Costs and Returns of Navel Orangeworm Management

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Introduction

Navel Orangeworm (NOW) is one of the top pests in almond production. Two of the primary tools available to growers to combat NOW include winter sanitation and chemical pesticide sprays. When used in combination, the integrated pest management (IPM) protocol can reduce the incidence of NOW damage and the share of harvested meats rejected by the processor.

The main economic costs to growers of NOW include costly pest management, reduced revenue from rejected meats, and premium deductions. The 2019 UC Davis Cost Study for almond production in San Joaquin Valley-South assumes two chemical pesticide applications after hull split and winter sanitation as the NOW IPM program. This breaks down to the following IPM cost estimates as a percentage of total operating costs:

- **Total NOW IPM as percentage of operating costs: 9.4%**
  - **Insecticides: 2.4%**
  - **Pesticide application (equipment and labor): 0.8%**
  - **Winter sanitation: 6.2%**

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New NOW pest management technologies, like sterile insect technology and mating disruption, might change pesticide use and the cost and returns to NOW pest management. To adopt this new technology, growers must compare the costs of their current IPM program with the costs of the new tools, as well as the corresponding benefits.

Our objective is to explore growers' costs of NOW management by answering the following questions:

1. What is the average number of pesticide applications targeting NOW per acre per year?
2. What is the cost of NOW pesticide sprays per acre?
3. What is the cost of NOW management per acre?
4. How do these costs vary by region within California?

This work is ongoing, but preliminary results are below. Visit the UC Davis Cost and Returns Studies website for updates.

Data

Our main data source is the Pesticide Use Report (PUR) from the California Department of Pesticide Regulation. PUR is a comprehensive dataset of agricultural pesticide use and is the most complete data set of pesticide use in the world. Relevant PUR variables for our study include product name, the quantity of product used on almond orchards, treated acres, and total acres.

A major data challenge for this study is capturing pesticides used specifically to target NOW. We focus on products listed in the integrated pest management program for NOW from the University of California and Natural Resources used around hull split from May through August. This includes pesticides approved for use in organic orchards.

We estimate orchard acres at the annual county level using the PUR data and confirmed the estimated total almond acres with county agricultural commissioners' reports where almond data were available. Agricultural merchants were surveyed for pesticide spray prices.

Our analysis focuses on 2016 through 2018.

Calculations

Here are some relevant details about the calculations used for the results presented in Figures 1, 2, and 3.

The county-level average number of NOW pesticide spray applications per acre were calculated using planted acres as weights.

For the results in Figure 2, the county-level average cost of NOW pesticide sprays per acre were calculated by multiplying the total quantity of pesticide product used in a orchard by the price, summing over all products used in an orchard, and calculating a weighted average using planted acres as weights. Next, we multiplied the average number of NOW spray applications (results in Figure 1) by $17 per acre (cost calculated based on current labor and fuel prices). Lastly, the sum of pesticide product and application costs equals the total NOW spraying costs.

For the estimate of NOW spraying cost plus winter sanitation presented in Figure 3, we assume 82% of planted acres receive winter sanitation at the cost of $306/acre.

