Understanding the Season Long Incidence of Pepper Weevil in the Santa Clara and San Benito Pepper Production Areas Trial Report 2016

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Statement of the Problem and Background

Pepper weevil (*Anthonomus eugenii*) can be a serious pest of peppers and could pose a significant threat to pepper production in the Santa Clara-San Benito region. Adult weevils feed on fruit and leaf buds, and adult females lay eggs inside holes created on pepper buds or in the base of young pepper fruits. The larvae that develop from these eggs bore into the pepper fruit and the larval feeding plus excrements make the fruit unmarketable. This feeding by the adults and the larvae causes the young fruit to drop prematurely, thereby reducing yields (UC IPM, 2012).

Pepper weevil is a persistent problem in southern California where the pest migrates in from warm weather areas or survives year round during warm winters. However, in 2015 a heavy infestation of pepper weevil was identified in two pepper fields in Santa Clara County (S.V. Joseph and A. Baameur, personal communication), a region outside the pest's typical habitat. Pepper weevils are a considerable threat to pepper production and a better understanding of their biology and development of IPM tools for long-term control is very critical, especially before significant losses begin to occur. This project was undertaken in response to local growers' needs to identify the extent of the pest problem and to understand the seasonal incidence of the pest.

Objectives of this Project

1. To determine if pepper weevil is established in the Santa Clara pepper production areas.
2. Assess the season long activity of pepper weevil on pepper fields.

Methods

Pheromone baited yellow sticky traps were installed (Figure 1) in four grower fields in the Santa Clara-San Benito pepper growing region. The four grower fields that were selected had a known history of pepper weevil infestation in the 2015 growing season. Pheromone baited yellow sticky traps are the best monitoring tools for the pest (UC IPM, 2012; Segarra-Carmona and Pantoja, 1988), and one trap can capture as many weevils as are detected by inspecting 50 flower buds (Riley and Schuster, 1994). The trap installation height was adjusted with plant growth (Figure 2).

The sticky traps were assessed for the incidence of pepper weevil adults (Figure 3) on a weekly basis from May 13, 2016 to October 21, 2016 (last harvest) for a total of 23 weeks. Nightshade plants belong to the *Solanaceae* family and are known to support pepper weevil populations, especially black nightshade (Eller et al., 1994). So, all four fields were assessed for the presence of nightshade plants after transplanting. Fields 1, 2 and 3 were bell pepper fields and field 4 had banana peppers.

Results

None of the four grower fields that we monitored had nightshade either in the field or adjacent to the field, and overall the fields were free from any weed infestation. In collaboration with local Pest Control Advisors (PCAs) and trapping that we conducted, weevil monitoring data for 63 fields in the Santa Clara-San Benito pepper production region were analyzed and is presented in this report. Pepper weevil was first detected on May 27th, 2016. Following this instance of detection, weevils were detected regularly throughout the entire Santa Clara and San Benito pepper growing region until the end of the production season in November (Figure 4). The seasonal total weevil counts per production field ranged between 0-176 and the pest was detected in 55 of the total 63 fields that were monitored (Table 1). In the fields where pepper weevils were detected, majority of the fields had weevil infestation by September and the highest total monthly weevil counts per field were also seen in September (Table 2).

Out of all the 55 infested fields, immature fruit drop was detected only in Field 3 on August 19th, 2016. The dropped fruit were confirmed to be infested with weevils. Prior to that date, weevils were not detected in any of the sticky traps installed in this field. The major outcomes from this survey:

- There appears to be two peaks of pepper weevil detection in the field. The first peak is smaller than the second peak.
- The pepper weevil detection intensified by mid-to late-season.
- Early season pepper weevil management sprays (May-June) is advised to discourage weevils from laying eggs in the field.
- Mid-season management sprays (mid-July to August) is advised to discourage newly introduced weevils and re-infestation.
- 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 managed.

These data suggest that pepper fields need to be monitored for pepper weevil using pheromone lures. Over the last two years weevil infestation has noticeably increased in the region. Therefore, survey of pepper fields is warranted for another year to better understand the seasonal incidence of the pest. This information will help determine the insecticide spray timing.

References

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Segarra-Carmona, A.E. and A. Pantoja. 1988. Evaluation of relative sampling methods for population estimation of the pepper weevil, *Anthonomus eugenii* Cano (Coleoptera: Curculionidae). Journal of Agriculture, University of Puerto Rico 72: 387-393.

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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	31
10-20	9
20-30	5
30-40	2
40-50	1
50-60	2
60-70	1
70-80	2
100-176	2

Table 2: Number of pepper fields with weevil infestation by month of production.

Month	Total Number of Pepper Fields in Production	Number of Pepper Fields with Weevil Infestation	Range of Total Monthly Weevil Counts Per Field
May	15	1	0-1
June	32	4	0-1
July	45	10	0-12
August	50	25	0-28
September	53	46	0-140
October	40	28	0-26
November	2	2	1

Figure 1: Installation of pheromone baited yellow sticky traps in growers' fields with a known history of pepper weevil infestation in the 2015 growing season.

Figure 2: Pheromone baited yellow sticky traps installed 18” above the soil in response to plant growth.

Figure 3: 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.