B	5		Unidentifiable		16	0.01
74	25A	B	77		Cactaceae	Cactus Family	2	0.01
74	25A	B	77		*Chenopodium quinoa*	Quinoa	11	0.01
74	25A	B	77		*Malvastrum* sp.		1	0.01
74	25A	B	77		*Portulaca* sp.		1	0.01
74	25A	B	77		*Schinus molle*	Molle Carbonized Processed	16	0.02
74	25A	B	77		*Schinus molle*	Molle Desiccated Processed	10	0.01
75	24A	E1	18	12	*Chenopodium quinoa*	Quinoa	7	0.01
75	24A	E1	18	12	*Cucurbita maxima*	Zapallo	7	0.01
75	24A	E1	18	12	*Lagenaria* sp.	Bottle Gourd Seed	3	0.01
75	24A	E1	18	12	*Phaseolus vulgaris*	Common Bean	1	0.02
75	24A	E1	18	12	*Physalis peruviana*	Aguaymanto	1	0.01
75	24A	E1	18	12	Poaceae	Grass Family	1	0.01
75	24A	E1	18	12	*Schinus molle*	Molle Carbonized Processed	7	0.01
75	24A	E1	18	12	*Schinus molle*	Molle Desiccated Processed	3	0.01

75	24A	E1	18	12	*Zea mays*	Maize Kernel Carbonized	2	0.02
75	24A	E1	18	12	UID		10	0.06
76	25A	B	62	2	*Chenopodium quinoa*	Quinoa	11	0.01
76	25A	B	62	2	*Malvastrum* sp.		22	0.01
76	25A	B	62	2	*Portulaca* sp.		10	0.01
76	25A	B	62	2	*Schinus molle*	Molle Carbonized Processed	4	0.01
76	25A	B	62	2	*Schinus molle*	Molle Desiccated Processed	1	0.01
76	25A	B	62	2		Unidentifiable	1	0.01
77	25A3	B	121		*Chenopodium quinoa*	Quinoa	7	0.01
77	25A3	B	121		*Haageocereus* sp.	Cactus	1	0.01
77	25A3	B	121		*Portulaca* sp.		11	0.01
77	25A3	B	121		*Schinus molle*	Molle Desiccated Processed	11	0.02
77	25A3	B	121		*Schinus molle*	Molle Stem	3	0.01
77	25A3	B	121		UID		27	0.02
78	25A2	A/B	78		*Chenopodium quinoa*	Quinoa	2	0.01
78	25A2	A/B	78		*Haageocereus* sp.	Cactus	1	0.01
78	25A2	A/B	78		*Schinus molle*	Molle Carbonized Processed	2	0.01
78	25A2	A/B	78		*Schinus molle*	Molle Desiccated Processed	23	0.17
79	25A	B	30		*Chenopodium quinoa*	Quinoa	1	0.01
79	25A	B	30		*Schinus molle*	Molle Carbonized Processed	12	0.01
79	25A	B	30		UID		2	0.01
80	25A	B	53		*Chenopodium quinoa*	Quinoa	2	0.01
80	25A	B	53		*Malvastrum* sp.		1	0.01
80	25A	B	53		Poaceae	Grass Family	1	0.01
80	25A	B	53		*Schinus molle*	Molle Stem	1	0.01
81	25A	B	65		*Malvastrum* sp.		3	0.01
81	25A	B	65		*Oxalis* sp.		1	0.01
81	25A	B	65		*Portulaca* sp.		4	0.01
82	24B	C	35		*Malvastrum* sp.		1	0.01
82	24B	C	35		*Portulaca* sp.		1	0.01
82	24B	C	35		*Schinus molle*	Molle Carbonized Processed	1	0.01
83	24B	C	13		*Malvastrum* sp.		1	0.01
83	24B	C	13		*Portulaca* sp.		30	0.01
84	24B	C	33E		*Armatocereus* sp.	Cactus	1	0.01
84	24B	C	33E		*Capsicum* sp.	Ají Seed	1	0.01
84	24B	C	33E		*Chenopodium quinoa*	Quinoa	10	0.01
84	24B	C	33E		*Haageocereus* sp.	Cactus	1	0.01
84	24B	C	33E		*Malvastrum* sp.		3	0.01
84	24B	C	33E		*Neoraimondia* sp.	Cactus	1	0.01
84	24B	C	33E		*Portulaca* sp.		3	0.01

84	24B	C	33E		*Schinus molle*	Molle Carbonized Processed	1	0.01
84	24B	C	33E			UID Seed	1	0.01
85	24B	C	11		*Chenopodium quinoa*	Quinoa	12	0.01
85	24B	C	11		*Malvastrum* sp.		1	0.01
85	24B	C	11		*Portulaca* sp.		49	0.01
86	24B	C	25E		*Malvastrum* sp.		1	0.01
86	24B	C	25E		*Portulaca* sp.		40	0.01
87	24B	C	20		*Amaranthus* sp.	Kiwicha	1	0.01
87	24B	C	20		*Chenopodium quinoa*	Quinoa	1	0.01
87	24B	C	20		*Portulaca* sp.		8	0.01
87	24B	C	20		*Schinus molle*	Molle Carbonized Processed	1	0.01
87	24B	C	20		UID Seed		1	0.01
88	24B	C	9		*Chenopodium quinoa*	Quinoa	14	0.01
88	24B	C	9		*Malvastrum* sp.		2	0.01
88	24B	C	9		*Physalis peruviana*	Aguaymanto	1	0.01
88	24B	C	9		*Portulaca* sp. cf.		2	0.01
88	24B	C	9		*Schinus molle*	Molle Desiccated Processed	37	0.02
88	24B	C	9		*Schinus molle*	Molle Stem	2	0.01
89	24B	C	10		*Chenopodium quinoa*	Quinoa	66	0.02
89	24B	C	10		*Malvastrum* sp.		4	0.01
89	24B	C	10		*Schinus molle*	Molle Carbonized Processed	2	0.01
89	24B	C	10		*Zea mays*	Maize Kernel Carbonized	1	0.01
89	24B	C	10		UID Seed		1	0.01
90	24B	C	25W		*Chenopodium quinoa*	Quinoa	18	0.01
90	24B	C	25W		*Malvastrum* sp.		1	0.01
90	24B	C	25W		*Portulaca* sp.		1	0.01
90	24B	C	25W		*Schinus molle*	Molle Carbonized Processed	37	0.08
90	24B	C	25W		*Schinus molle*	Molle Desiccated Processed	2	0.01
90	24B	C	25W		*Schinus molle*	Molle Stem	3	0.01
90	24B	C	25W		UID		1	0.01
91	24B	C	43		*Portulaca* sp.		4	0.01
92	24B	C	42		*Chenopodium quinoa*	Quinoa	24	0.01
92	24B	C	42		*Physalis peruviana*	Aguaymanto	1	0.01
92	24B	C	42		*Portulaca* sp.		1	0.01
93	24A	E3	15	4B	*Chenopodium quinoa*	Quinoa	57	57
93	24A	E3	15	4B	Fabaceae	Bean Family	1	1
93	24A	E3	15	4B	Poaceae	Grass Family	1	1
93	24A	E3	15	4B	*Portulaca* sp.		3	0.01
93	24A	E3	15	4B	*Schinus molle*	Molle Carbonized Processed	154	154
93	24A	E3	15	4B	*Schinus molle*	Molle Desiccated Processed	67	67

93	24A	E3	15	4B	*Schinus molle*	Molle Stem	6	6
93	24A	E3	15	4B	*Viola* sp. cf.		10	10
93	24A	E3	15	4B	*Zea mays*	Maize Kernel Carbonized	6	6
93	24A	E3	15	4B	UID Seed		4	4
93	24A	E3	15	4B	Unidentifiable		4	0.01
94	24A	E2	6		*Capsicum* sp.	Ají Seed	2	0.01
94	24A	E2	6		*Chenopodium quinoa*	Quinoa	11	0.02
94	24A	E2	6		*Cucurbita maxima*	Zapallo	26	0.03
94	24A	E2	6		*Echinopsis* sp.	Cactus	78	0.28
94	24A	E2	6		*Phaseolus vulgaris*	Common Bean	1	0.03
94	24A	E2	6		*Physalis peruviana*	Aguaymanto	4	0.01
94	24A	E2	6		Poaceae	Grass Family	1	0.01
94	24A	E2	6		*Portulaca* sp.		2	0.01
94	24A	E2	6		*Schinus molle*	Molle Carbonized Processed	11	0.06
94	24A	E2	6		*Schinus molle*	Molle Desiccated Processed	54	0.01
94	24A	E2	6		*Schinus molle*	Molle Stem	1	0.01
94	24A	E2	6		*Zea mays*	Maize Kernel Carbonized	4	0.04
94	24A	E2	6		UID		23	0.01
95	24A	E2	2	3	*Chenopodium quinoa*	Quinoa	2	0.01
95	24A	E2	2	3	*Gossypium barbadense*	Cotton Seed	1	0.01
95	24A	E2	2	3	*Lagenaria* sp.	Bottle Gourd Seed	3	0.03
95	24A	E2	2	3	*Portulaca* sp.		2	0.01
95	24A	E2	2	3	*Schinus molle*	Molle Carbonized Processed	1	0.01
95	24A	E2	2	3	*Schinus molle*	Molle Desiccated Processed	393	1.45
95	24A	E2	2	3	*Schinus molle*	Molle Stem	1	0.01
96	24A	E1	2	3	*Gossypium barbadense*	Cotton Seed	2	0.02
96	24A	E1	2	3	*Lagenaria* sp.	Bottle Gourd Seed	3	0.01
96	24A	E1	2	3	*Malvastrum* sp.		1	0.01
96	24A	E1	2	3	*Portulaca* sp.		4	0.01
96	24A	E1	2	3	*Schinus molle*	Molle Carbonized Processed	8	0.03
96	24A	E1	2	3	*Schinus molle*	Molle Desiccated Processed	956	3.37
96	24A	E1	2	3	*Schinus molle*	Molle Stem	1	0.01
96	24A	E1	2	3	*Zea mays*	Maize Cupule Carbonized	1	0.01
96	24A	E1	2	3	UID		1	0.01
97	24A	E1	15	4B	*Chenopodium quinoa*	Quinoa	7	0.01
97	24A	E1	15	4B	*Malvastrum* sp.		1	0.01
97	24A	E1	15	4B	*Portulaca* sp.		1	0.01
97	24A	E1	15	4B	*Schinus molle*	Molle Carbonized Processed	775	3.53
97	24A	E1	15	4B	*Schinus molle*	Molle Desiccated Processed	143	1.05

97	24A	E1	15	4B	*Schinus molle*	Molle Stem	1	0.01
97	24A	E1	15	4B	*Viola* sp.		1	0.01
97	24A	E1	15	4B	*Zea mays*	Maize Cupule Carbonized	3	0.01
97	24A	E1	15	4B	*Zea mays*	Maize Kernel Carbonized	9	0.07
97	24A	E1	15	4B	UID		14	0.01
97	24A	E1	15	4B	UID Seed		30	0.01
98	41E	E	77	3	*Atriplex* sp.		1	0.01
98	41E	E	77	3	*Chenopodium quinoa*	Quinoa	28	0.01
98	41E	E	77	3	*Cucurbita maxima*	Zapallo	2	0.09
98	41E	E	77	3	*Fagonia chilensis*		1	0.01
98	41E	E	77	3	*Schinus molle*	Molle Carbonized Processed	25	0.07
98	41E	E	77	3	*Schinus molle*	Molle Desiccated Processed	3	0.01
98	41E	E	77	3	*Zea mays*	Maize Cupule Carbonized	3	0.01
98	41E	E	77	3	*Zea mays*	Maize Embryo	7	0.04
98	41E	E	77	3	*Zea mays*	Maize Kernel Carbonized	145	1.7
98	41E	E	77	3	UID		19	0.02
99	41E	E	77	3	*Chenopodium quinoa*	Quinoa	59	0.01
99	41E	E	77	3	*Schinus molle*	Molle Carbonized Processed	49	0.15
99	41E	E	77	3	*Schinus molle*	Molle Desiccated Processed	4	0.02
99	41E	E	77	3	*Schinus molle*	Molle Stem	6	0.02
99	41E	E	77	3	*Verbena* sp.		2	0.01
99	41E	E	77	3	*Zea mays*	Maize Cupule Carbonized	1	0.01
99	41E	E	77	3	*Zea mays*	Maize Kernel Carbonized	107	0.65
99	41E	E	77	3	UID Seed		7	0.01
100	41E	E	77	3	*Chenopodium quinoa*	Quinoa	45	0.01
100	41E	E	77	3	Cyperaceae	Sedge Family	4	0.01
100	41E	E	77	3	Fabaceae	Bean Family	3	0.01
100	41E	E	77	3	*Phaseolus vulgaris*	Common Bean	1	0.02
100	41E	E	77	3	Poaceae	Grass Family	2	0.01
100	41E	E	77	3	*Portulaca* sp.		24	0.01
100	41E	E	77	3	*Schinus molle*	Molle Carbonized Processed	160	0.81
100	41E	E	77	3	*Schinus molle*	Molle Desiccated Processed	1	0.01
100	41E	E	77	3	*Schinus molle*	Molle Stem	16	0.01
100	41E	E	77	3	*Verbena* sp.		1	0.01
100	41E	E	77	3	*Zea mays*	Maize Cupule Carbonized	5	0.01
100	41E	E	77	3	*Zea mays*	Maize Embryo	11	0.05
100	41E	E	77	3	*Zea mays*	Maize Kernel Carbonized	93	0.7
100	41E	E	77	3	UID Seed		15	0.01
100	41E	E	77	3	Unidentifiable		29	0.14
101	24A	6	9		*Arachis hypogaea*	Peanut Shell	5	0.08

