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An Evaluation of Different Plant Species for Rearing Asian Citrus Psyllid, *Diaphorina citri* Kuwayama (Hemiptera: Psyllidae)

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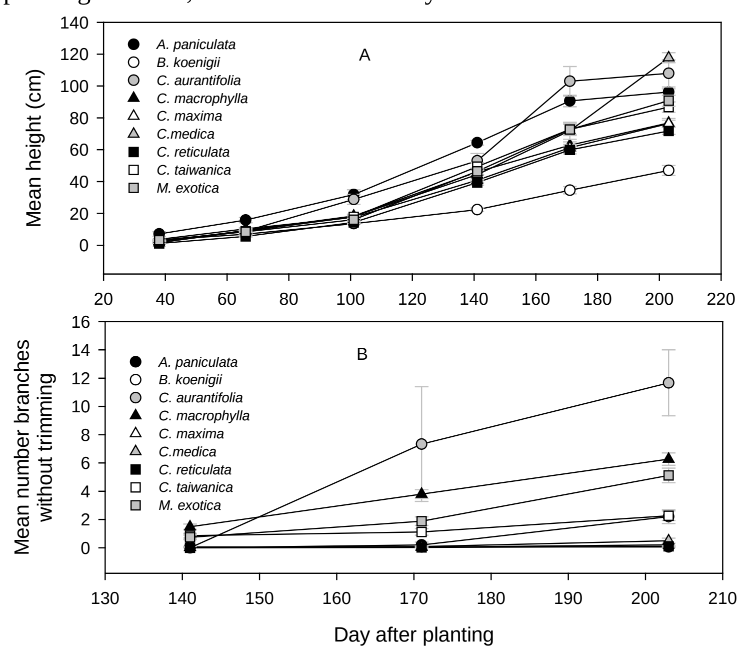
Many research projects concerning the Asian citrus psyllid (ACP) are dependent on a steady supply of ACP. ACP is not a difficult insect to rear in most respects, and basic information on rearing procedures has been published (Skelley and Hoy 2004). Skelley and Hoy (2004) reported on rearing procedures using the host plant *Murraya exotica* (=*paniculata*) L. USDA-ARS in Fort Pierce, Florida has reared ACP on *M. exotica* (Hall et al. 2007) and also on *Citrus macrophylla* Wester (Hall and Richardson 2012). ACP only lay eggs on newly emerging flush points, and nymphs only develop on flush – flushing characteristics of some plant species may be better than others for rearing ACP. A plant can be trimmed to stimulate development of flush. Intuitively, the more flush points a plant produces, the greater the ACP production potential.

A field study of 87 genotypes within the Rutaceae showed that a number of these were vastly favored over others by ACP for colonization (Westbrook et al. 2011). Research was recently initiated to compare nine favored genotypes as potential rearing hosts. These genotypes (and corresponding Citrus Research Center accession numbers) are: *Afraegle paniculata* (Schumach.) Engl. (CRC #297), *Bergera koenigii L.* (CRC #3165), *Citrus aurantifolia* (Christm.) Swingle (CRC #3822), *C. macrophylla* (CRC # 3842), *Citrus maxima* (Burm.) Merr. (CRC #3945), *Citrus medica* L. (CRC #3523), *Citrus taiwanica* Tanaka & Y. Shimada (CRC # 2588), *Citrus reticulata* Blanco (CRC #2590), and *M. exotica* (CRC # 1637).

Figure 1. Growth comparisons of nine plant species favored by Asian citrus psyllid. A. Plant height (cm). B. Number of branches per plant produced without trimming. Average conditions after planting: 30.1°C, 60% relative humidity.



Seeds of the nine genotypes were obtained from the USDA-ARS National Clonal Germplasm Repository for Citrus & Dates. These were planted in small pots during March 2012 and repotted into 1 gal pots 3 months later. Relatively good germination occurred for all genotypes except *A. paniculata* and *C. aurantifolia*.

Plant height was recorded periodically begtinning 40 days after planting. During early October, the main stem of each plant was trimmed (clipped) to a height of 32 cm above soil, and any remaining branches were trimmed at least half way to the stem. Data were subsequently collected on the total number of flush points produced per plant. The plants were trimmed again in early December, and the number of flush points suitable for oviposition on a daily basis was counted periodically beginning 7 days after trimming.

Table 1. Flush production by plants 16 days after they were trimmed to a height of 32 cm during early October 2012 (at 203 days after planting). Conditions after trimming averaged 30.4°C and 66% relative humidity.

