Effect of Winter Flooding on Spider Mites and Navel Orangeworm Infestation in Almond Orchard

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Introduction

- Navel orangeworm (NOW) and spider mites are two major arthropod pests in almond orchard in California.
- Tree and ground mummy nuts harbor overwintering NOW larvae which contribute to the increased seasonal NOW population and ultimately lead to the crop damage.
- Spider mites overwinter in ground during the winter and begin infesting trees as the environment becomes favorable in the spring.
- Almond Board funded a separate groundwater recharge project. Based on the protocol, total 24 inches water was applied to the almond orchard during the winter.
- In general, spider mites and NOW are sensitive to the external environmental conditions.
- We proposed a study to evaluate the effect of winter water application in the orchard on overwintering NOW larvae and spider mite population.

Objectives

1. Evaluate NOW larval mortality (in winter) and nut damage (in harvest) in winter-flooded vs. non-flooded orchard blocks.

2. Evaluate overwintering mite population in the soil (in winter) and monitor in-season mite activity.

Methods

- On groundwater recharge study site, 6-inch water was applied to the flooded portion of the orchard weekly for 4 consecutive weeks in January while leaving the non-flooded portion without applying water.
- Ground mummies were collected from flooded and non-flooded blocks twice 3-5 days after the application of 18 and 24 inches of water. The mummies were cracked, and the number of dead and live NOW larvae were recorded.
- For spider mites, 60 tree-base soil samples were collected from 12 trees from each of the flooded vs. non-flooded blocks. The number of overwintered female mites recovered were recorded.

Results

- NOW larval mortality was numerically higher in flooded treatment than the non-flooded in both sample dates, January 21 (after 18 inches water) and February 3 (after 24 inches water) (Fig. 1).
- Based on 900 nuts evaluated at harvest, percent nut damage by NOW was 0.56% in flooded treatment while 1.0% in non-flooded block (Fig. 2).
- No statistical difference was observed on spider mite counts between flood and non-flood (Fig. 4). This might have been contributed by the very low abundance of mites in the soil.
- Seasonal spider mite counts were presented in Fig. 3.

Fig. 1. Average % mortality of overwintering larvae in ground mummies

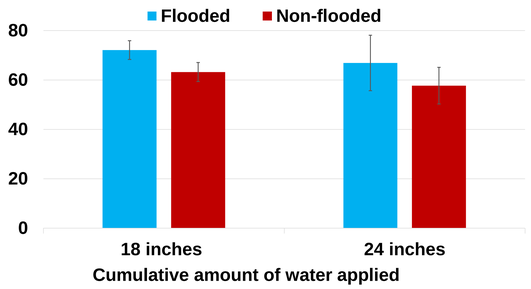


Fig. 2. Percent nut damage by NOW at harvest (*N* = 900)

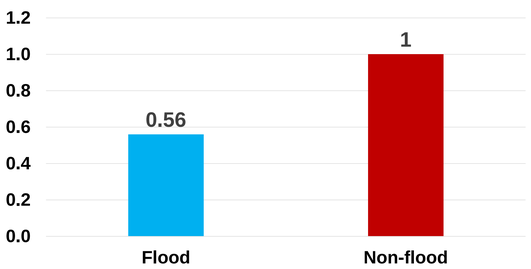


Fig. 3. Average number of spider mites per leaf

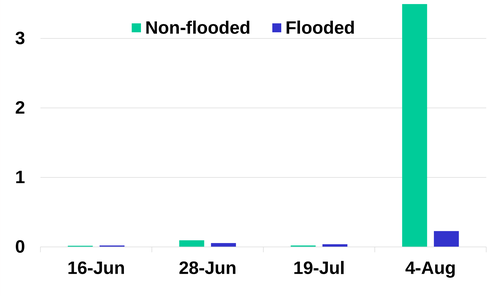
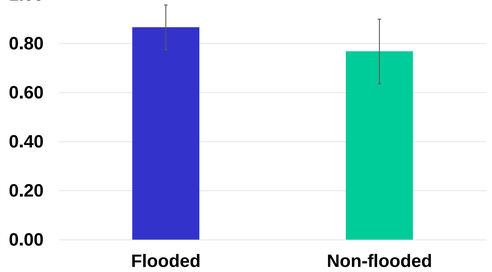
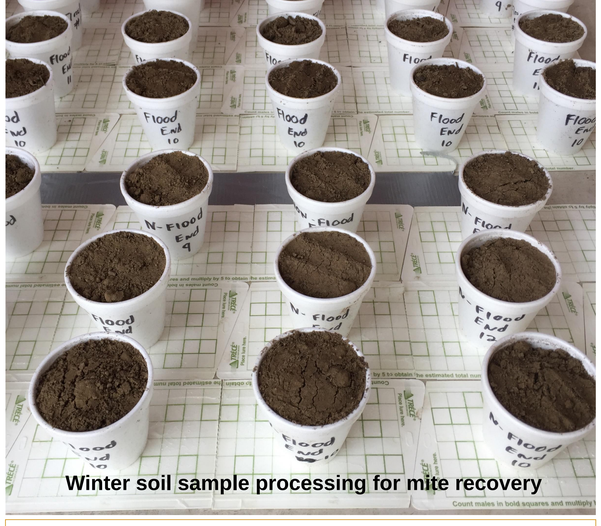


Fig. 4. Average no. of mites per 6 oz. soil sample





Winter soil sample processing for mite recovery

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