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## THE SUMMER EUROPEAN STARLING PROBLEM IN TULARE COUNTY

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Summer starlings (*Sturnus vulgaris*) are known to have caused damage to the agricultural industry of Tulare County since 1960. At this time the first confirmed appreciable damage to grapes occurred. Since that year the threat has grown considerably as populations have increased. Annual monetary losses have fluctuated but damage has increased steadily and many losses are going unreported or unevaluated by the growers. Known total monetary losses in Tulare County have reached over \$28,500.00 in a single summer and the unknown or unrealized losses would probably double this figure.

The diversity of crops damaged has mounted steadily, as anticipated, and grapes of various varieties are still the hardest hit, with plums approaching a close parallel. Certain varieties of figs are preyed upon extensively even though they are not the kind predominantly grown commercially now in Tulare County. Nectarine, peach, berry, apple, cherry and olive varieties are also effected by this gregarious pest.

### DAMAGE

Damage begins soon after the first fledged birds gather into small family flocks in the middle of April. Flocks and damage mount steadily on into late August when the last starlings leave the nests. In September a puzzling situation occurs, for the most part the birds start leaving and damage begins to drop off. Why and where is not known although abundant grape crops and other late soft fruit are still available to them. Should this situation not occur or be post-poned a short time catastrophic losses could result.

The first damage generally occurs in the first crop of Black Mission variety figs and spring peaches, next is Thompson seedless grapes and early plums. Then later varieties of peaches and plums. Queen Anne plums and Thompson grapes share in the heaviest predation in mid-summer. As the season progresses other varieties of grapes and second crops of figs are affected.

Fig damage results from the starling sticking its bill into the ripe fruit, then quickly opening its mouth, thus ripping an opening exposing the flesh. The entire inside of the fig is consumed (Fig. 1) and not rarely the skin and all.

Black Mission, Kadota and Adreatic varieties are hardest hit. Complete crop losses have occurred from this depredation and any back yard tree has experienced some extent of visitation by starlings.

Grape damage on smaller varieties appears as missing berries from the bunch (Fig. 2) or completely naked stems. This results from the bird picking and swallowing a whole grape at a time. Grapes not taken or eaten are frequently punctured by the claws of the bird as it clings to the bunch. Another occurrence results when the bloom (a fine film) is removed from the berries as a birds body or wings rub the fruit, this lowers the appearance and standard. In the process of feeding considerable amounts of berries are shattered from the vine and are lost on the ground. Measured amounts of shattering have reached 2 1/2 lbs. from a single vine.

Larger varieties of grapes are punctured and pecked or completely consumed. Even if a bunch of grapes is not extensively damaged a few berries leaking can cause decay to start or time loss due to the extra trimming required during packing operations. Tulare County is the worlds largest producer of fresh table grapes and damages suffered here are of great importance.

Losses in grapes have been from slight to nearing 80% in a grower's crop. All varieties of grapes have been affected with Thompson Seedless, small juice varieties, Perlette, Cardinal, Ribier, Muscats and Emperors suffering the greatest. Damage can start anytime after grapes attain a sugar content of 12%. Plum, peach, nectarine, apricot and apple damage results from pecking the flesh of the fruit in part or whole. As much as one-half pick box per tree loss has been observed in a given orchard. Incipient to moderate damage also comes from the defecation on all types of fruit crops during depredation or roosting.

Flock sizes observed in a single orchard or vineyard at one time have never been much over 2,000 birds.

Most generally once a property suffers crop depredation or is frequented by starlings a recurrence in successive years results.

#### CONTROL MEASURES TAKEN

Many facets of control have been investigated in Tulare County. Of these control trials, many have yielded only sporadic results.

Of the most successful, trapping with various modifications and styles of traps either singly or incorporated with toxic baiting show promise. Many of the mechanics need to be more thoroughly worked out to perfect the end results of this tool.

The modified Australian crow trap has been used with good outcome where static populations result, and where birds stage or gather before going to roost. The use of a 40 ft. cotton trailer converted to a trap, by means of a crow trap type entrance has proved very successful (Fig. 3). Such a trap has been utilized in a staging area with daily catches of 200 to 500 or more. This was used in early summer when fledglings constituted most of the flock. Birds so taken in a trap are asphyxiated by placing them in a wire cage which is placed inside an air-tight box connected by hose to the exhaust of a vehicle. Starlings succumb in about 30 seconds. The wire cage is then removed, dumped and carcasses disposed of.

Exposing bait in conjunction with the use of a trap as a decoy cage has proved most fruitful. In excess of 16,000 starlings on one ranch, during a single season, have been taken with this combination. The method of bait exposure used in Tulare County consists of a trap with a tray or trays (constructed of a small mesh hardware cloth bottom with wooden sides or made of wood completely) on top of or attached to the sides (Fig. 4 and 5). The use of hardware cloth trays is preferred as bait is aerated and holds up longer. Also birds feed more freely due to visibility factors. The trap is set up with live decoys, water and feed inside. On the trays outside are fresh grapes dipped in a toxic solution or treated raisins (DRC 1339 used in pilot studies).

The above method is the only way baiting has been successful in the County. It is felt the decoy birds are the prime factor.

