

Understanding the Season Long-Incidence of Pepper Weevil in the Santa Clara and San Benito Pepper Production Areas

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Statement of the Problem and Background

Pepper weevil (*Anthonomus eugenii*) is a serious pest of pepper (*Capsicum annuum*) worldwide and poses a serious threat to pepper production in the Santa Clara-San Benito region. The female weevils lay eggs inside holes created on pepper buds or in the base of young pepper fruits while feeding. The larvae develop inside the fruits and buds. The larval feeding and the excrement that accumulates inside the fruits make the fruits unmarketable. Also, the adults and the larval feeding cause premature fruit drop which severely reduces yields (UC IPM, 2012).

Pepper weevil is a persistent problem in southern California where the pest migrates from warm weather areas in Mexico or overwinters on pepper plants. However, in 2015 and in 2016 pepper fruits were severely infested with pepper weevils in the Santa Clara-San Benito pepper growing region. Most of the pepper weevil infestations were noticed on late-season peppers harvested from late September to early October. In 2016, we monitored four pepper fields with a history of weevil incidence. Based on our monitoring data and information collected from Pest Control Advisers (PCAs), pepper weevils were found in more than 1000 acres and about 250 acres were severely affected. Clearly, pepper weevil has emerged as a major pest of pepper in the region. Thus, to develop an integrated pest management program, understanding of their seasonal incidence and abundance is critical. This information will also help to determine timely intervention including the use of insecticide.

Objectives

The major objectives of this project were: 1) assess the season-long incidence and abundance of pepper weevil in the pepper fields, 2) determine if there is preference among pepper type, time of harvest time (early versus late) on pest infestation levels.

Methods

Pheromone-baited yellow sticky traps were deployed (Figure 1) in commercial production fields in the Santa Clara and San Benito pepper region. Pheromone-baited yellow sticky trap is the best monitoring tool for adult pepper weevil (UC IPM, 2012; Segarra-Carmona and Pantoja, 1988), and adult pepper weevil captures from a trap are equivalent to surveying 50 flower buds (Riley and Schuster, 1994). Six traps were deployed in each field at approximately 30 feet from the border towards the center to detect weevils migrating into the fields. The traps were placed at an equal distance from each other varying with the size of the field. During the growing season, the trap height was adjusted to plant canopy height. The yellow sticky traps were collected and replaced (Figure 2) weekly from May 23, 2017 to November 14, 2017 (final harvest). The sticky cards were transported to laboratory and carefully inspected for adult pepper weevil.

Results

We obtained pepper weevil monitoring data from 60 fields spread across Santa Clara and San Benito pepper production region. Adult pepper weevil was first detected on 23 May, 2017. Thereafter, weevils were continuously detected throughout the Santa Clara and San Benito pepper growing region until November 14, 2017 (Figure 4). The seasonal total weevil counts per production field ranged between 0 and 434 adults. Weevils were detected in 85% of the fields monitored (Table 1). Most of the fields were infested with weevils by late August. The adult weevil captures per week peaked in September and October.

Out of all the monitored fields, five fields were planted late (planted between July and August). Three of them were infested by August and the highest total monthly weevil counts per field were seen in October. In the field that we monitored, immature fruit drop was detected from October 10, 2017 onwards. Random inspection of dropped fruits showed that some fruits were infested with adult weevils (Figure 3).

In 2017, pepper types from 24 fields were evaluated for susceptibility to pepper weevil. Amongst the varieties, 20 varieties were bell pepper, two mini sweet and two chili pepper. One of the chili pepper field had no weevil infestation at all. Based on the data analysis, there was no difference in the level of infestation for the three types of pepper (Figure 6).

The major outcomes from this survey are:

- There appears to be two peaks of pepper weevil population in fields, one prior to the application of pest management sprays, and the second overlapping with a decrease in insecticidal application during the last two to three months of the season. The first peak is smaller than the second peak.
- The peak in weevil population was reached later in late planting fields than in early planting fields.
- The infestation level was not different in the bell, mini sweet or chili pepper fields.
- Early season pepper weevil management sprays (May-June) is advised to minimize the number of pepper weevil life cycles in the field.
- Mid-season (mid-July to August) and late season (August to November) management sprays are advised to discourage buildup of pepper weevil population in the fields.
- Transplants should be inspected or treated with effective insecticides.
- Potential sources of pepper weevil such as weed hosts or infested pepper residues should be monitored and removed.

Over the last three years, pepper weevil infestations have noticeably increased in the region. These data suggest that pepper fields need to be monitored for pepper weevil using pheromone lures. UC IPM (2012) recommends that the pheromone-baited traps should be deployed prior to bloom to detect first adult emergence, and around the perimeter of the field to detect migrating weevils into the field. The traps should be mounted on poles and should be adjusted during crop growth to ensure that the bottom of the traps is just at or slightly below the tops of the plants. Check traps twice a week in the morning or more frequently if adults are known to be present. Apply insecticidal sprays when the first adult is captured.

References

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Table 1: Seasonal total pepper weevil counts of infested pepper fields.

Seasonal Total Pepper Weevil Counts Per Field	Number of Fields
Less than 10	10
10-20	9
20-30	7
30-40	12
40-50	6
50-60	0
60-70	4
70-80	1
100-200	6
200-400	4

Figure 1: Pheromone baited yellow sticky traps installed 18" above the soil in response to plant growth.



Figure 2: Pheromone baited yellow sticky trap with pepper weevil.



Figure 4: Seasonal levels of pepper weevils in the Santa Clara-San Benito production region, as detected by trapping with pheromone baited yellow sticky traps (with standard deviation).