101	24A	6	9		*Capsicum* sp.	Ají Seed	5	0.01
101	24A	6	9		*Chenopodium quinoa*	Quinoa	6	0.01
101	24A	6	9		*Echinopsis* sp.	Cactus	79	0.03
101	24A	6	9		*Lagenaria* sp.	Bottle Gourd Seed	14	0.01
101	24A	6	9		*Malvastrum* sp.		2	0.01
101	24A	6	9		*Phaseolus vulgaris*	Common Bean	1	0.12
101	24A	6	9		*Physalis peruviana*	Aguaymanto	11	0.01
101	24A	6	9		Poaceae	Grass Family	1	0.01
101	24A	6	9		*Portulaca* sp.		12	0.01
101	24A	6	9		*Schinus molle*	Molle Carbonized Processed	3	0.01
101	24A	6	9		*Schinus molle*	Molle Desiccated Processed	19	0.03
101	24A	6	9		*Schinus molle*	Molle Stem	8	0.01
101	24A	6	9		*Verbena* sp.		1	0.01
101	24A	6	9		*Zea mays*	Maize Kernel Carbonized	1	0.04
101	24A	6	9		Unidentifiable		14	0.02
102	24B	D4	43	5	*Chenopodium quinoa*	Quinoa	2	0.01
102	24B	D4	43	5	*Cucurbita maxima*	Zapallo	1	0.01
102	24B	D4	43	5	Fabaceae cf.	Bean Family cf.	1	0.01
102	24B	D4	43	5	*Schinus molle*	Molle Carbonized Processed	20	0.06
102	24B	D4	43	5	*Zea mays*	Maize Cupule Carbonized	2	0.01
102	24B	D4	43	5	*Zea mays*	Maize Embryo	1	0.03
102	24B	D4	43	5	*Zea mays*	Maize Kernel Carbonized	1	0.01
102	24B	D4	43	5	UID		13	0.01
103	24B	D	15	4	*Chenopodium quinoa*	Quinoa	1	0.01
103	24B	D	15	4	*Echinopsis* sp.	Cactus	2	0.01
103	24B	D	15	4	*Lagenaria* sp.	Bottle Gourd Seed	6	0.01
103	24B	D	15	4	*Schinus molle*	Molle Desiccated Processed	9	0.03
103	24B	D	15	4	*Zea mays* cf.	Maize Kernel cf.	1	0.01
103	24B	D	15	4	UID		1	0.01
104	24B	D	15		*Chenopodium quinoa*	Quinoa	6	0.01
104	24B	D	15		Fabaceae	Bean Family	1	0.01
104	24B	D	15		*Schinus molle*	Molle Carbonized Processed	44	0.17
104	24B	D	15		*Schinus molle*	Molle Desiccated Processed	52	0.41
104	24B	D	15		*Schinus molle*	Molle Stem	3	0.01
104	24B	D	15		*Zea mays*	Maize Kernel Carbonized	8	0.05
104	24B	D	15		*Zea mays* cf.	Maize Cupule cf.	3	0.01
104	24B	D	15		UID		9	0.01
105	41 A	D	60	6	*Arachis hypogaea*	Peanut Shell	7	0.07
105	41 A	D	60	6	*Atriplex* sp.		1	0.01
105	41 A	D	60	6	*Capsicum* sp.	Ají Seed	8	0.01

105	41 A	D	60	6	*Chenopodium quinoa*	Quinoa	2	0.01
105	41 A	D	60	6	*Cucurbita maxima*	Zapallo	1	0.02
105	41 A	D	60	6	Cyperaceae	Sedge Family	1	0.01
105	41 A	D	60	6	*Lagenaria* sp.	Bottle Gourd Seed	34	0.14
105	41 A	D	60	6	*Portulaca* sp.		1	0.01
105	41 A	D	60	6	*Prosopis* sp.	Algarrobo	3	0.01
105	41 A	D	60	6	*Schinus molle*	Molle Carbonized Processed	8	0.03
105	41 A	D	60	6	*Schinus molle*	Molle Desiccated Processed	274	1.92
105	41 A	D	60	6	*Schinus molle*	Molle Stem	8	0.01
105	41 A	D	60	6	*Verbena* sp.		1	0.01
105	41 A	D	60	6	*Zea mays*	Maize Cob Carbonized	1	0.01
105	41 A	D	60	6	*Zea mays*	Maize Cupule Carbonized	1	0.01
105	41 A	D	60	6	*Zea mays*	Maize Kernel Carbonized	3	0.01
105	41 A	D	60	6	UID		50	0.11
105	41 A	D	60	6	UID Seed		5	0.01
106	41 A	D	61	4	*Chenopodium quinoa*	Quinoa	10	0.01
106	41 A	D	61	4	*Lagenaria* sp.	Bottle Gourd Seed	12	0.01
106	41 A	D	61	4	*Schinus molle*	Molle Carbonized Processed	10	0.02
106	41 A	D	61	4	*Schinus molle*	Molle Desiccated Processed	306	2.16
106	41 A	D	61	4	*Zea mays*	Maize Cupule Carbonized	1	0.01
106	41 A	D	61	4	UID		4	0.01
107	41 B	D2	112	18	*Chenopodium quinoa*	Quinoa	3	0.01
107	41 B	D2	112	18	*Portulaca* sp.		1	0.01
107	41 B	D2	112	18	*Schinus molle*	Molle Carbonized Processed	11	0.01
107	41 B	D2	112	18	*Schinus molle*	Molle Desiccated Processed	18	0.03
107	41 B	D2	112	18	*Schinus molle*	Molle Stem	3	0.01
107	41 B	D2	112	18	*Zea mays*	Maize Cupule Carbonized	6	0.01
107	41 B	D2	112	18	*Zea mays*	Maize Embryo	1	0.01
107	41 B	D2	112	18	*Zea mays*	Maize Kernel Carbonized	5	0.02
107	41 B	D2	112	18	UID		22	0.02
108	26A	I	12	5	*Arachis hypogaea*	Peanut Shell	15	0.05
108	26A	I	12	5	*Capsicum* sp.	Ají Seed	1	0.01
108	26A	I	12	5	*Chenopodium quinoa*	Quinoa	1	0.01
108	26A	I	12	5	*Lagenaria* sp.	Bottle Gourd Seed	1	0.06
108	26A	I	12	5	*Malvastrum* sp.		1	0.01
108	26A	I	12	5	*Schinus molle*	Molle Carbonized Processed	71	0.5
108	26A	I	12	5	*Schinus molle*	Molle Desiccated Non-Processed	1	0.01
108	26A	I	12	5	*Schinus molle*	Molle Desiccated Processed	17	0.07
108	26A	I	12	5	*Schinus molle*	Molle Stem	2	0.01
108	26A	I	12	5	*Zea mays*	Maize Embryo	1	0.01

108	26A	I	12	5	*Zea mays*	Maize Kernel Carbonized	7	0.1
108	26A	I	12	5	UID		11	0.05
108	26A	I	12	5	UID Seed		6	0.01
109	26A1	I	12	5	*Arachis hypogaea*	Peanut Shell	11	0.03
109	26A1	I	12	5	*Capsicum* sp.	Ají Seed	38	0.01
109	26A1	I	12	5	*Chenopodium quinoa*	Quinoa	3	0.01
109	26A1	I	12	5	*Echinopsis* sp.	Cactus	2	0.01
109	26A1	I	12	5	*Lagenaria* sp.	Bottle Gourd Seed	9	0.46
109	26A1	I	12	5	*Physalis peruviana*	Aguaymanto	1	0.01
109	26A1	I	12	5	*Schinus molle*	Molle Carbonized Processed	10	0.05
109	26A1	I	12	5	*Schinus molle*	Molle Desiccated Processed	85	0.74
109	26A1	I	12	5	*Schinus molle*	Molle Stem	5	0.01
109	26A1	I	12	5	*Verbena* sp.		1	0.01
109	26A1	I	12	5	*Zea mays*	Maize Cupule Carbonized	1	0.01
109	26A1	I	12	5	*Zea mays*	Maize Cupule Carbonized	11	0.04
109	26A1	I	12	5	*Zea mays*	Maize Kernel Carbonized	2	0.01
109	26A1	I	12	5	UID		6	0.03
109	26A1	I	12	5	UID Seed		4	0.02
110	26A1	I	19-20	7	*Atriplex* sp.		1	0.01
110	26A1	I	19-20	7	*Chenopodium quinoa*	Quinoa	3	0.01
110	26A1	I	19-20	7	*Echinopsis* sp.	Cactus	1	0.01
110	26A1	I	19-20	7	*Lagenaria* sp.	Bottle Gourd Seed	4	0.03
110	26A1	I	19-20	7	*Lagenaria* sp.	Gourd Rind	7	0.01
110	26A1	I	19-20	7	*Schinus molle*	Molle Carbonized Processed	1	0.01
110	26A1	I	19-20	7	*Schinus molle*	Molle Desiccated Processed	21	0.07
110	26A1	I	19-20	7	*Schinus molle*	Molle Stem	2	0.01
110	26A1	I	19-20	7	*Verbena* sp.		1	0.01
110	26A1	I	19-20	7	*Zea mays*	Maize Cupule Carbonized	48	0.01
110	26A1	I	19-20	7	*Zea mays*	Maize Kernel Carbonized	4	0.03
110	26A1	I	19-20	7	UID		8	0.01
111	26A1	H	2	2	*Arachis hypogaea*	Peanut Shell	1	0.02
111	26A1	H	2	2	*Capsicum* sp.	Ají Seed	12	0.02
111	26A1	H	2	2	Cenchrus sp.		1	0.01
111	26A1	H	2	2	*Cucurbita maxima*	Zapallo	2	0.02
111	26A1	H	2	2	Cyperaceae	Sedge Family	1	0.01
111	26A1	H	2	2	*Lagenaria* sp.	Bottle Gourd Seed	3	0.02
111	26A1	H	2	2	*Lagenaria* sp.	Gourd Rind	2	0.01
111	26A1	H	2	2	*Prosopis* sp.	Algarrobo	2	0.01
111	26A1	H	2	2	*Schinus molle*	Molle Carbonized Processed	3	0.01
111	26A1	H	2	2	*Schinus molle*	Molle Desiccated Processed	451	4.42

