

Efficacy Trial of Registered and Developmental Insecticides for Navel Orangeworm Control in Almond



Introduction

Navel Orangeworm (*Amyelois transitella*) continues to be a major pest of harvestable almond nut meats throughout the San Joaquin and Sacramento Valleys of California. In some cases multiple insecticide sprays are applied in addition to sanitation programs to remove overwintering inoculum sources. Several new insecticides that target worms have become registered for almonds in California, with several other products in developmental stages.

One group of products includes newer generation pyrethroids such as Brigade, Battalion, Baythroid, Danitol, Renounce and Warrior. Additionally, there are a wide range of new reduced-risk insecticides that offer a wide range of existing and new modes of action such as Altacor, Belt, Delegate, Intrepid, Asana, Proclaim, Brigade, Athena, and Hero. Currently there is a gap in our understanding of the efficacy of these products.

Many of these products have undergone substantial testing and have been proven effective against codling moth in apples, pears and walnuts; however, to date there is less information on their efficacy against Navel Orangeworm on almond. Considering the economic significance of Navel Orangeworm as a pest of almonds in California, including both the effects on percentage offgrades and aflatoxins, it is essential that we learn more about how each of these new insecticides works and might contribute to improved control in the field and in resistance management programs.

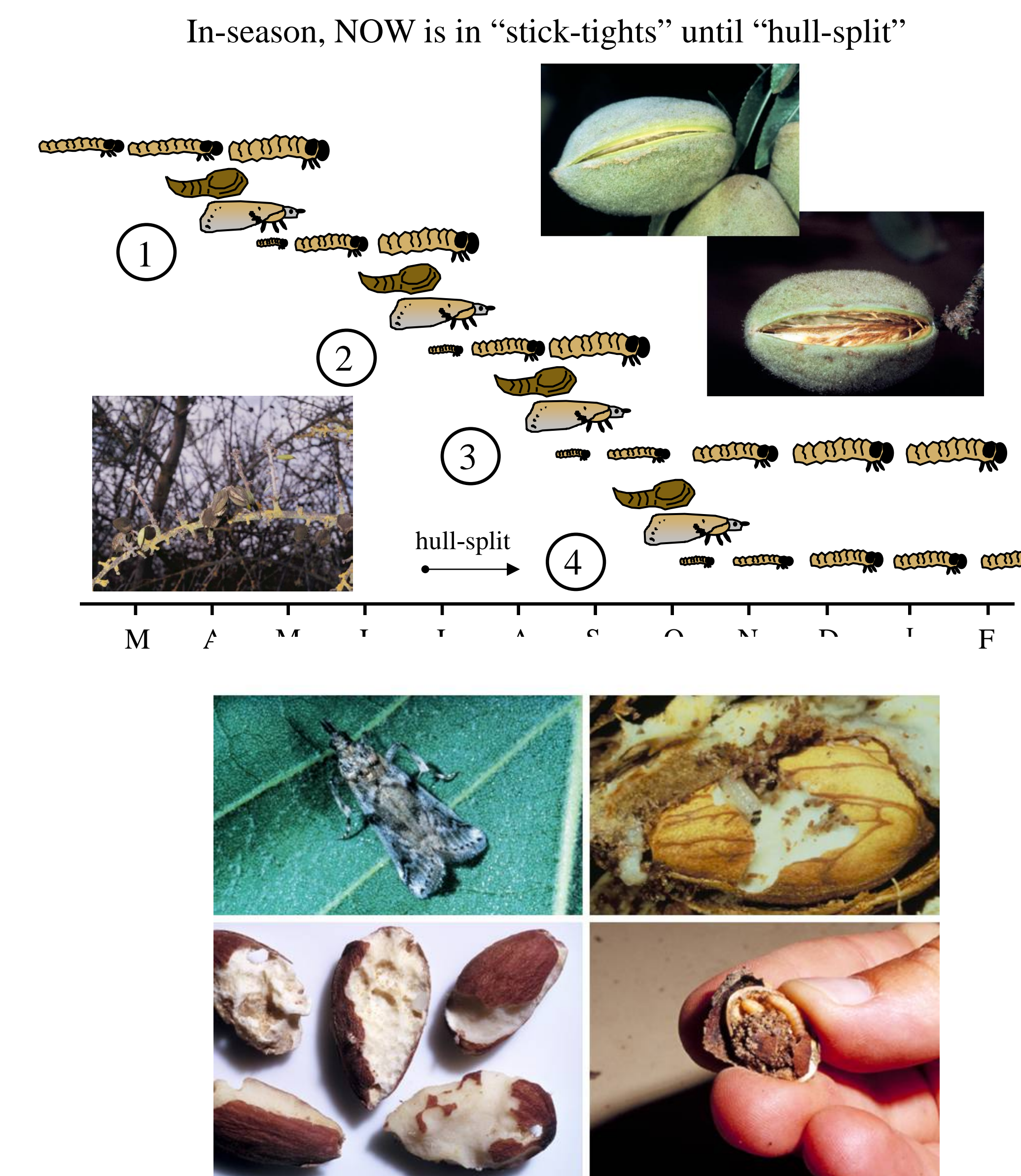
Method

An insecticide efficacy screening trial was conducted in 2013 at the Kearney Research & Extension Center, Parlier, CA. Products tested and rates applied were determined through consultations with members of the almond industry, chemical company product development representatives, and other colleagues within the University of California. Sequential treatments of To evaluate “sequential treatments” of Altacor®(Rynaxypyr), Altacor® + Asana pyrethroid (Esfenvalerate), Altacor® + Brigade (Bifenthrin), Cyazypyr (HGW86), Proclaim (Emamectin benzoate), Brigade (Bifenthrin Pyrethroid), Athena (Bifenthrin + Abamectin), and Hero (Bifenthrin+Zeta-cypermethrin) in tank-mixtures for control of NOW at hull-split in California almonds.