These control measures hinge on the pattern of flock behavior. The feeling is that most larger flocks cover a fairly large area during a given period of time and feed at different locations. A probable feeding nucleus is within this area and a likely site for a control station.

One such site was utilized and no appreciable damage resulted within approximately 10 square miles. Post observations showed depredation within this area prior to trials of this method. (This should not lead one to believe that all areas are similar in size.)

Limited local banding from nest box studies and trapping indicate movement within areas large and small was fairly great, yet constant.

The use of the afore mentioned methods is not always feasible, as some areas are sufficiently protected with carbide or acetylene exploders, or even with shell crackers. Another problem also present is that some times damage is so rapidly extensive that a control station cannot be effective soon enough. Other bird species are apparently not affected by baiting operations (with DRC-1339). Long detailed observations were made at several stations before any treated baits were exposed and no adverse problems were apparent.

At other times of the year starlings have presented only one years problem at cattle feedlots, yet this was severe. Close watch by Tulare County Agricultural Commission personnel and industry is maintained. As anyone familiar with starlings knows, you just can not depend on them or their movements. Several million birds feed in the southern part of Tulare County during the winter months, but so far they have confined themselves to the mummified grapes left in the vineyards after harvest.

The relatively rapid advancements that have been made in this area are tools to be utilized. Although they do not complete, by any means, the necessary answer to starling prob-

lems, the agricultural industry is or may be confronted with. The gains made can be attributed to the "green light" attitude of Mr. E. O. Mankins, Tulare County Agricultural Commissioner and the cooperative agreements with weed and vertebrate pest control personnel of the California Department of Agriculture. Also the various departments of the University of California at Davis. The Bureau of Sport Fisheries & Wildlife has also been most understanding and cooperative.



Fig 1. Black Mission figs damaged by Starlings.

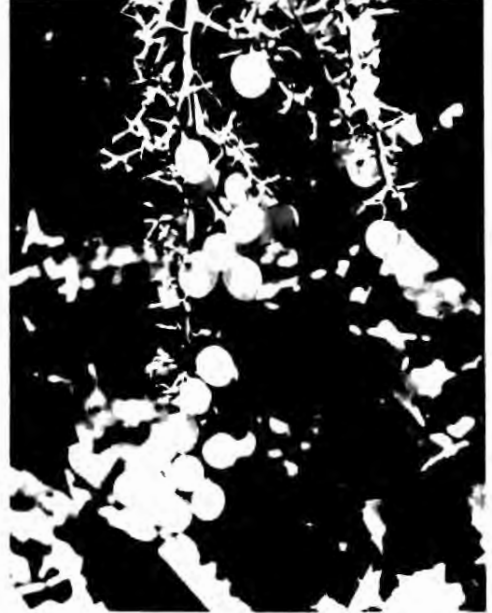


Fig. 2. Thompson Seedless grapes damaged by Starlings.



Fig. 3. Cotton trailer control station.

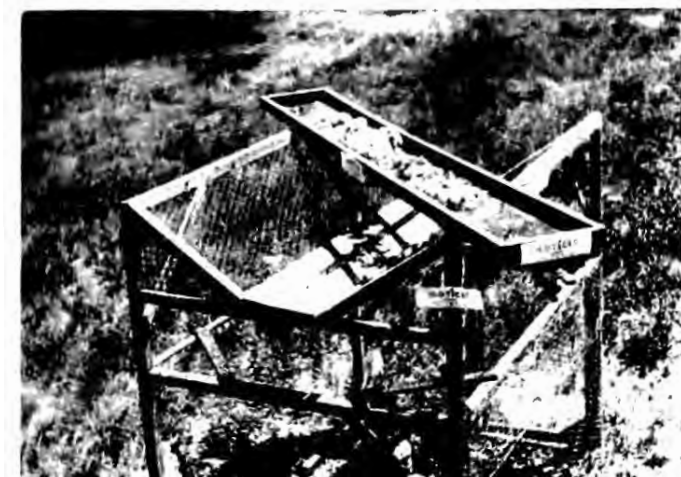


Fig. 4. Bait tray laid across top of modified Australian crow trap.

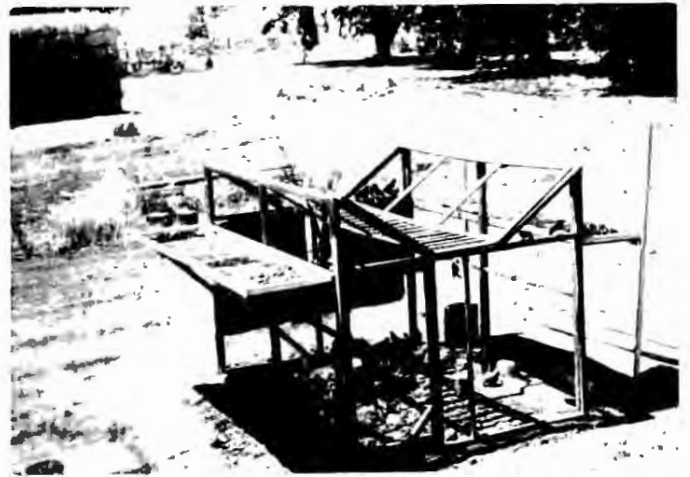


Fig. 5. Bait trays attached to sides of modified Australian crow trap.