

WEST COAST NUT

JANUARY 2019 ISSUE

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A Crucial Tool for Nut Growers

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Assessing Origin of Infection, Disease Management and Prevention

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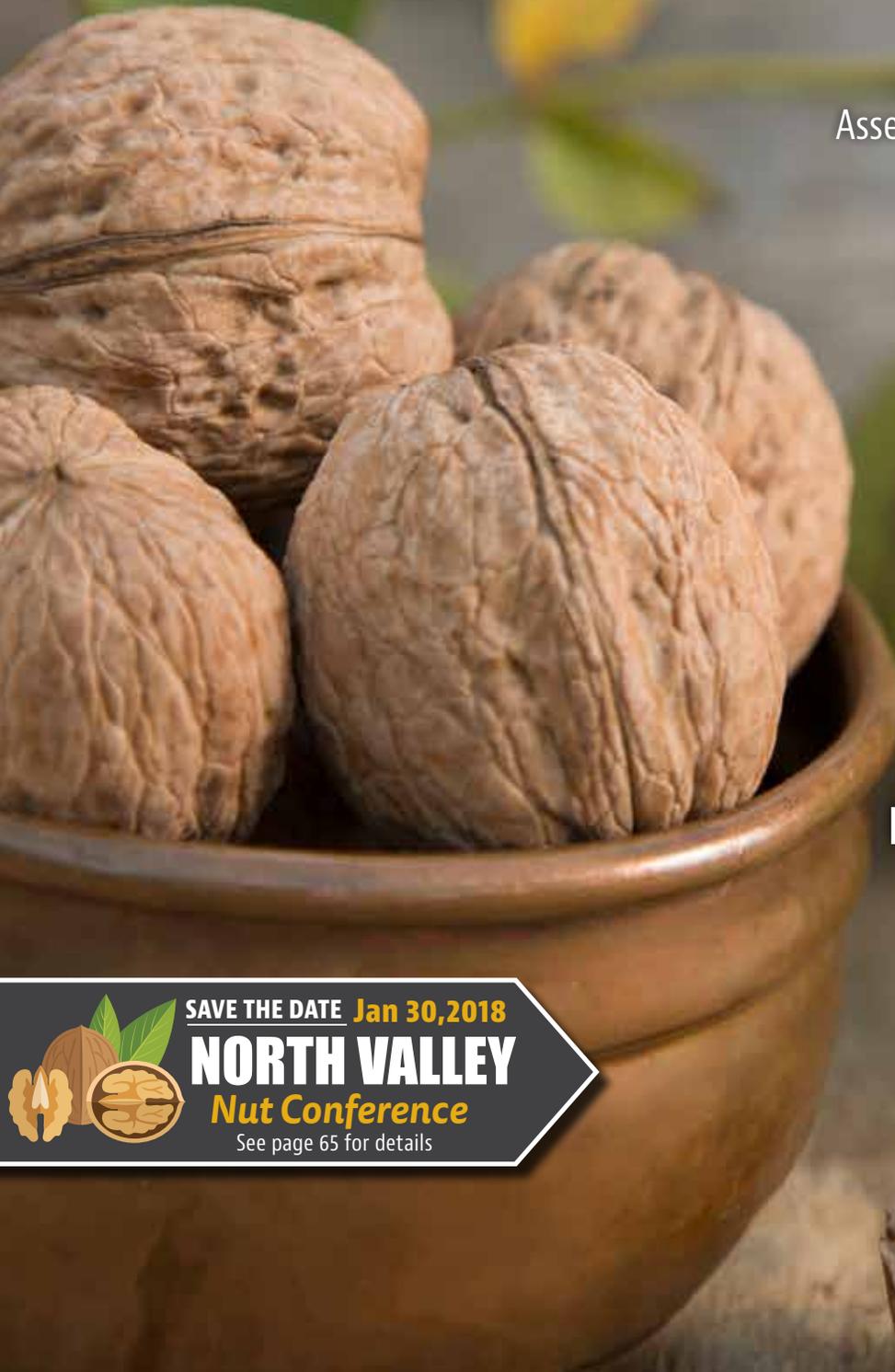
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 **SAVE THE DATE** Jan 30, 2018
NORTH VALLEY
Nut Conference
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WEST COAST NUT

By the Industry, For the Industry

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Mating disruption—A Crucial Tool for Nut Growers

Mating disruption for navel orangeworm (NOW) has been widely tested throughout California with numerous research studies, and peer reviewed research has demonstrated it's efficacy.

Mating disruption is a very simple process. Females emit pheromones, males use those pheromones to find the female. If an orchard is flooded with artificially produced pheromone the entire orchard smells like a female and the males struggle to find the real females. If they don't find each other, they don't mate, and if they don't mate there are no eggs, no larvae, and less overall nut damage.

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Sterile Insect Research Going Forward

By CECILIA PARSONS | Associate Editor

WITH THE FIRST RELEASES OF IRRADIATED navel orangeworm (NOW) moths over Kern County almond and pistachio orchards completed this fall, researchers are now looking at the future of the sterile insect technique project.

Sterile Insect Project

The sterile insect technique (SIT) project, where NOW adults are mass-raised, irradiated to make sterile then released to outnumber fertile NOW, is in its third year at a cost of \$4 million. California Pistachio Research Board began funding to determine if sterile NOW releases are effective in reducing NOW pressure. The SIT project is aimed at area-wide suppression of NOW in the approximately one million acres of almonds, 250,000 acres of pistachios and 250,000 acres of walnuts in production in California.