The trial was organized as a completely randomized block design with five replications of single-tree plots; exact specifications were made after tree plots were located. Plots were sprayed at hull split with portable hand gun sprayers. Water volume was dependent on the size and density of the tree canopy. The trial was performed on the Nonpareil variety.

The first application was timed for early hull-split (July 7th) followed-by a second application one month later (August 9th). Harvest was delayed until approximately 2% worm damage was surveyed in unsprayed trees, next to the plots, by Walt Bentley, UC IPM Entomologist Emeritus.

At harvest, trees were shaken and a nut sample of at least 200 nuts per tree was collected. Shelled nuts were cracked out and evaluated for Navel Orangeworm damage to the kernel. Data was analyzed by ANOVA with means separated by Fisher’s Protected LSD.



Results

Nonpareil Variety-August Harvest

Treatments	^a % NOW ^b	data transformed ^c
8 Proclaim + Dyne-Amic 4.5 oz + 0.25% v/v	0.4 a	a
11 Hero EW 11.3 floz	0.4 a	a
9 Brigade WSB 18 oz + Hort oil	0.5 a	ab
3 Altacor®+Asana® XL 3.0 oz+ 9.6 floz	0.6 a	ab
4 Altacor® + Bifenthrin 3.0 oz +16.0 oz	0.7 ab	ab
10 Brigade WSB 18 oz + Hort oil+ Vigilant	0.7 ab	abc
12 Athena 19.2 fl oz + Hort oil 1 gal/ac	0.8 abc	abcd
1 Altacor® (Rynaxypyr) 3.5 oz/ac + Hort oil	0.9 abc	abcd
2 Altacor® (Rynaxypyr) 4.0 oz/ac +Hort oil	1.0 abc	abcd
7 Cyazypyr (HGW86) 20.5 floz + Onager	1.2 abc	abcd
6 Cyazypyr (HGW86) 16.9 floz + Zeal	1.5 bcd	bcd
5 Cyazypyr (HGW86) 13.5 floz + Vigilant	1.6 cd	cd
13 Untreated	2.1 d	d

^a200 nuts were cracked out of each rep, 5 replications, 1000 nuts per treatment. Percent worm damage was determined per 1000 nuts. Data was both transformed (ArcSin(sqrt(x))^c and not transformed^b for analysis (one way anova).

Brent A. Holtz, Ph.D.
Rudy S. Whitley,
Cheryl S. Gartner
San Joaquin County
2010 E. Earhart Ave., Suite 200
Stockton, CA 95206