111	26A1	H	2	2	*Schinus molle*	Molle Stem	3	0.01
111	26A1	H	2	2	*Zea mays*	Maize Kernel Carbonized	1	0.01
111	26A1	H	2	2	*Zea mays*	Maize Kernel Carbonized	1	0.01
111	26A1	H	2	2	UID		9	0.03
111	26A1	H	2	2	UID Seed		3	0.01
112	26A2	I	7		*Arachis hypogaea*	Peanut Shell	2	0.01
112	26A2	I	7		*Atriplex* sp.		3	0.01
112	26A2	I	7		*Capsicum* sp.	Ají Seed	36	0.01
112	26A2	I	7		*Chenopodium quinoa*	Quinoa	1	0.01
112	26A2	I	7		*Cucurbita maxima*	Zapallo	2	0.01
112	26A2	I	7		*Malvastrum* sp.		1	0.01
112	26A2	I	7		*Portulaca* sp.		1	0.01
112	26A2	I	7		*Schinus molle*	Molle Carbonized Processed	1	0.01
112	26A2	I	7		*Schinus molle*	Molle Desiccated Processed	8	0.05
112	26A2	I	7		*Schinus molle*	Molle Stem	5	0.01
112	26A2	I	7		*Verbena* sp.		2	0.01
112	26A2	I	7		*Zea mays*	Maize Cupule Carbonized	1	0.01
112	26A2	I	7		*Zea mays*	Maize Cupule Desiccated	1	0.01
112	26A2	I	7		UID Seed		1	0.07
112	26A2	I	7		Unidentifiable		9	0.06
113	42A	D	48		*Capsicum* sp.	Ají Seed	3	0.01
113	42A	D	48		*Chenopodium quinoa*	Quinoa	82	0.01
113	42A	D	48		*Desmodium* sp.		2	0.01
113	42A	D	48		*Malvastrum* sp.		1	0.01
113	42A	D	48		*Phaseolus vulgaris*	Common Bean	42	0.58
113	42A	D	48		*Physalis peruviana*	Aguaymanto	1	0.01
113	42A	D	48		Poaceae	Grass Family	2	0.01
113	42A	D	48		*Prosopis* sp.	Algarrobo	3	0.08
113	42A	D	48		*Prosopis* sp. cf.	Algarrobo cf.	17	0.06
113	42A	D	48		*Schinus molle*	Molle Carbonized Processed	137	0.71
113	42A	D	48		*Schinus molle*	Molle Desiccated Non-Processed	35	0.53
113	42A	D	48		*Schinus molle*	Molle Desiccated Processed	12	0.03
113	42A	D	48		*Schinus molle*	Molle Stem	9	0.01
113	42A	D	48		*Zea mays*	Maize Cob Carbonized	2	0.15
113	42A	D	48		*Zea mays*	Maize Embryo	7	0.01
113	42A	D	48		*Zea mays*	Maize Kernel Carbonized	6	0.02
113	42A	D	48		UID		5	0.03
113	42A	D	48		UID Seed		8	0.01
114	42A	D	48	7	*Arachis hypogaea*	Peanut	1	0.03
114	42A	D	48	7	*Capsicum* sp.	Ají Seed	10	0.01

114	42A	D	48	7	*Chenopodium quinoa*	Quinoa	4	0.01
114	42A	D	48	7	*Gossypium barbadense*	Cotton Seed	1	0.01
114	42A	D	48	7	*Gossypium barbadense* cf.	Cotton Seed cf.	2	0.01
114	42A	D	48	7	*Phaseolus vulgaris*	Common Bean	1	0.11
114	42A	D	48	7	*Prosopis* sp.	Algarrobo	19	0.11
114	42A	D	48	7	*Schinus molle*	Molle Carbonized Non-Processed	1	0.01
114	42A	D	48	7	*Schinus molle*	Molle Carbonized Processed	30	0.21
114	42A	D	48	7	*Schinus molle*	Molle Desiccated Non-Processed	2	0.01
114	42A	D	48	7	*Schinus molle*	Molle Desiccated Processed	66	0.7
114	42A	D	48	7	*Schinus molle*	Molle Stem	4	0.01
114	42A	D	48	7	*Zea mays*	Maize Cupule Carbonized	1	0.01
114	42A	D	48	7	UID		34	0.15
114	42A	D	48	7	UID Seed		5	0.01
115	42A	D	45		*Capsicum* sp. cf.	Ají Seed cf.	1	0.01
115	42A	D	45		*Chenopodium quinoa*	Quinoa	17	0.01
115	42A	D	45		*Phaseolus vulgaris*	Common Bean	36	0.52
115	42A	D	45		Poaceae	Grass Family	2	0.01
115	42A	D	45		*Prosopis* sp.	Algarrobo	1	0.01
115	42A	D	45		*Schinus molle*	Molle Carbonized Processed	391	2.07
115	42A	D	45		*Schinus molle*	Molle Desiccated Non-Processed	1	0.01
115	42A	D	45		*Schinus molle*	Molle Desiccated Processed	6	0.05
115	42A	D	45		*Schinus molle*	Molle Stem	8	0.01
115	42A	D	45		*Zea mays*	Maize Cob Carbonized	1	0.08
115	42A	D	45		*Zea mays*	Maize Cupule Carbonized	14	0.05
115	42A	D	45		*Zea mays*	Maize Embryo	7	0.03
115	42A	D	45		*Zea mays*	Maize Kernel Carbonized	12	0.26
115	42A	D	45		UID		68	0.24
115	42A	D	45		UID Seed		16	0.03
116	42A	D	49	22	*Capsicum* sp.	Ají Seed	2	0.01
116	42A	D	49	22	*Chenopodium quinoa*	Quinoa	27	0.01
116	42A	D	49	22	*Desmodium* sp.		2	0.01
116	42A	D	49	22	*Phaseolus vulgaris*	Common Bean	24	0.36
116	42A	D	49	22	Poaceae	Grass Family	7	0.01
116	42A	D	49	22	*Prosopis* sp.	Algarrobo	16	0.11
116	42A	D	49	22	*Schinus molle*	Molle Carbonized Processed	320	2.75
116	42A	D	49	22	*Schinus molle*	Molle Desiccated Non-Processed	2	2.72
116	42A	D	49	22	*Schinus molle*	Molle Desiccated Processed	24	0.23

116	42A	D	49	22	*Zea mays*	Maize Cupule Carbonized	25	0.09
116	42A	D	49	22	*Zea mays*	Maize Embryo	83	0.03
116	42A	D	49	22	*Zea mays*	Maize Kernel Carbonized	25	0.01
116	42A	D	49	22	UID		27	0.08
116	42A	D	49	22	UID Seed		5	0.02
117	42A	D	41		*Capsicum* sp.	Ají Seed	17	0.03
117	42A	D	41		*Chenopodium quinoa*	Quinoa	30	0.02
117	42A	D	41		Cyperaceae	Sedge Family	1	0.01
117	42A	D	41		*Desmodium* sp.		2	0.01
117	42A	D	41		*Gossypium barbadense*	Cotton Seed	49	0.57
117	42A	D	41		*Phaseolus vulgaris*	Common Bean	164	2.72
117	42A	D	41		*Portulaca* sp.		2	0.01
117	42A	D	41		*Schinus molle*	Molle Carbonized Non-Processed	3	0.03
117	42A	D	41		*Schinus molle*	Molle Carbonized Processed	12	0.05
117	42A	D	41		*Schinus molle*	Molle Desiccated Processed	26	0.31
117	42A	D	41		*Schinus molle*	Molle Stem	4	0.01
117	42A	D	41		*Zea mays*	Maize Cupule Carbonized	5	0.02
117	42A	D	41		*Zea mays*	Maize Embryo	3	0.03
117	42A	D	41		*Zea mays*	Maize Kernel Carbonized	23	0.71
117	42A	D	41		UID		9	0.04
117	42A	D	41		Unidentifiable		23	0.65

APPENDIX III

INVENTORY OF PLANTS RECOVERED FROM YAHUAY ALTA FLOT SAMPLES

Specimen	Sector	Unit	Area	Capa	Nivel	Grid	Feature	Taxonomic Identification	Common Name	Count
01-016-008	F	1	B	A	2	16	2	Unidentifiable		56
01-017-002	F	1	B	A	2	17	2	Unidentifiable		4
01-023-001	F	1	B	A	2	23	2	Unidentifiable		109
01-023-002	F	1	B	A	2	23	2	Unidentifiable		4
03-055-009	E	3	B	B		55	7	*Schinus molle*	Molle	1
03-058-013	E	3	B	B		58	12	*Gossypium barbadense*	Cotton	2
03-058-013	E	3	B	B		58	12	*Schinus molle*	Molle	3
03-059-012	E	3	B	B		59	14	*Schinus molle*	Molle	6
03-060-009	E	3	B	B		60	15	*Schinus molle*	Molle	3
03-070-011	E	3	B	A		70	1	*Chenopodium* sp.	Quinoa	1
03-071-009	E	3	B	A		71	3	*Schinus molle*	Molle	1
03-074-012	E	3	B	B		74	13	*Schinus molle*	Molle	5
03-075-015	E	3	B	B		75	16	*Chenopodium* sp.	Quinoa	1
03-075-015	E	3	B	B		75	16	*Schinus molle*	Molle	4
03-076-009	E	3	B	B		76	17	*Schinus molle*	Molle	127
03-089-008	E	3	B	B		89	25	*Schinus molle*	Molle	1
03-091-015	E	3	B	B		91	19	*Schinus molle*	Molle	10
03-092-009	E	3	B	B		92	19	*Schinus molle*	Molle	7
04-025-009	E	4	A	A		25	1	*Fagonia chilensis*		1
05-004-003	C	5	B	B		4	1	*Bidens* sp.	Spanish Needles	1
05-004-003	C	5	B	B		4	1	*Malva* sp.		3
05-004-003	C	5	B	B		4	1	*Malva* sp.		3
05-004-003	C	5	B	B		4	1	*Portulaca* sp.	Purslane	3
05-004-003	C	5	B	B		4	1	*Portulaca* sp.	Purslane	3
05-007-003	C	5	B	B		7	1	*Portulaca* sp.	Purslane	16
05-007-003	C	5	B	B		7	1	*Portulaca* sp.	Purslane	16
05-011-004	C	5	B	B		11	4	*Arracacia xanthorrhiza* cf.	Arracacha cf.	5
05-011-004	C	5	B	B		11	4	*Bidens* sp.	Spanish Needles	1
05-011-004	C	5	B	B		11	4	*Bromus* sp.		8
05-011-004	C	5	B	B		11	4	*Cassia* sp.		10
05-011-004	C	5	B	B		11	4	*Echinopsis* sp.	Cactus	2
05-011-004	C	5	B	B		11	4	*Echinopsis* sp.	Cactus	2
05-011-004	C	5	B	B		11	4	*Fagonia chilensis*		8

05-011-004	C	5	B	B		11	4	*Fagonia chilensis*		1
05-011-004	C	5	B	B		11	4	*Fagonia chilensis*		8
05-011-004	C	5	B	B		11	4	*Fagonia chilensis*		1
05-011-004	C	5	B	B		11	4	*Malva* sp.		1
05-011-004	C	5	B	B		11	4	*Malva* sp.		1
05-011-004	C	5	B	B		11	4	*Malva* sp.		1
05-011-004	C	5	B	B		11	4	*Malva* sp.		1
05-011-004	C	5	B	B		11	4	*Schinus molle*	Molle	2
05-011-004	C	5	B	B		11	4	UID		792
05-016-002	C	5	B	B		16, 17	2	*Chenopodium* sp.	Quinoa	36
05-016-002	C	5	B	B		16, 17	2	*Chenopodium* sp.	Quinoa	36
05-016-002	C	5	B	B		16, 17	2	*Fagonia chilensis*		1
05-016-002	C	5	B	B		16, 17	2	*Fagonia chilensis*		1
05-016-002	C	5	B	B		16, 17	2	*Fagonia chilensis*		1
05-016-002	C	5	B	B		16, 17	2	*Fagonia chilensis*		1
05-020-005	C	5	B	B		21,21	3	*Arracacia xanthorrhiza* cf.	Arracacha cf.	6
05-020-005	C	5	B	B		21,21	3	Cassia sp.		3
05-020-005	C	5	B	B		21,21	3	*Fagonia chilensis*		15
05-020-005	C	5	B	B		21,21	3	*Fagonia chilensis*		19
05-020-005	C	5	B	B		21,21	3	*Fagonia chilensis*		15
05-020-005	C	5	B	B		21,21	3	*Fagonia chilensis*		19
05-020-005	C	5	B	B		21,21	3	*Malva* sp.		1
05-020-005	C	5	B	B		21,21	3	*Malva* sp.		3
05-020-005	C	5	B	B		21,21	3	*Malva* sp.		4
05-020-005	C	5	B	B		21,21	3	*Malva* sp.		1
05-020-005	C	5	B	B		21,21	3	*Malva* sp.		3
05-020-005	C	5	B	B		21,21	3	*Malva* sp.		4
05-020-005	C	5	B	B		21,21	3	Poaceae cf.	Grass Family cf.	1
05-020-005	C	5	B	B		21,21	3	Poaceae cf.	Grass Family cf.	11
05-020-005	C	5	B	B		21,21	3	*Portulaca* sp.	Purslane	1
05-020-005	C	5	B	B		21,21	3	*Portulaca* sp.	Purslane	1
05-020-005	C	5	B	B		21,21	3	UID		6
06-004-012	C	6	E	C		4	18	*Verbena* sp.		1
06-033-006	C	6	A	B		33, 41	13	*Chenopodium* sp.	Quinoa	2
06-067-004	C	6	B	A	1	67	1	*Chenopodium* sp.	Quinoa	1
06-075-008	C	6	B	A	2	75	2	*Salix* sp.		1
06-075-008	C	6	B	A	2	75	2	*Salix* sp.		1
06-075-014	C	6	B	A	3	75	2	*Bromus* sp.		1
07-013-007	B	7	B	B		13	2	*Boerhavia* sp.		1
07-013-007	B	7	B	B		13	2	*Chenopodium* sp.	Quinoa	1
07-013-007	B	7	B	B		13	2	*Echinopsis* sp.	Cactus	3
07-013-007	B	7	B	B		13	2	*Portulaca* sp.	Purslane	3
07-013-007	B	7	B	B		13	2	*Schinus molle*	Molle	337