The first step in the sterile insect project was determination if this lepidopteran pest could be mass raised. This step was

accomplished at a re-purposed United States Department of Agriculture (USDA) facility in Phoenix, Arizona, that had been used for the pink bollworm eradication project. Irradiation doses were determined for NOW sterilization and this year the first NOW were shipped to California for release by plane over targeted orchards. Releases of 750,000 moths at a time were made five to six times per week for several months with the belief that the irradiated male and female sterile moths would mate with wild NOW, reducing the number of offspring.

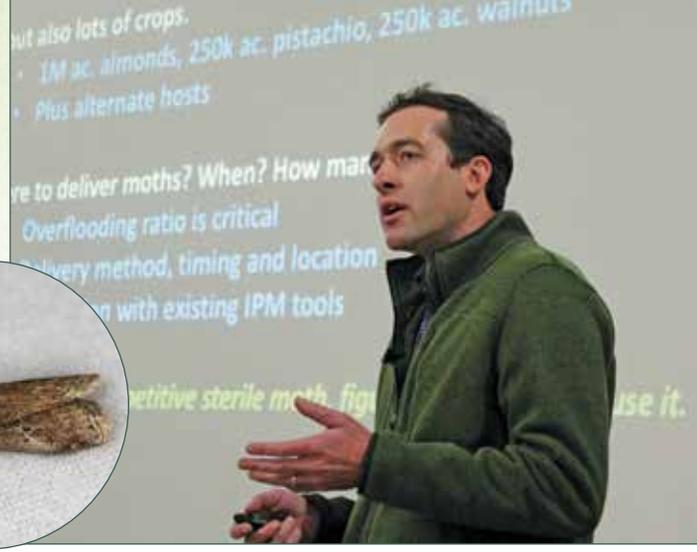
Although NOW damage was reportedly lower in most orchards this year, the pest has caused millions of dollars of damage to nut quality in recent years. Most growers are using a combination of orchard sanitation, insecticides and mating disruption to control NOW populations in their orchards. The SIT project is not meant to replace those control methods, but to supplement those efforts.

Long Term SIT

Houston Wilson, an assistant Cooperative Extension specialist in tree crop integrated pest management, has been looking at the effectiveness of this year's sterile release program and developing a long term plan for the program. As part of Kern Ag Day, Wilson outlined some long-term suggestions and noted findings from this year's release program.

Wilson, who is working out of the Kearney Agriculture Research Center in Parlier and conducting the studies with USDA researcher Chuck Burks at additional release sites said the goal of this pilot program is to develop a competitive sterile moth and figure out how to best use it.

Sterile moth releases were made over commercial blocks of almonds and pistachio trees in Kern County where additional control practices, including mating disruption were in use. Wilson and Burks were also releasing sterile moths in two sites, a Kettleman City block of conventional pistachios with no mating disruption and a two-acre block of pistachios in Parlier. The Kettleman City site had weekly aerial releases



Photos courtesy of Cecilia Parsons.

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July 1-October 15 and the Parlier site had weekly ground releases.

One of the critical aspects of the program, Wilson said, was the over flooding ratio of sterile moths to the wild NOW in the orchards. At the Lost Hills site in Kern County, 750,000 NOW moths were released five to six times per week July-October. The Kettleman site received 750,000 moths once a week and the Parlier site received 6,000 moths once a week.

Trap Finds

Wilson said he and his field assistants checked lure traps in the orchards to determine the levels of sterile moths that were active. The sterile moths are distinguished from wild NOW by a red dye ingested at the mass rearing facility. What Wilson found in the traps were very low numbers of sterile moths. After asking the facility to improve on the dye marking, he said sterile numbers were still below expected.

Releases were done in a grid pattern at the Kearney site, Wilson said, and the focus was on the female moths which were marked by a clipped wing. Mating activity the first night after the release was low, but improved by the third night. He said this showed that the shipping process, where the moths are in darkness inside a container and they may have to adjust after release.

In a trial meant to determine activity of irradiated male and female NOW, Wilson said irradiated males rarely showed up in pheromone traps and never in the mating tables meant to show mating activity. Wilson said at Kearney, 4,455 moths were trapped and only 11 were marked with red dye. At the Kettleman site, 15,493 were trapped and only 54 marked. As for the irradiated females, Wilson said they do attract wild males, but activity is better then second or third night after release. Irradiated females call and mate at about the same time as wild NOW.

Key immediate issues were moths not flying or male moths not following pheromone plumes.

Down the Road

Wilson said his suggestions for a long term SIT program include work to produce a NOW moth that is equivalent and competitive with wild NOW. A ratio of 20 sterile moths to one wild is one example of over flooding, but Wilson said different programs could have different ratios. Determining an effective over flooding ratio could be done in the laboratory and then field cage studies. The sterile moths' lack of proven activity in the field may be genetic or it could be due to the shipping and release protocol, he said. Making sure the moths will be competitive in an orchard situation will include work to determine ideal strains of NOW, adjusting production conditions, radiation dose and shipping and release methods. Currently

the releases have been made by plane. Wilson said ground or drone releases are options.

When time of the year releases are made is another component of the project that should be considered, Wilson said. Should key periods be identified for releases or year around releases scheduled?

A next step in the program could also be larger scale field trials with paired plots with or with sterile moth releases. Wilson also suggested dispersal studies to determine movement of moths in an orchard.

To develop area-wide IPM programs with SIT, Wilson suggested determining the best situations for use of irradiated moths, regional monitoring of populations and coordination of Integrated Pest Management efforts.

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