County-Level Results

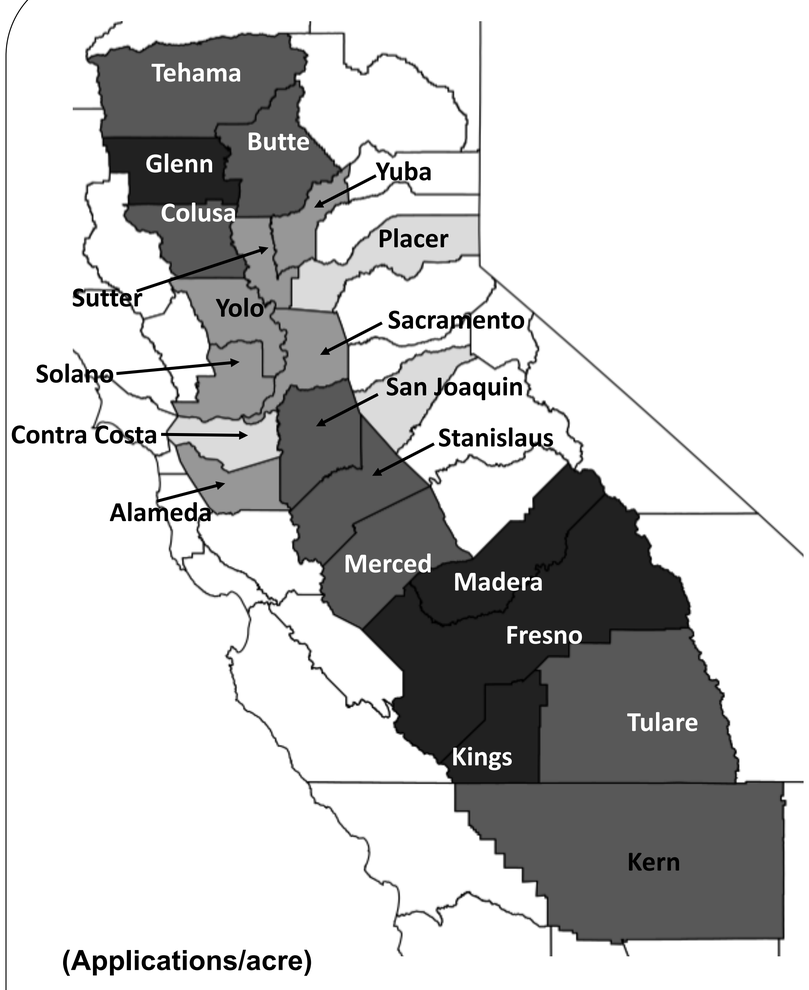

Figure 1. The average number of NOW pesticide spray applications per acre

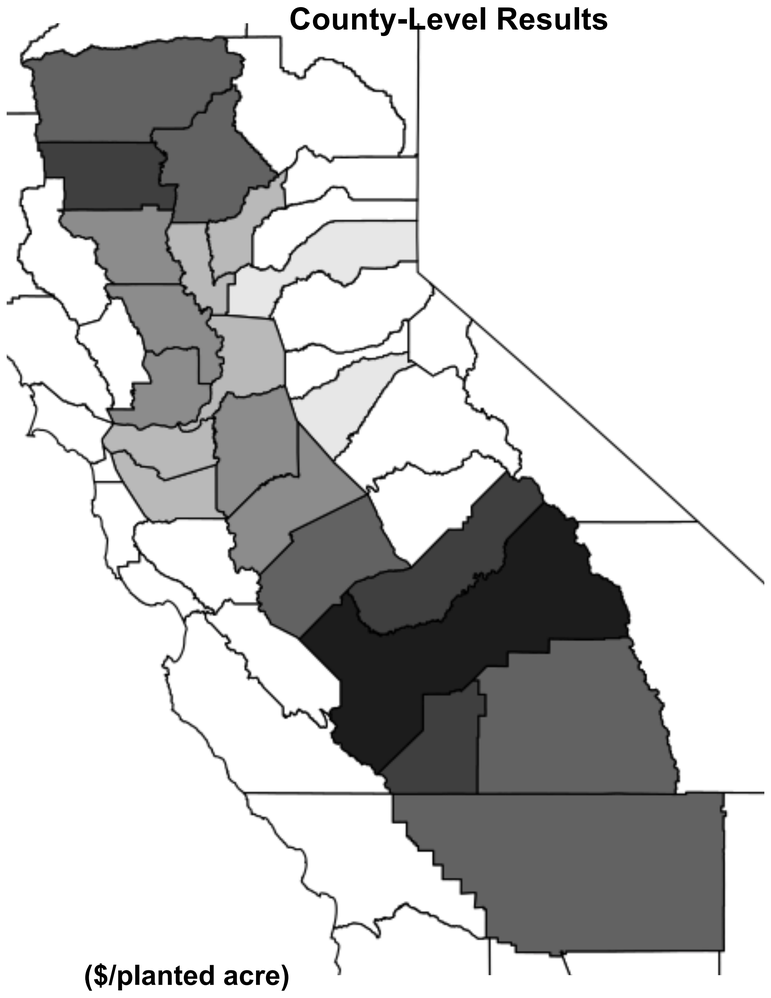

Figure 2. The annual average NOW spraying costs per acre (pesticide material plus application costs)

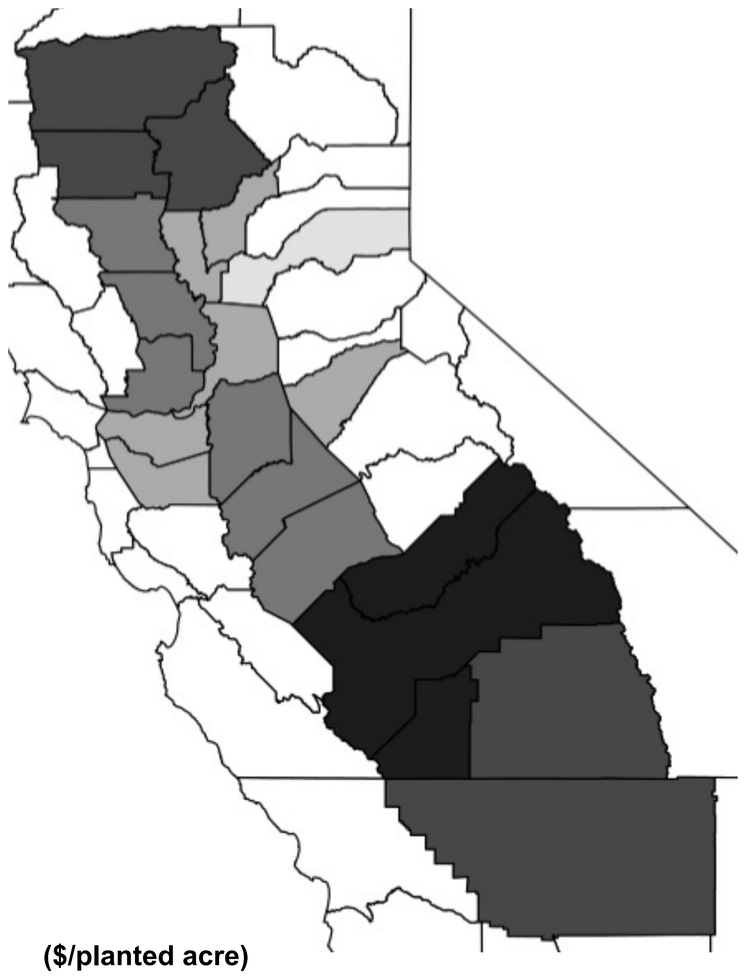

Figure 3. Annual average cost of NOW pesticide applications plus winter sanitation per acre

Main Takeaway Messages

There are some important differences in NOW pesticide use between counties.

- The average number of NOW pesticide applications per acre ranges from 0.4 in Placer county to 2 in Fresno.
- The state-wide average number of applications is 1.4.
- More spray applications mean more fuel, labor, and equipment hours and meaningful differences in the cost of NOW pest management.
- We estimate that statewide, almond growers spent $471 million dollars on NOW management in recent years, not including trap monitoring or mating disruption costs.
- This amounts to roughly 9% of the 2021/2022 total almond value of $5 billion.
- The cost of NOW management ranges from about $240 per acre in Placer county to about $390 per acre in Fresno.

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