07-013-007	B	7	B	B		13	2	*Suaeda* sp.		2
07-013-007	B	7	B	B		13	2	*Verbena* sp.		1
07-018-011	B	7	B	B		18	2	*Chenopodium* sp.	Quinoa	1
07-018-011	B	7	B	B		18	2	*Chenopodium* sp.	Quinoa	6
07-018-011	B	7	B	B		18	2	*Portulaca* sp.	Purslane	1
07-018-011	B	7	B	B		18	2	*Schinus molle*	Molle	214
07-018-011	B	7	B	B		18	2	UID		1
07-027-014	B	7	B	C		27	3A	*Schinus molle*	Molle	9
07-031-017	B	7	B	C		31	3A	*Schinus molle*	Molle	6
07-031-017	B	7	B	C		31	3A	UID		1
07-031-018	B	7	B	C	1	31	3B	*Echinopsis* sp.	Cactus	6
07-031-018	B	7	B	C	1	31	3B	*Fagonia chilensis*		1
07-031-018	B	7	B	C	1	31	3B	*Malva* sp.		3
07-031-018	B	7	B	C	1	31	3B	*Portulaca* sp.	Purslane	5
07-032-013	B	7	B	C	1	32	6	*Schinus molle*	Molle	146
07-035-013	B	7	B	C		35	12	*Schinus molle*	Molle	239
08-044-014	A	8	B	C	90	44	20	*Chenopodium* sp.	Quinoa	1
08-044-014	A	8	B	C		44	20	*Schinus molle*	Molle	1
08-045-014	A	8	B	B		45	1	*Schinus molle*	Molle	5

APPENDIX IV

INVENTORY OF PLANTS HAND COLLECTED FROM YAHUAY ALTA

Unit	Layer	Grid	Level	Feature	Taxonomic Identification	Common Name	Count	Weight (g)
1	B	11/12				Wood Charcoal		0.09
1	A	16	1	2		Wood Charcoal		4.65
1	A	16	2	2		Wood Charcoal		3.07
1	A	19				Wood Charcoal		12.6
1	A	20				Wood Charcoal		1.82
1	A	26				Wood Charcoal		1.1
3	A	43			No Plant Remains Recovered			
3	A	60				Wood Charcoal		2.38
3	B	76		17	*Schinus molle*	Molle	88	
3	B	91		19	*Gossypium barbadense*	Cotton	2	
3	A	130			No Plant Remains Recovered			
3	A	142			No Plant Remains Recovered			
4	S	17				Wood Charcoal		3.08
4	S	20				Wood Charcoal		6.61
7	A	9			No Plant Remains Recovered			
7	B	13		2	*Arachis hypogaea*	Peanut	142	
7	B	13		2	*Cucurbita* sp.	Squash	142	
7	B	13		2	*Schinus molle*	Molle	80,944	
7	B	13		2	*Schinus molle*	Molle	849	
7	B	13		2	*Schinus molle*	Molle	142	
7	B	13		2		Wood Charcoal		2.83
7	B	13		2	*Cyperus* sp.	Sedge	1	
7	B	13		2	*Lagenaria* sp.	Bottle Gourd	2	
7	B	13		2	*Lagenaria* sp.	Bottle Gourd	19	
7	B	13		2	*Schinus molle*	Molle	19	
7	B	13		2	*Lagenaria* sp.	Bottle Gourd	1	
7	B	13		2	*Lagenaria* sp.	Bottle Gourd	1	
7	B	13		2		Wood Charcoal		3.51
7	B	13		2	*Arachis hypogaea*	Peanut	7	
7	B	13		2	*Lagenaria* sp.	Bottle Gourd	1	
7	B	13		2	No Plant Remains Recovered			
7	B	13		2	*Cucurbita* sp.	Squash	7	
7	B	13		2	*Lagenaria* sp.	Bottle Gourd	63	
7	B	13		2	*Lagenaria* sp.	Bottle Gourd	5	
7	B	13		2	*Schinus molle*	Molle	1	
7	B	13		2		Wood Charcoal		0.04
7	B	13		2	*Arachis hypogaea*	Peanut	1	

7	B	13		2	*Cucurbita maxima*	Zapallo	9	
7	B	13		2	*Cucurbita* sp.	Squash	70	
7	B	13		2	*Lagenaria* sp.	Bottle Gourd	30	
7	B	13		2	*Schinus molle*	Molle	12	
7	B	13		2	Unidentifiable		1	
7	B	13		2		Wood Charcoal		0.17
7	S	14				Wood Charcoal		4.69
7	S	14			*Annona* sp. *cf.*	Cherimoya cf.	1	
7	B	18		2	*Schinus molle*	Molle	323	
7	B	18		2	*Schinus molle*	Molle	73,529	
7	B	18		2		Wood Charcoal		0.46
7	B	18		2		Wood Charcoal		1.84
7	B	18		2	*Arachis hypogaea*	Peanut	1	
7	B	18		2	*Cucurbita maxima*	Zapallo	51	
7	B	18		2	*Lagenaria* sp.	Bottle Gourd	3	
7	B	18		2	*Lagenaria* sp.	Bottle Gourd	42	
7	B	18		2	*Schinus molle*	Molle	2	
7	B	18		2		Wood Charcoal		0.09
7	B	18		2	*Schinus molle*	Molle	60	
7	B	18		2	*Schinus molle*	Molle	5	
7	B	18		2		Wood Charcoal		1.26
7	B	18		2	*Arachis hypogaea*	Peanut	1	
7	S	19				Wood Charcoal		0.85
7	B	19			No Plant Remains Recovered			
7	A	23				Wood Charcoal		0.22
7	C	23	1	9		Wood Charcoal		1.27
7	C	23	2	9		Wood Charcoal		2.08
7	A	24			No Plant Remains Recovered			
7	C	31		3A	*Schinus molle*	Molle	12	
7	C	31		3A	*Schinus molle*	Molle	1	
7	C	31	2	3B	*Schinus molle*	Molle	211	
7	C	31	2	3B	*Schinus molle*	Molle	35,510	
7	C	31	2	3B		Wood Charcoal		0.7
7	C	32	2	6	*Arachis hypogaea*	Peanut	2	
7	C	32	2	6	*Schinus molle*	Molle	5,473	
7	C	32	2	6		Wood Charcoal		0
7	C	32	2	6	*Arachis hypogaea*	Peanut	6	
7	C	32	2	6	*Lagenaria* sp.	Bottle Gourd	1	
7	C	32	2	6	*Lagenaria* sp.	Bottle Gourd	7	
8	B	27			*Prosopis* sp.	Algarrobo	2	
8	C	42		13	*Schinus molle*	Molle	21	

APPENDIX V

INVENTORY OF PLANTS RECOVERED FROM QUILCAPAMPA

Sample	Unit	Locus	N de EA	Taxonomic Identification	Common Name	Count	Weight
1	17	1608	17	*Lagenaria* sp.	Gourd Rind	2	0.06
1	17	1608	17	*Schinus molle*	Molle Carbonized Processed	920	7.58
1	17	1608	17	*Schinus molle*	Molle Desiccated Non-Processed	86	2.05
1	17	1608	17	*Schinus molle*	Molle Desiccated Processed	2924	19.39
1	17	1608	17	*Schinus molle*	Molle Stem	6	0.02
2	25	2414	29	*Capsicum* sp.	Ají Seed	14	0.02
2	25	2414	29	*Chenopodium quinoa*	Quinoa	4	0.02
2	25	2414	29	Fabaceae	Bean Family	2	0.06
2	25	2414	29	*Schinus molle*	Molle Carbonized Processed	641	7.43
2	25	2414	29	*Schinus molle*	Molle Desiccated Processed	436	6.07
2	25	2414	29	*Schinus molle*	Molle Stem	30	0.02
2	25	2414	29	*Zea mays*	Maize Cob Desiccated	12	2.59
2	25	2414	29	*Zea mays*	Maize Cupule Desiccated	67	0.3
2	25	2414	29	*Zea mays*	Maize Kernel Desiccated	4	0.1
2	25	2414	29		UID	43	0.77
3	17	1610	17	*Arachis hypogaea*	Peanut Shell	13	0.69
3	17	1610	17	*Capsicum* sp.	Ají Fruit	92	0.22
3	17	1610	17	*Capsicum* sp.	Ají Seed	220	0.38
3	17	1610	17	*Capsicum* sp.	Ají Stem	233	2.21
3	17	1610	17	Fabaceae cf.	Bean Family cf.	2	0.31
3	17	1610	17	*Schinus molle*	Molle Desiccated Non-Processed	9	0.13
3	17	1610	17	*Zea mays*	Maize Cob Desiccated	4	7.48
3	17	1610	17	*Zea mays*	Maize Cupule Desiccated	49	0.06
3	17	1610	17	*Zea mays*	Maize Kernel Desiccated	7	0.04
3	17	1610	17		UID	18	0.96
4	17	1611	17	*Arachis hypogaea*	Peanut Seed	5	0.05
4	17	1611	17	*Arachis hypogaea*	Peanut Shell	134	4.01
4	17	1611	17	*Capsicum* sp.	Ají Seed	18	0.04
4	17	1611	17	*Capsicum* sp.	Ají Stem	5	0.01
4	17	1611	17	*Cucurbita maxima*	Zapallo	8	0.14
4	17	1611	17	*Gossypium barbadense*	Cotton Seed	3	0.06
4	17	1611	17	*Inga feuillei*	Pacay Pod	13	2.04
4	17	1611	17	*Pouteria lucuma*	Lucuma	21	11.66
4	17	1611	17	*Schinus molle*	Molle Desiccated Processed	18	0.45
4	17	1611	17	*Zea mays*	Maize Cob Desiccated	11	8.38
4	17	1611	17	*Zea mays*	Maize Cupule Desiccated	6	0.5
4	17	1611	17		UID Seed	5	0.01

5	17	1613	17	*Arachis hypogaea*	Peanut Shell	9	0.49
5	17	1613	17	*Physalis peruviana*	Aguaymanto	15	1.66
5	17	1613	17	*Physalis peruviana*	Aguaymanto	70	0.59
5	17	1613	17	*Schinus molle*	Molle Carbonized Processed	2	0.02
5	17	1613	17	*Schinus molle*	Molle Desiccated Processed	15	0.24
5	17	1613	17	*Solanum tuberosum*	Potato	256	58.52
5	17	1613	17	*Zea mays*	Maize Cob Desiccated	2	3.5
5	17	1613	17	*Zea mays*	Maize Cupule Desiccated	35	0.04
5	17	1613	17		UID	2	0.02
6	25	2415	29	*Capsicum* sp.	Ají Seed	68	0.2
6	25	2415	29	*Capsicum* sp.	Ají Stem	12	0.08
6	25	2415	29	*Schinus molle*	Molle Desiccated Non-Processed	4	0.04
6	25	2415	29	*Schinus molle*	Molle Desiccated Processed	22588	291.93
6	25	2415	29	*Schinus molle*	Molle Stem	84	0.2
6	25	2415	29	*Zea mays*	Maize Cob Desiccated	8	2.32
6	25	2415	29		UID	40	0.92
7	21	2022	25	*Inga feuillei*	Pacay Pod	16	2.18
7	21	2022	25	*Inga feuillei*	Pacay Seed	40	1.33
7	21	2022	25	*Pouteria lucuma*	Lucuma	4	0.08
7	21	2022	25	*Schinus molle*	Molle Carbonized Processed	4	0.04
7	21	2022	25	*Schinus molle*	Molle Desiccated Processed	3006	115.14
7	21	2022	25	*Schinus molle*	Molle Stem	48	0.04
7	21	2022	25	*Solanum tuberosum*	Potato	20	1.85
7	21	2022	25	*Solanum tuberosum* cf.	Potato cf.	20	0.52
7	21	2022	25	*Zea mays*	Maize Cupule Desiccated	93	0.2
7	21	2022	25	*Zea mays*	Maize Kernel Desiccated	299	2.26
7	21	2022	25		UID	12	0.12
8	21	2021	25	*Gossypium barbadense*	Cotton Seed	12	0.04
8	21	2021	25	*Gossypium barbadense* cf.	Cotton Seed cf.	4	0.2
8	21	2021	25	*Lagenaria* sp.	Gourd Rind	8	0.52
8	21	2021	25	*Schinus molle*	Molle Desiccated Processed	578	12.68
8	21	2021	25	*Solanum tuberosum* cf.	Potato cf.	12	0.64
8	21	2021	25	*Zea mays*	Maize Cob Desiccated	24	3.96
8	21	2021	25	*Zea mays*	Maize Cupule Desiccated	452	0.6
8	21	2021	25	*Zea mays* cf.	Maize Kernel cf.	4	0.04
8	21	2021	25		UID	8	0.04
9	21	2024	25	*Arachis hypogaea*	Peanut Shell	8	0.04
9	21	2024	25	*Capsicum* sp.	Ají Seed	55	0.04
9	21	2024	25	*Chenopodium quinoa*	Quinoa	51	0.04
9	21	2024	25	Fabaceae	Bean Family	27	0.35
9	21	2024	25	*Gossypium barbadense*	Cotton Seed	31	0.08
9	21	2024	25	*Phaseolus vulgaris*	Common Bean	4	0.15
9	21	2024	25	*Pouteria lucuma*	Lucuma	32	0.19
9	21	2024	25	*Schinus molle*	Molle Desiccated Processed	743	12.94
9	21	2024	25	*Schinus molle*	Molle Stem	4	0.04
9	21	2024	25	*Solanum tuberosum* cf.	Potato cf.	211	3.64
9	21	2024	25	*Zea mays*	Maize Cob Desiccated	8	0.5
9	21	2024	25	*Zea mays*	Maize Cupule Desiccated	43	0.04
9	21	2024	25	*Zea mays*	Maize Kernel Desiccated	12	0.08