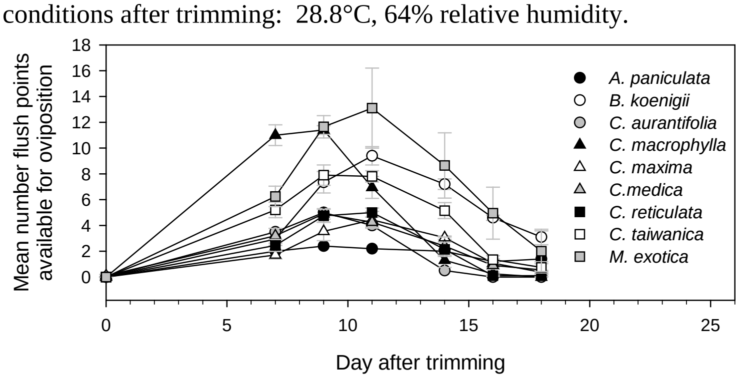
Plant species	Mean ± SEM percent or number: Total number of flush shoots per plant	Final number of leaflets per flush shoot
Experiment 1		
Bergera koenigii	16.9±0.6 b	11.8 ±0.1 a
Citrus macrophylla	13.8±0.7 c	6.7±0.4 b
Citrus maxima	3.4±0.5 e	8.1±0.6 b
Citrus medica	6.2±0.3 de	7.0±0.5 b
Citrus reticulata	4.5±0.2 e	7.6±0.5 b
Citrus taiwanica	8.4±1.0 d	10.7±0.5 a
Murraya exotica	25.1±1.2 a	7.0±0.2 b
Experiment 2		
Afraegle paniculata	7.8±0.5 b	8.7±0.5 a
Citrus aurantifolia	15.3±2.4 a	9.1±0.2 a

Exp 1: RCB design, 5 plants per rep, 4 reps. Exp 2: 5 *A paniculata* and 3 *C. aurantiifolia* plants. Within an experiment, means in the same column followed by the same letter are not significantly different (P = 0.05), Ryan-Einot-Gabriel-Welsch multiple range test.

At 200 days after planting, *C. aurantifolia* and *A. paniculata* were generally the tallest plants while *B. koenigii* was the smallest (Fig. 1A). *C. aurantifolia*, *C. macrophylla* and *M. exotica* produced the most number of branches without trimming (Fig. 1B). After trimming, *M. exotica* produced the most flush points, but *B. koenigii*, *C. aurantifolia* and *C. macrophylla* produced respectable numbers of flush shoots (Table 1). Correlation analyses indicated that the greater the number of branches per plant before trimming, the greater the number of flush shoots produced after trimming (r = 0.66, P = 0.0001).

Of interest is how long it takes a newly-trimmed plant to begin generating new flush and for how long new flush continues to be generated. This information is useful for determining when to introduce parental ACP onto plants and thereafter how many days that oviposition sites will be available. Each genotype began producing flush in less than 7 days after trimming (Fig. 2). *C. macrophylla* and *M. exotica* generally had the largest numbers of flush points suitable for oviposition on any given day, with peak numbers occurring within about 7 and 11 days after trimming, respectively. Although the number of suitable flush points peaked earlier with C. *macrophylla* than *M. exotica*, we projected that there was about a four-day period for each of these genotypes during which there was an optimal number of suitable flush points (i.e., 90% or more of the maximum number observed per

Figure 2. Flush production by nine plant species favored by Asian citrus psyllid: number of flush points suitable for ACP oviposition at the indicated day after trimming in early December 2012. Average conditions after trimming: 28.8°C, 64% relative humidity.



day). At 18 days after trimming, *M. exotica* and *B. koenigii* were the only plants with any appreciable number of suitable oviposition sites remaining.

Summary

The choice of a rearing plant for ACP may be greatly influenced by the flushing characteristics of a plant species, particularly if the goal is to produce large numbers of ACP. This is because ACP is dependent on flush for reproduction. Plants can be trimmed to stimulate flush growth. Of nine plant genotypes known to be favored by ACP, *M. exotica* produced the most flush, but *B. koenigii*, *C. aurantifolia* and *C. macrophylla* also produced respectable numbers of flush shoots. On any given day after trimming, *C. macrophylla* and *M. exotica* generally had the largest number of flush points suitable for oviposition, with peak numbers developing within about 7 and 11 days, respectively. The choice of a rearing plan may also be influenced by ACP biology and ACP production parameters associated with a plant species, which we will begin to address in the near future.

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