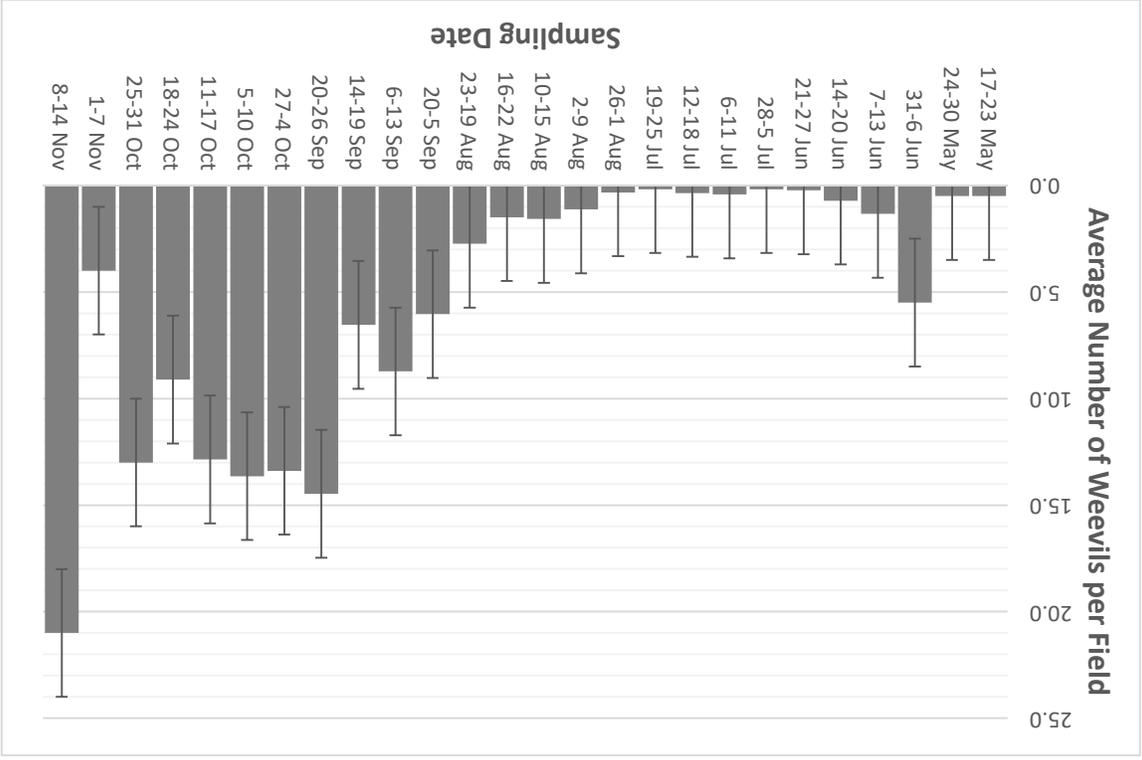


Figure 3: Dropped pepper fruit infested with pepper weevil.

Figure 5: Season-long pepper weevil infestation in the Santa Clara-San Benito production region as detected by trapping with pheromone baited yellow sticky traps in early and late planted fields (with standard deviation).

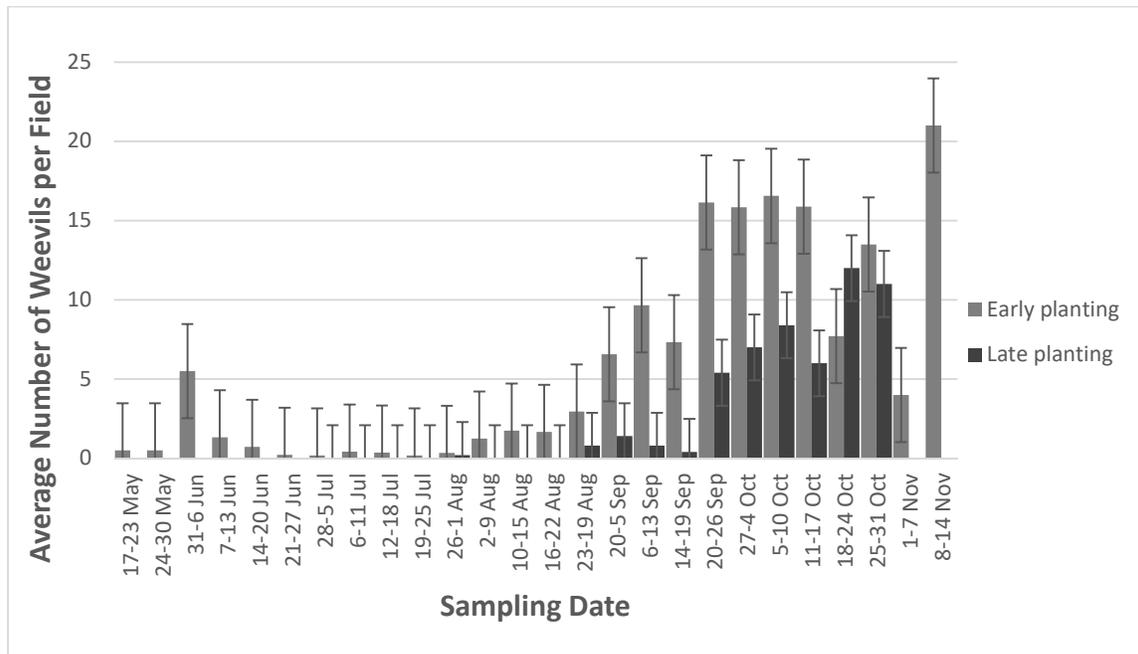


Figure 6: Seasonal mean counts (May-November 2017) of pepper weevils by variety of pepper (with standard deviation).