9	21	2024	25		UID	8	0.04
9	21	2024	25		UID Seed	4	0.04
10	21	2022	25	*Capsicum* sp.	Ají Fruit	4	0.17
10	21	2022	25	*Capsicum* sp.	Ají Seed	64	0.08
10	21	2022	25	*Chenopodium quinoa*	Quinoa	4	0.12
10	21	2022	25	*Inga feuillei*	Pacay Seed	26	19.81
10	21	2022	25	*Phaseolus vulgaris*	Common Bean	302	11.76
10	21	2022	25	*Pouteria lucuma*	Lucuma	55	0.6
10	21	2022	25	*Schinus molle*	Molle Desiccated Processed	30	0.08
10	21	2022	25	*Schinus molle*	Molle Stem	4	0.04
10	21	2022	25	*Solanum tuberosum*	Potato	85	15.16
10	21	2022	25	*Zea mays*	Maize Cob Desiccated	4	0.85
10	21	2022	25	*Zea mays*	Maize Cupule Desiccated	4	0.04
10	21	2022	25	*Zea mays*	Maize Kernel Desiccated	524	37.86
10	21	2022	25	*Zea mays* cf.	Maize Cob cf.	4	0.08
10	21	2022	25		UID	4	0.12
10	21	2022	25		UID Seed	13	0.04
10	21	2022	25		Unidentifiable	4	0.04
11	21	2021	25	*Inga feuillei*	Pacay Pod	12	2.45
11	21	2021	25	*Schinus molle*	Molle Desiccated Processed	233	9.16
11	21	2021	25	*Solanum tuberosum*	Potato	4	0.04
11	21	2021	25	*Zea mays*	Maize Cob Desiccated	8	7.69
11	21	2021	25	*Zea mays*	Maize Cupule Desiccated	155	0.65
11	21	2021	25	*Zea mays*	Maize Kernel Desiccated	29	1.26
11	21	2021	25	*Zea mays* cf.	Maize Kernel cf.	4	0.04
11	21	2021	25		UID Seed	4	0.04
12	17	1625	17	*Arachis hypogaea*	Peanut Seed	4	0.04
12	17	1625	17	*Arachis hypogaea*	Peanut Shell	51	1.5
12	17	1625	17	*Capsicum* sp.	Ají Seed	20	0.04
12	17	1625	17	*Capsicum* sp.	Ají Stem	12	0.04
12	17	1625	17	*Chenopodium quinoa*	Quinoa	24	0.04
12	17	1625	17	Cucurbitaceae	Squash/Gourd Seed	16	0.16
12	17	1625	17	Fabaceae	Bean Family	12	0.11
12	17	1625	17	*Inga feuillei*	Pacay Pod	482	92.55
12	17	1625	17	*Inga feuillei* cf.	Pacay cf.	78	39.24
12	17	1625	17	*Lagenaria* sp.	Gourd Rind	35	0.23
12	17	1625	17	Poaceae	Grass Family	4	0.04
12	17	1625	17	*Prunus* sp. cf.	Wild Plum/Cherry cf.	4	0.04
12	17	1625	17	*Schinus molle*	Molle Desiccated Processed	651	11.05
12	17	1625	17	*Zea mays*	Maize Cob Desiccated	4	3.76
12	17	1625	17	*Zea mays*	Maize Cupule Desiccated	67	0.59
12	17	1625	17		UID	4	0.04
13	17	1636	17.2	*Schinus molle*	Molle Desiccated Non-Processed	4	0.03
14	26	1636	26	*Capsicum* sp.	Ají Seed	8	0.04
14	26	1636	26	*Capsicum* sp.	Ají Stem	8	0.04
14	26	1636	26	Fabaceae	Bean Family	4	0.08
14	26	1636	26	*Gossypium barbadense*	Cotton Seed	37	0.24
14	26	1636	26	*Lagenaria* sp.	Gourd Rind	4	2.6
14	26	1636	26	*Schinus molle*	Molle Desiccated Processed	203	2.31

14	26	1636	26	*Schinus molle*	Molle Stem	8	0.04
14	26	1636	26	*Zea mays*	Maize Cob Desiccated	8	1.29
14	26	1636	26	*Zea mays*	Maize Cupule Desiccated	208	1.42
14	26	1636	26		UID	1	0.16
14	26	1636	26		UID Seed	4	0.04
15	22	2104	26	*Capsicum* sp.	Ají Seed	51	0.08
15	22	2104	26	*Capsicum* sp.	Ají Stem	8	0.04
15	22	2104	26	*Chenopodium quinoa*	Quinoa	107	0.04
15	22	2104	26	Chenopodium/Amaranthus	Quinoa/Kiwicha	12	0.04
15	22	2104	26	Cucurbitaceae	Squash/Gourd Rind	24	1.39
15	22	2104	26	*Inga feuillei* cf.	Pacay cf.	4	0.04
15	22	2104	26	*Schinus molle*	Molle Carbonized Processed	28	0.12
15	22	2104	26	*Schinus molle*	Molle Desiccated Processed	158	4.63
15	22	2104	26	*Schinus molle*	Molle Stem	24	0.04
15	22	2104	26	*Solanum tuberosum* cf.	Potato cf.	12	0.95
15	22	2104	26	*Zea mays*	Maize Cupule Carbonized	321	1.07
15	22	2104	26	*Zea mays*	Maize Cupule Desiccated	309	3.13
15	22	2104	26	*Zea mays*	Maize Embryo	16	0.04
15	22	2104	26	*Zea mays*	Maize Kernel Carbonized	4	0.04
15	22	2104	26	*Zea mays*	Maize Kernel Desiccated	24	0.19
15	22	2104	26		UID	2	0.95
16	19	1808	13	*Arachis hypogaea*	Peanut Seed	3	0.01
16	19	1808	13	*Capsicum* sp.	Ají Seed	35	0.1
16	19	1808	13	*Capsicum* sp. cf.	Capsicum cf.	7	0.03
16	19	1808	13	*Chenopodium quinoa*	Quinoa	35	0.03
16	19	1808	13	Cucurbitaceae	Squash/Gourd Rind	4	0.76
16	19	1808	13	Fabaceae cf.	Bean Family cf.	4	0.03
16	19	1808	13	*Gossypium barbadense*	Cotton Seed	7	0.03
16	19	1808	13	*Inga feuillei*	Pacay Pod	59	5.24
16	19	1808	13	*Inga feuillei*	Pacay Seed	7	0.48
16	19	1808	13	*Schinus molle*	Molle Carbonized Processed	17	0.24
16	19	1808	13	*Schinus molle*	Molle Desiccated Processed	149	3.43
16	19	1808	13	*Schinus molle*	Molle Stem	28	0.03
16	19	1808	13	*Zea mays*	Maize Cob Desiccated	7	13.08
16	19	1808	13	*Zea mays*	Maize Cupule Desiccated	711	5.76
16	19	1808	13	*Zea mays* cf.	Maize Kernel cf.	7	0.07
16	19	1808	13		UID	7	3.36
17	25	2419	29	*Capsicum* sp.	Ají Seed	5	0.02
17	25	2419	29	*Chenopodium quinoa*	Quinoa	18	0.02
17	25	2419	29	*Echinocereus* sp.	Cactus	3	0.05
17	25	2419	29	*Prunus* sp. cf.	Wild Plum/Cherry cf.	3	0.02
17	25	2419	29	*Schinus molle*	Molle Desiccated Processed	334	6.67
17	25	2419	29	*Schinus molle*	Molle Stem	77	0.05
17	25	2419	29	*Zea mays*	Maize Kernel Carbonized	8	0.1
17	25	2419	29		UID	3	0.58
18	22	2104	26	*Amaranthus* spp.	Kiwicha	3	0.03
18	22	2104	26	*Arachis hypogaea*	Peanut Shell	3	0.06
18	22	2104	26	*Capsicum* sp.	Ají Seed	13	0.03
18	22	2104	26	*Chenopodium quinoa*	Quinoa	225	0.13

18	22	2104	26	Cucurbitaceae	Squash/Gourd Rind	13	2.21
18	22	2104	26	*Echinocereus* sp.	Cactus	3	0.03
18	22	2104	26	Poaceae	Grass Family	3	0.03
18	22	2104	26	*Schinus molle*	Molle Carbonized Non-Processed	13	0.03
18	22	2104	26	*Schinus molle*	Molle Desiccated Processed	3	0.03
18	22	2104	26	*Schinus molle*	Molle Desiccated Processed	175	2.78
18	22	2104	26	*Schinus molle*	Molle Stem	3	0.03
18	22	2104	26	*Zea mays*	Maize Cob Desiccated	13	2.8
18	22	2104	26	*Zea mays*	Maize Cupule Carbonized	13	0.03
18	22	2104	26	*Zea mays*	Maize Cupule Desiccated	47	0.24
18	22	2104	26	*Zea mays*	Maize Embryo	3	0.06
18	22	2104	26	*Zea mays*	Maize Kernel Carbonized	13	0.2
18	22	2104	26		UID	3	0.03
19	20	1905	3	*Amaranthus* spp.	Kiwicha	64	0.07
19	20	1905	3	*Arachis hypogaea*	Peanut Shell	4	0.14
19	20	1905	3	*Capsicum* sp.	Ají Fruit	21	0.35
19	20	1905	3	*Capsicum* sp.	Ají Stem	18	0.32
19	20	1905	3	*Chenopodium quinoa*	Quinoa	50	0.03
19	20	1905	3	*Gossypium barbadense*	Cotton Seed	4	0.03
19	20	1905	3	*Inga feuillei*	Pacay Pod	4	1.13
19	20	1905	3	*Inga feuillei*	Pacay Seed	18	2.3
19	20	1905	3	*Schinus molle*	Molle Desiccated Processed	21	0.6
19	20	1905	3	*Zea mays*	Maize Cob Desiccated	11	2.48
19	20	1905	3	*Zea mays*	Maize Cupule Desiccated	28	0.21
19	20	1905	3	*Zea mays*	Maize Kernel Desiccated	4	0.03
19	20	1905	3		UID	11	0.36
19	20	1905	3		UID Seed	4	0.35
20	23	2214	23	*Anadenanthera colubrina*	Vilca	8	0.42
20	23	2214	23	*Capsicum* sp.	Ají Seed	160	0.15
20	23	2214	23	*Capsicum* sp.	Ají Stem	23	0.03
20	23	2214	23	*Chenopodium quinoa*	Quinoa	2366	17.37
20	23	2214	23	Cucurbitaceae	Squash/Gourd Rind	8	0.03
20	23	2214	23	Cucurbitaceae cf.	Squash/Gourd cf.	8	0.03
20	23	2214	23	Fabaceae	Bean Family	27	0.11
20	23	2214	23	*Gossypium barbadense*	Cotton Seed	73	1.67
20	23	2214	23	*Inga feuillei*	Pacay Pod	4	0.87
20	23	2214	23	*Inga feuillei*	Pacay Seed	11	0.18
20	23	2214	23	*Inga feuillei* cf.	Pacay cf.	23	1.33
20	23	2214	23	*Pouteria lucuma*	Lucuma	16	0.48
20	23	2214	23	*Schinus molle*	Molle Carbonized Non-Processed	80	1.22
20	23	2214	23	*Schinus molle*	Molle Desiccated Processed	438	7.43
20	23	2214	23	*Schinus molle*	Molle Stem	30	0.03
20	23	2214	23	*Zea mays*	Maize Cob Carbonized	15	0.8
20	23	2214	23	*Zea mays*	Maize Cob Desiccated	42	3.35
20	23	2214	23	*Zea mays*	Maize Cupule Carbonized	232	0.76
20	23	2214	23	*Zea mays*	Maize Cupule Desiccated	236	0.99
20	23	2214	23	*Zea mays*	Maize Embryo	80	0.3
20	23	2214	23	*Zea mays*	Maize Kernel Carbonized	792	12.27

20	23	2214	23	*Zea mays*	Maize Kernel Desiccated	42	0.45
20	23	2214	23		UID Seed	8	0.03
20	23	2214	23		Unidentifiable	34	0.53
20	23	2214	23		Unidentifiable	50	0.3
21	23	2213	23	*Capsicum* sp.	Ají Seed	8	0.01
21	23	2213	23	*Chenopodium quinoa*	Quinoa	5021	0.64
21	23	2213	23	Fabaceae	Bean Family	39	0.14
21	23	2213	23	*Inga feuillei*	Pacay Seed	35	0.56
21	23	2213	23	Poaceae	Grass Family	19	0.01
21	23	2213	23	*Schinus molle*	Molle Carbonized Non-Processed	39	0.12
21	23	2213	23	*Schinus molle*	Molle Carbonized Processed	16	0.02
21	23	2213	23	*Schinus molle*	Molle Desiccated Processed	64	0.23
21	23	2213	23	*Schinus molle*	Molle Stem	43	0.01
21	23	2213	23	*Zea mays*	Maize Cob Carbonized	50	1.3
21	23	2213	23	*Zea mays*	Maize Cob Desiccated	12	0.4
21	23	2213	23	*Zea mays*	Maize Cupule Carbonized	411	0.29
21	23	2213	23	*Zea mays*	Maize Cupule Desiccated	140	0.1
21	23	2213	23	*Zea mays*	Maize Embryo	39	0.05
21	23	2213	23	*Zea mays*	Maize Kernel Carbonized	221	0.68
21	23	2213	23		UID	16	0.15
21	23	2213	23		UID Seed	31	0.01
21	23	2213	23		Unidentifiable	16	0.11
22	22	2110	26	*Capsicum* sp.	Ají Seed	26	0.04
22	22	2110	26	*Capsicum* sp.	Ají Stem	4	0.04
22	22	2110	26	*Chenopodium quinoa*	Quinoa	74	0.04
22	22	2110	26	*Echinopsis* sp.	Cactus	4	0.04
22	22	2110	26	*Inga feuillei*	Pacay Pod	9	0.04
22	22	2110	26	*Lagenaria* sp. cf.	Gourd Rind cf.	4	0.04
22	22	2110	26	*Pouteria lucuma*	Lucuma	4	0.04
22	22	2110	26	*Schinus molle*	Molle Carbonized Processed	4	0.04
22	22	2110	26	*Schinus molle*	Molle Desiccated Processed	83	1.61
22	22	2110	26	*Schinus molle*	Molle Stem	9	0.04
22	22	2110	26	*Zea mays*	Maize Cob Desiccated	4	0.87
22	22	2110	26	*Zea mays*	Maize Cupule Desiccated	244	1.57
22	22	2110	26	*Zea mays* cf.	Maize Kernel cf.	165	16.92
23	22	2111	26	*Capsicum* sp.	Ají Seed	109	0.04
23	22	2111	26	*Capsicum* sp.	Ají Stem	4	0.04
23	22	2111	26	*Chenopodium quinoa*	Quinoa	58	0.04
23	22	2111	26	*Echinopsis* sp.	Cactus	20	0.04
23	22	2111	26	Fabaceae	Bean Family	4	0.04
23	22	2111	26	*Inga feuillei*	Pacay Pod	21	0.33
23	22	2111	26	*Lagenaria* sp.	Gourd Rind	13	0.54
23	22	2111	26	*Phaseolus vulgaris*	Common Bean	4	0.29
23	22	2111	26	*Schinus molle*	Molle Desiccated Processed	54	0.84
23	22	2111	26	*Schinus molle*	Molle Stem	4	0.04
23	22	2111	26	*Zea mays*	Maize Cob Desiccated	8	2.98
23	22	2111	26	*Zea mays*	Maize Cupule Desiccated	155	0.38
23	22	2111	26	*Zea mays*	Maize Kernel Carbonized	8	0.04
23	22	2111	26	*Zea mays*	Maize Kernel Desiccated	4	0.04

23	22	2111	26		UID	4	0.04
23	22	2111	26		UID Seed	4	0.04
24	25	2414	29	*Inga feuillei*	Pacay Seed	4	0.18
24	25	2414	29	*Lagenaria* sp. cf.	Gourd Rind cf.	7	0.36
24	25	2414	29	*Schinus molle*	Molle Desiccated Processed	22	0.21
24	25	2414	29	*Schinus molle*	Molle Stem	11	0.36
24	25	2414	29	*Schinus molle* cf.	Molle Carbonized Processed cf.	4	0.36
24	25	2414	29	*Zea mays*	Maize Cob Carbonized	14	0.97
24	25	2414	29	*Zea mays*	Maize Cupule Carbonized	14	0.07
24	25	2414	29		Unidentifiable	4	0.36
25	23	2213	23	*Capsicum* sp.	Ají Seed	70	0.5
25	23	2213	23	*Chenopodium quinoa*	Quinoa	7155	6.17
25	23	2213	23	*Echinocereus* sp.	Cactus	17	4.15
25	23	2213	23	*Erythroxylum coca*	Coca	8	0.12
25	23	2213	23	*Erythroxylum coca* cf.	Coca cf.	141	0.12
25	23	2213	23	*Inga feuillei*	Pacay Seed	91	1.87
25	23	2213	23	*Phaseolus vulgaris*	Common Bean	25	0.66
25	23	2213	23	*Physalis peruviana*	Aguaymanto	8	0.04
25	23	2213	23	*Pouteria lucuma*	Lucuma	4	0.41
25	23	2213	23	*Pouteria lucuma* cf.	Lucuma cf.	83	0.04
25	23	2213	23	*Schinus molle*	Molle Carbonized Non-Processed	116	0.83
25	23	2213	23	*Schinus molle*	Molle Carbonized Processed	25	0.12
25	23	2213	23	*Schinus molle*	Molle Desiccated Processed	552	3.9
25	23	2213	23	*Schinus molle*	Molle Stem	17	0.41
25	23	2213	23	*Zea mays*	Maize Cob Carbonized	33	8.34
25	23	2213	23	*Zea mays*	Maize Cupule Carbonized	710	3.11
25	23	2213	23	*Zea mays*	Maize Cupule Desiccated	187	0.83
25	23	2213	23	*Zea mays*	Maize Embryo	145	0.5
25	23	2213	23	*Zea mays*	Maize Kernel Carbonized	988	15.56
25	23	2213	23	*Zea mays*	Maize Kernel Desiccated	33	1.62
25	23	2213	23		UID	232	1.12
25	23	2213	23		UID Seed	62	0.17
26	21	2020	21		No Plant Remains Recovered		
27	25	2421	29	*Chenopodium quinoa*	Quinoa	15	0.08
27	25	2421	29	*Cucurbita maxima*	Zapallo	4	0.04
27	25	2421	29	*Inga feuillei*	Pacay Seed	74	0.07
27	25	2421	29	*Schinus molle*	Molle Carbonized Non-Processed	20	0.59
27	25	2421	29	*Schinus molle*	Molle Carbonized Processed	3090	2.52
27	25	2421	29	*Schinus molle*	Molle Desiccated Non-Processed	233	46.7
27	25	2421	29	*Schinus molle*	Molle Desiccated Processed	7	0.04
27	25	2421	29	*Schinus molle*	Molle Stem	1169	0.55
27	25	2421	29	*Zea mays*	Maize Cupule Carbonized	4	0.04
27	25	2421	29	*Zea mays*	Maize Embryo	15	0.11
27	25	2421	29	*Zea mays*	Maize Kernel Carbonized	78	1.37
27	25	2421	29	*Zea mays*	Maize Kernel Desiccated	19	0.26
27	25	2421	29		UID	30	0.15

28	17	1638	17.2		No Plant Remains Recovered		
29	24	2308	28.2	*Capsicum* sp.	Ají Seed	11	0.04
29	24	2308	28.2	*Chenopodium quinoa*	Quinoa	18	0.04
29	24	2308	28.2	*Inga feuillei*	Pacay Pod	7	0.16
29	24	2308	28.2	*Lagenaria* sp.	Gourd Seed	7	0.04
29	24	2308	28.2	*Lagenaria* sp. cf.	Gourd Rind cf.	4	0.04
29	24	2308	28.2	*Pouteria lucuma*	Lucuma	21	0.77
29	24	2308	28.2	*Schinus molle*	Molle Desiccated Processed	7	0.04
29	24	2308	28.2	*Schinus molle*	Molle Stem	109	0.04
29	24	2308	28.2	*Zea mays*	Maize Cob Desiccated	196	23.57
29	24	2308	28.2	*Zea mays*	Maize Cupule Desiccated	868	1.99
29	24	2308	28.2		UID	7	0.04
29	24	2308	28.2		UID	8	0.04
30	24	2303	28.2	*Capsicum* sp.	Ají Seed	49	0.04
30	24	2303	28.2	*Chenopodium quinoa* cf.	Quinoa cf.	4	0.04
30	24	2303	28.2	*Echinopsis* sp.	Cactus	4	0.04
30	24	2303	28.2	*Physalis peruviana*	Aguaymanto	41	0.04
30	24	2303	28.2	*Schinus molle*	Molle Desiccated Processed	49	0.77
30	24	2303	28.2	*Schinus molle*	Molle Stem	4	0.04
30	24	2303	28.2	*Zea mays*	Maize Cob Desiccated	57	23.57
30	24	2303	28.2	*Zea mays*	Maize Cupule Desiccated	105	0.16
30	24	2303	28.2		UID	4	0.04
30	24	2303	28.2		UID Seed	4	0.04
31	28	2701	27	*Schinus molle*	Molle Carbonized Non-Processed	13	0.22
31	28	2701	27	*Schinus molle*	Molle Carbonized Processed	27	0.09
31	28	2701	27	*Schinus molle*	Molle Desiccated Processed	620	16.43
31	28	2701	27	*Zea mays*	Maize Cob Desiccated	260	90.43
31	28	2701	27	*Zea mays*	Maize Cupule Desiccated	1477	4.13
31	28	2701	27		UID	4	0.04
31	28	2701	27		UID Seed	12	0.36
32	28	2708	27	*Capsicum* sp.	Ají Seed	4	0.04
32	28	2708	27	*Chenopodium quinoa*	Quinoa	40	0.08
32	28	2708	27	Fabaceae	Bean Family	36	0.2
32	28	2708	27	*Inga feuillei*	Pacay Seed	8	0.2
32	28	2708	27	*Lagenaria* sp.	Gourd Rind	16	0.12
32	28	2708	27	*Lagenaria* sp. cf.	Gourd Rind cf.	4	0.04
32	28	2708	27	*Pouteria lucuma*	Lucuma	4	0.08
32	28	2708	27	*Schinus molle*	Molle Carbonized Processed	340	2.01
32	28	2708	27	*Schinus molle*	Molle Desiccated Non-Processed	4	0.04
32	28	2708	27	*Schinus molle*	Molle Desiccated Processed	478	6.16
32	28	2708	27	*Zea mays*	Maize Cupule Carbonized	16	0.04
32	28	2708	27	*Zea mays*	Maize Cupule Desiccated	4	0.04
32	28	2708	27	*Zea mays*	Maize Embryo	36	0.2
32	28	2708	27	*Zea mays*	Maize Kernel Carbonized	162	1.66
32	28	2708	27		UID	40	0.08
33	22	2102	26	*Anadenanthera colubrina*	Vilca	5	0.77
33	22	2102	26	*Capsicum* sp.	Ají Seed	5	0.05
33	22	2102	26	*Chenopodium quinoa*	Quinoa	10	0.05

33	22	2102	26	Chenopodium/Amaranthus	Quinoa/Kiwicha	5	0.04
33	22	2102	26	Cucurbitaceae cf.	Squash/Gourd cf.	5	0.04
33	22	2102	26	Cyperaceae	Sedge Family	5	0.04
33	22	2102	26	*Inga feuillei*	Pacay Pod	10	9.05
33	22	2102	26	*Inga feuillei*	Pacay Seed	22	3.75
33	22	2102	26	*Phaseolus vulgaris*	Common Bean	15	9.24
33	22	2102	26	*Pouteria lucuma*	Lucuma	5	1.06
33	22	2102	26	*Zea mays*	Maize Kernel Desiccated	29	0.19
33	22	2102	26		UID Seed	5	0.04
33	22	2102	26		Unidentifiable	10	1.2
34	17	1609	17	*Anadenanthera colubrina*	Vilca	3	0.07
34	17	1609	17	*Arachis hypogaea*	Peanut Seed	6	0.1
34	17	1609	17	*Arachis hypogaea*	Peanut Shell	63	1.32
34	17	1609	17	*Capsicum* sp.	Ají Fruit	3	0.03
34	17	1609	17	*Capsicum* sp.	Ají Seed	13	0.03
34	17	1609	17	*Chenopodium quinoa*	Quinoa	43	0.07
34	17	1609	17	Fabaceae	Bean Family	7	0.03
34	17	1609	17	Fabaceae cf.	Bean Family cf.	40	0.33
34	17	1609	17	*Inga feuillei*	Pacay Pod	23	3
34	17	1609	17	*Inga feuillei*	Pacay Seed	23	0.76
34	17	1609	17	*Lagenaria* sp. cf.	Gourd Rind cf.	7	0.1
34	17	1609	17	*Pouteria lucuma*	Lucuma	13	0.92
34	17	1609	17	*Schinus molle*	Molle Carbonized Processed	224	1.45
34	17	1609	17	*Schinus molle*	Molle Desiccated Processed	604	9.34
34	17	1609	17	*Zea mays*	Maize Cupule Carbonized	3	0.03
34	17	1609	17	*Zea mays*	Maize Cupule Carbonized	20	0.56
34	17	1609	17	*Zea mays*	Maize Kernel Carbonized	13	0.1
34	17	1609	17		UID	33	0.2
35	24	2312	28.1	*Amaranthus* spp.	Kiwicha	268	0.04
35	24	2312	28.1	*Arachis hypogaea*	Peanut Seed	13	0.04
35	24	2312	28.1	*Arachis hypogaea* cf.	Peanut cf.	8	0.04
35	24	2312	28.1	*Capsicum* sp.	Ají Seed	289	0.25
35	24	2312	28.1	*Chenopodium quinoa*	Quinoa	289	0.72
35	24	2312	28.1	Fabaceae	Bean Family	4	0.08
35	24	2312	28.1	*Inga feuillei*	Pacay Pod	59	2.26
35	24	2312	28.1	*Lagenaria* sp.	Gourd Rind	29	9.05
35	24	2312	28.1	*Physalis peruviana*	Aguaymanto	42	0.04
35	24	2312	28.1	*Schinus molle*	Molle Carbonized Processed	4	0.04
35	24	2312	28.1	*Schinus molle*	Molle Desiccated Non-Processed	4	0.04
35	24	2312	28.1	*Schinus molle*	Molle Desiccated Processed	641	0.11
35	24	2312	28.1	*Schinus molle*	Molle Stem	96	0.13
35	24	2312	28.1	*Solanum tuberosum*	Potato	4	4.23
35	24	2312	28.1	*Solanum tuberosum* cf.	Potato cf.	8	0.04
35	24	2312	28.1	*Zea mays*	Maize Cob Desiccated	96	54.34
35	24	2312	28.1	*Zea mays*	Maize Cupule Carbonized	13	0.04
35	24	2312	28.1	*Zea mays*	Maize Cupule Desiccated	800	2.14
35	24	2312	28.1	*Zea mays*	Maize Kernel Carbonized	25	0.08
35	24	2312	28.1		UID	101	27.86
35	24	2312	28.1		UID Seed	327	0.04

36	28	2707	27	*Schinus molle*	Molle Desiccated Processed	1282092	3821
266	2	105	120	*Chenopodium quinoa*	Quinoa	1	0.01
738	4	306	28	*Schinus molle*	Molle Carbonized Processed	1	0.01
738	4	306	28	*Schinus molle*	Molle Desiccated Processed	3	0.04
739	4		28	*Schinus molle*	Molle Desiccated Processed	58	0.94
739	4		28	*Zea mays*	Maize Cupule Desiccated	5	0.5
739	4		28	*Zea mays*	Maize Kernel Desiccated	3	0.01
739	4		28	*Zea mays*	Maize Stem	1	0.01
740	3	208	27	*Schinus molle*	Molle Desiccated Processed	4	0.06
758	3		27	*Capsicum* sp.	Ají Seed	3	0.01
758	3		27	*Echinopsis* sp.	Cactus	15	0.15
758	3		27	*Lagenaria* sp.	Gourd Rind	5	0.04
758	3		27	*Schinus molle*	Molle Desiccated Processed	178	0.85
758	3		27	*Zea mays*	Maize Cupule Desiccated	73	0.2
758	3		27	*Zea mays*	Maize Kernel Desiccated	24	0.11
758	3		27		UID	2	0.02
947	2	505	6	*Capsicum* sp.	Ají Seed	25	0.04
947	2	505	6	*Lagenaria* sp.	Gourd Rind	59	7.85
947	2	505	6	*Pouteria lucuma*	Lucuma	29	0.63
947	2	505	6	*Schinus molle*	Molle Carbonized Processed	25	1.26
947	2	505	6	*Schinus molle*	Molle Desiccated Processed	23470	546
947	2	505	6	*Zea mays*	Maize Cob Desiccated	4	1.6
947	2	505	6	*Zea mays*	Maize Cupule Desiccated	59	0.25
947	2	505	6	*Zea mays*	Maize Kernel Desiccated	34	0.17
947	2	505	6		UID	4	0.08
948	6	506	2	*Capsicum* sp.	Ají Seed	17	0.01
948	6	506	2	*Pouteria lucuma*	Lucuma	17	0.53
948	6	506	2	*Schinus molle*	Molle Desiccated Processed	8019	30.5
948	6	506	2	*Schinus molle*	Molle Stem	17	0.01
949	6		2	Cactaceae	Cactus Family	1	0.01
949	6		2	*Capsicum* sp.	Ají Seed	1	0.01
949	6		2	*Chenopodium quinoa*	Quinoa	3	0.01
949	6		2	*Lagenaria* sp.	Gourd Rind	1	0.3
949	6		2	*Pouteria lucuma*	Lucuma	9	1.89
949	6		2	*Schinus molle*	Molle Desiccated Processed	5795	163
949	6		2	*Schinus molle*	Molle Stem	3	0.01
949	6		2	*Zea mays*	Maize Cupule Desiccated	2	0.01
949	6		2	*Zea mays*	Maize Kernel Desiccated	2	0.01
966	4	344	28	*Amaranthus* spp.	Kiwicha	1	0.01
966	4	344	28	*Capsicum* sp.	Ají Seed	7	0.01
966	4	344	28	*Chenopodium quinoa*	Quinoa	83	0.02
966	4	344	28	*Echinopsis* sp.	Cactus	1	0.01
966	4	344	28	*Gossypium barbadense*	Cotton Seed	4	0.03
966	4	344	28	*Schinus molle*	Molle Desiccated Processed	4	0.03
966	4	344	28	*Zea mays*	Maize Embryo	1	0.01
966	4	344	28	*Zea mays*	Maize Kernel Carbonized	6	0.04
969	4	305	28	*Chenopodium quinoa*	Quinoa	2	0.01
969	4	305	28	*Schinus molle*	Molle Desiccated Processed	3	0.05
971	4	308	28	*Gossypium barbadense*	Cotton Seed	2	0.01

971	4	308	28	*Schinus molle*	Molle Desiccated Processed	2	0.04
971	4	308	28		UID Seed	1	0.01
972	4	310	28	*Schinus molle*	Molle Stem	1	0.01
972	4	310	28	*Zea mays*	Maize Cupule Desiccated	1	0.01
972	4	310	28	*Zea mays*	Maize Kernel Carbonized	1	0.02
972	4	310	28		UID	8	0.01
973	4	312	28		No Plant Remains Identified		
974	4	317	28		No Plant Remains Identified		
977	4	325	28	*Phaseolus vulgaris*	Common Bean	1	0.02
990	6	503	2		No Plant Remains Identified		
991	6	503	2	*Chenopodium quinoa*	Quinoa	8	0.01
991	6	503	2	*Schinus molle*	Molle Carbonized Processed	4	0.06
991	6	503	2	*Schinus molle*	Molle Desiccated Processed	209	2.7
991	6	503	2	*Schinus molle*	Molle Stem	4	0.01
991	6	503	2	*Zea mays*	Maize Embryo	1	0.01
992	6	503	2	*Chenopodium quinoa* cf.	Quinoa cf.	1	0.01
992	6	503	2	*Schinus molle*	Molle Carbonized Processed	2	0.01
992	6	503	2	*Schinus molle*	Molle Desiccated Processed	636	9.21
992	6	503	2	*Schinus molle*	Molle Stem	11	0.01
993	6	503	2	*Chenopodium quinoa*	Quinoa	3	0.01
993	6	503	2	*Inga feuillei*	Pacay Pod	2	0.24
993	6	503	2	*Schinus molle*	Molle Carbonized Processed	2	0.01
993	6	503	2	*Schinus molle*	Molle Desiccated Non-Processed	2	0.04
993	6	503	2	*Schinus molle*	Molle Desiccated Processed	567	7.51
993	6	503	2	*Schinus molle*	Molle Stem	4	0.01
993	6	503	2	*Zea mays*	Maize Cupule Desiccated	6	0.06
994	6	505	2	*Chenopodium quinoa*	Quinoa	8	0.01
994	6	505	2	*Schinus molle*	Molle Desiccated Processed	109	1.77
994	6	505	2	*Zea mays*	Maize Cupule Desiccated	1	0.01
995	6	506	2	*Schinus molle*	Molle Desiccated Processed	259	3.57
996	6	505	2	*Chenopodium quinoa*	Quinoa	1	0.01
996	6	505	2	*Schinus molle*	Molle Desiccated Processed	132	1.87
997	6		2	*Amaranthus* spp.	Kiwicha	2	0.01
997	6		2	*Capsicum* sp.	Ají Seed	3	0.01
997	6		2	*Chenopodium quinoa*	Quinoa	1	0.01
997	6		2	*Schinus molle*	Molle Desiccated Processed	537	20.51
997	6		2	*Schinus molle*	Molle Stem	10	0.01
998	6	507	2	*Chenopodium quinoa*	Quinoa	2	0.01
998	6	507	2	*Echinopsis* sp.	Cactus	1	0.01
998	6	507	2	Poaceae	Grass Family	1	0.01
998	6	507	2	*Schinus molle*	Molle Desiccated Processed	460	10.45
998	6	507	2	*Schinus molle*	Molle Stem	12	0.01
1002	6	509	2	*Schinus molle*	Molle Desiccated Processed	12	0.25
1004	6	512	2	*Schinus molle*	Molle Desiccated Processed	2	0.01
1004	6	512	2	*Zea mays*	Maize Cupule Desiccated	1	0.01
1005	6	513	2	*Schinus molle*	Molle Desiccated Processed	2	0.01
1005	6	513	2	*Zea mays*	Maize Cupule Desiccated	1	0.01
1006	6	515	21	*Capsicum* sp.	Ají Seed	4	0.02
1007	6	515	21	*Capsicum* sp.	Ají Seed	12	0.01

1008	6	515	21	*Capsicum* sp.	Ají Seed	22	0.01
1008	6	515	21	*Schinus molle*	Molle Desiccated Processed	4	0.13
1009	6	516	22	*Chenopodium quinoa*	Quinoa	1	0.01
1009	6	516	22	*Schinus molle*	Molle Desiccated Processed	3	0.01
1009	6	516	22	*Schinus molle*	Molle Stem	2	0.01
2344	16	1606	5	Cactaceae	Cactus Family	16	0.04
2344	16	1606	5	*Chenopodium quinoa*	Quinoa	8	0.04
2344	16	1606	5	*Lagenaria* sp.	Bottle Gourd Seed	8	0.04
2344	16	1606	5	*Lagenaria* sp.	Gourd Rind	4	0.35
2344	16	1606	5	*Schinus molle*	Molle Desiccated Processed	12	0.08
2344	16	1606	5	*Zea mays*	Maize Cupule Desiccated	16	0.04
2344	16	1606	5		UID	8	0.04
2345	16	1510	5	*Inga feuillei*	Pacay Pod	86	7.29
2345	16	1510	5	*Lagenaria* sp.	Gourd Rind	4	0.59
2345	16	1510	5	*Schinus molle*	Molle Carbonized Processed	27	0.08
2345	16	1510	5	*Schinus molle*	Molle Desiccated Processed	47	0.51
2345	16	1510	5	*Zea mays*	Maize Cupule Carbonized	16	0.04
2345	16	1510	5	*Zea mays*	Maize Cupule Desiccated	51	0.49
2345	16	1510	5	*Zea mays*	Maize Kernel Carbonized	16	0.12
2346	16	1512	5	*Arachis hypogaea*	Peanut Seed	16	0.12
2346	16	1512	5	*Echinopsis* sp.	Cactus	16	0.04
2346	16	1512	5	*Inga feuillei*	Pacay Pod	139	10,78
2346	16	1512	5	*Lagenaria* sp.	Gourd Rind	4	0.04
2346	16	1512	5	*Schinus molle*	Molle Desiccated Processed	66	0.7
2346	16	1512	5	*Zea mays*	Maize Cob Desiccated	180	15.33
2346	16	1512	5	*Zea mays*	Maize Cupule Carbonized	49	2.84
2346	16	1512	5	*Zea mays*	Maize Cupule Desiccated	49	0.04
2346	16	1512	5	*Zea mays*	Maize Embryo	4	0.04
2346	16	1512	5	*Zea mays*	Maize Kernel Carbonized	4	0.04
2346	16	1512	5		UID	4	0.04
2394	22		26	*Arachis hypogaea*	Peanut Shell	17	0.08
2394	22		26	*Capsicum* sp.	Ají Seed	185	0.08
2394	22		26	*Chenopodium quinoa*	Quinoa	113	0.04
2394	22		26	*Gossypium barbadense*	Cotton Seed	8	0.08
2394	22		26	*Inga feuillei*	Pacay Pod	17	1.8
2394	22		26	*Inga feuillei*	Pacay Seed	4	0.17
2394	22		26	*Lagenaria* sp.	Gourd Rind	4	0.29
2394	22		26	*Schinus molle*	Molle Carbonized Processed	4	0.04
2394	22		26	*Schinus molle*	Molle Desiccated Processed	126	2.52
2394	22		26	*Schinus molle*	Molle Stem	25	0.04
2394	22		26	*Zea mays*	Maize Cob Desiccated	38	10.16
2394	22		26	*Zea mays*	Maize Cupule Desiccated	386	2.52
2394	22		26	*Zea mays*	Maize Embryo	8	0.04
2394	22		26		UID	29	1.68
2395	23	2209	23	*Canna indica*	Achira Seed	10	2.06
2395	23	2209	23	*Lagenaria* sp.	Bottle Gourd Seed	10	0.1
2395	23	2209	23	*Zea mays*	Maize Cob Desiccated	52	18.23
2395	23	2209	23	*Zea mays*	Maize Cupule Desiccated	155	0.31
2395	23	2209	23		UID	21	0.1

2396	23	2215	23	*Capsicum* sp.	Ají Seed	59	0.08
2396	23	2215	23	*Chenopodium quinoa*	Quinoa	9329	10.26
2396	23	2215	23	Cyperaceae	Sedge Family	4	0.04
2396	23	2215	23	*Schinus molle*	Molle Carbonized Processed	4	0.04
2396	23	2215	23	*Schinus molle*	Molle Desiccated Processed	2870	17.78
2396	23	2215	23	*Schinus molle*	Molle Stem	90	0.08
2396	23	2215	23	*Schinus molle*	Molle Stem	12	0.04
2396	23	2215	23	*Zea mays*	Maize Cob Carbonized	8	0.9
2396	23	2215	23	*Zea mays*	Maize Cob Desiccated	16	1.6
2396	23	2215	23	*Zea mays*	Maize Cupule Carbonized	35	0.08
2396	23	2215	23	*Zea mays*	Maize Cupule Desiccated	679	1.76
2396	23	2215	23	*Zea mays*	Maize Kernel Desiccated	4	0.04
2396	23	2215	23		UID	4	0.04
2412	27	2604	38	*Capsicum* sp.	Ají Seed	6	0.05
2412	27	2604	38	*Schinus molle*	Molle Desiccated Processed	22	0.05
2434	33	3207	11	Poaceae	Grass Family	4	0.04
2434	33	3207	11	*Pouteria lucuma*	Lucuma	13	1.6
2434	33	3207	11	*Schinus molle*	Molle Desiccated Processed	8	0.08
2434	33	3207	11		UID	4	0.04
	6		2	Cactaceae	Cactus Family	5	0.05
	6		2	*Capsicum* sp.	Ají Seed	5	0.05
	6		2	*Chenopodium quinoa*	Quinoa	16	0.05
	6		2	*Lagenaria* sp.	Gourd Rind	5	1.59
	6		2	*Pouteria lucuma*	Lucuma	48	10.02
	6		2	*Schinus molle*	Molle Desiccated Processed	30,713	864
	6		2	*Schinus molle*	Molle Stem	16	0.05
	6		2	*Zea mays*	Maize Cupule Desiccated	11	0.05
	6		2	*Zea mays*	Maize Kernel Desiccated	11	0.05
	2	104	120	No Plant Remains Identified			

APPENDIX VI

INVENTORY OF PLANTS RECOVERED FROM HATUN COTUYOC

Bolsa	Unidad	Taxonomic Identification	Common Name	Count	Weight
1	1D	No taxa Recovered			
2	1	No taxa Recovered			
3	2 Rec 1	*Chenopodium quinoa*	Quinoa	1	0.01
3	2 Rec 1	*Zea mays*	Maize Cob	5	0.21
4	2 Rec 1	UID Seed		1	0.03
5	2	Poaceae	Grass Family	1	0.01
5	2	*Schinus molle*	Molle	5	0.01
6	1	*Zea mays*	Maize Kernel	2	0.05
6	1	UID Seed		1	0.01
7	1	*Zea mays*	Maize Kernel	1	0.04
8	1 Area F	*Zea mays*	Maize Kernel	1	0.01
9	1	Poaceae	Grass Family	1	0.01
10	1 Area D	*Chenopodium quinoa*	Quinoa	1	0.01
11	1	*Zea mays*	Maize Kernel	2	0.09
12	1	*Schinus molle*	Molle	9	0.01
13	1 Area D	UID Seed		1	0.01
14	2 Area D	*Schinus molle*	Molle	1	0.01
15	1 Area F	*Chenopodium quinoa*	Quinoa	1	0.01
16	1 Area F	*Chenopodium quinoa*	Quinoa	1	0.01
16	1 Area F	*Phaseolus vulgaris*	Common Bean	2	0.11
17	1 Area D	No taxa Recovered			
18	1 Area F	*Cyperus* sp.	*Cyperus* sp.	1	0.01
19	1 Area F	No taxa Recovered			
20	1 Area F	No taxa Recovered			
21	2 Area D	No taxa Recovered			
22	1 Area F	*Zea mays*	Maize Cupule	1	0.01
22	1 Area F	UID Seed		1	0.01
23	1 Area D	*Chenopodium quinoa*	Quinoa	1	0.01
23	1 Area D	UID Seed		1	0.01
24	2 Area D	*Zea mays*	Maize Kernel	5	0.02
24	2 Area D	UID Seed		1	0.01
25	1 Area D	UID Seed		1	0.01
26	1 Area F	UID Seed		1	0.01
27	1 Area F	*Zea mays*	Maize Kernel	1	0.01
28	1 Area F	*Zea mays*	Maize Cupule	1	0.01
29	1	No taxa Recovered			
30		No taxa Recovered			

31	1 Area D	*Chenopodium quinoa*	Quinoa	1	0.01
32	1 Area F	*Chenopodium quinoa*	Quinoa	2	0.01
32	1 Area F	*Cyperus* sp.	Sedge	1	0.01
32	1 Area F	*Zea mays*	Maize Kernel	2	0.01
33	1 Area F	*Chenopodium quinoa*	Quinoa	5	0.01
33	1 Area F	*Cyperus* sp.	Sedge	2	0.01
33	1 Area F	Poaceae	Grass Family	1	0.01
34	1 Area F	UID Seed		1	0.01
35	1 Area F	*Chenopodium quinoa*	Quinoa	1	0.01
35	1 Area F	UID Seed		1	0.01
36	1 Area F	No taxa Recovered			
37	1 Area F	UID Seed		2	0.01
38	1 Area E	No taxa Recovered			
39	1 Area E	*Echinopsis* sp.	Cactus	1	0.01
39	1 Area E	UID seed		1	0.01
40	1 Area D	Poaceae cf.	Grass Family cf.	1	0.01
41	1 Area E	*Bidens sp.*	Bidens sp.	1	0.01
41	1 Area E	*Capsicum* sp.	Ají	1	0.01
41	1 Area E	*Chenopodium quinoa*	Quinoa	8	0.01
41	1 Area E	*Chenopodium* sp.	Chenopodium/Amaranth	9	0.01
41	1 Area E	*Schinus molle*	Molle	1	0.01
41	1 Area E	UID		1	0.01
42	1	No taxa Recovered			
43	1 Area D	No taxa Recovered			
44	1 Area D	*Chenopodium* sp.	Chenopodium/Amaranth	1	0.01
44	1 Area D	*Zea mays*	Maize Kernel	1	0.02
45	1 Area D	No taxa Recovered			
46	1 Area F	*Cyperus* sp.	Sedge	2	0.01
46	1 Area F	Poaceae	Grass Family	3	0.01
46	1 Area F	*Zea mays*	Maize Kernel	3	0.04
47	1 Area D	*Schinus molle*	Molle	1	0.02
47	1 Area D	UID Seed		3	0.01
48	1 Area D	No taxa Recovered			

APPENDIX VII

PLANT COUNTS USED IN CERRO BAUL CORRESPONDENCE ANALYSIS

Unit	Molle	Maize	Quinoa	Cactus	Bottle Gourd	Zapallo	Capsicum	Verbena	Cotton	Coca	Bean	Peanut	Amaranth	Algarrobo	Portulaca
7	1319	21	3	0	0	0	1	0	0	0	4	0	0	0	0
9	346	75	45	11	17	0	4	7	1	1	1	0	0	0	0
24 A	2893	31	323	157	23	33	7	1	3	0	3	5	11	0	27
24 B and C	374	26	338	7	6	1	1	0	0	0	1	2	1	0	139
26	673	76	7	0	26	2	51	2	0	0	0	27	0	2	0
41	2423	552	225	12	135	6	37	21	3	1	1	7	2	4	76
42	1169	225	162	0	21	0	35	0	50	0	402	5	0	20	2

APPENDIX VIII

PLANT COUNTS USED IN QUILCAPAMPA CORRESPONDENCE ANALYSIS

Unit	Capsicum	Maize	Bean	Cotton	Peanut	Bottle Gourd	Molle	Cactus	Pacay	Quinoa	Coca	Aguaymanto	Lucuma	Potato	Amaranth
17	616	221	52	3	285	37	5463	0	541	67	0	70	34	256	0
19	35	43	0	7	3	4	194	0	66	35	0	0	0	0	0
20	39	43	0	4	4	0	21	0	22	50	0	0	0	0	64
21	123	1655	306	33	8	8	4650	0	94	55	0	0	91	109	0
22	405	0	19	8	20	37	0	27	83	587	0	0	9	0	0
23	320	5357	0	73	0	10	4396	17	141	23871	8	8	0	0	0
24	349	2160	0	0	13	29	914	4	66	307	0	83	21	4	268
25	99	243	0	0	0	0	28746	3	78	37	0	0	0	0	0
26	16	216	0	37	0	4	203	0	0	0	0	0	0	0	0
27	6	0	0	0	0	0	22	0	0	0	0	0	0	0	0
28	4	1955	0	0	0	16	1283574	0	8	40	0	0	0	0	0

APPENDIX IX

PLANT COUNTS USED IN YAHUAY ALTA CORRESPONDENCE ANALYSIS

Unit	**Molle**	**Quinoa**	**Cotton**	**Arracacha**	**Bromus**	**Malva**	**Portulaca**	**Cassia**	**Bidens**	**Fagonia**	**Verbena**	**Peanut**	**Prosopis**	**Cactus**	**Cucurbita**
3	168	2	2	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
5	1	36	0	11	8	9	20	13	2	46	0	0	0	0	0
6	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0
7	162622	8	2	0	0	3	9	0	0	1	1	160	2	11	60
8	35537	1	0	0	0	0	0	0	0	0	0	0	0	0	0