

# GOOD FRUIT GROWER

## Integrated pest management research has saved Washington's wine grape growers millions in pesticide costs. Hansen: Wine grapes — An IPM success story

Melissa Hansen // Mar 1, 2016 // Diseases // Grapes // Insects and mites // Pest Management // Trade



**Wine grape vineyards in the Yakima Valley of Washington State.**

 (Courtesy Melissa Hansen)

Washington's wine grape growers continue to enjoy benefits from integrated pest management (IPM) research, supported by the Washington State Wine Commission and conducted nearly a decade ago, that eliminated the need for organophosphate applications to control cutworm.

Washington grape growers reduced their use of pesticides by 80 percent from 1995 to 2005, according to a grower survey conducted by Washington State University, and today have few insect issues requiring insecticide applications.

The survey reflects the industry's widespread adoption of a targeted approach to cutworms — and shows how a change in one area of pest management can affect others.

### The cutworm problem

During the 1990s, grape growers had problems with cutworms, small caterpillars that climb grapevine trunks in early spring to feed on buds and shoots.

Cutworm feeding results in uneven vine growth and fruit loss. Yield reduction is most apparent on varieties with non-fruitful secondary buds.

At the time, growers used the broad-spectrum Lorsban (chlorpyrifos) for control, which helped suppress cutworms but disrupted beneficial insects that serve as predators for other pests.

Organophosphates, like Lorsban, are pretty harsh chemicals, says grape grower Jim Holmes of Ciel du Cheval Vineyard in Benton City, Washington.

Use of Lorsban requires worker (applicator) monitoring to ensure that blood levels of cholinesterase are not negatively impacted, and the broad-spectrum insecticide disrupts natural predators, he noted. “The cutworm research supported by the wine industry was game-changing.”

A decade ago, cutworms were a high priority for the Washington wine grape industry. Dr. Douglas Walsh, WSU entomologist and statewide IPM coordinator, led a team of scientists to explore ways to control cutworms without organophosphates.

Walsh’s research learned what species are present, conditions in which cutworms can be problems and how to monitor for them, and established suggested economic thresholds to guide growers in deciding if populations are high enough to warrant action.

### Innovative approach

Most important, his innovative research demonstrated that control could be achieved by selectively targeting the pest — spraying the base of grapevine trunks with synthetic pyrethroids.

Field trials demonstrated that cutworms will not cross the spray barrier and instead will remain on the ground.

By treating only the lower part of the trunk and soil berm, pesticide use was greatly reduced, as reflected in an industry survey comparing pesticide use in 1995 to 2005.

Moreover, pyrethroids were found to be effective, which eliminated the need for Lorsban.

Further research learned that the relatively new insecticide chlorantraniliprole (Rynaxypyr) is also effective in controlling cutworms under cold springtime conditions.

“Eliminating Lorsban has made all the difference,” Walsh said. “The virtual elimination of chlorpyrifos applications that put growers on the pesticide treadmill in early spring is the greatest benefit of the research.”

Field surveys conducted from 2003 to 2007 by WSU entomologist Dr. David James and technician Larry Wright found 25 species of caterpillars in Washington vineyards, mostly on the ground.

Two species — *Abagrotis orbis* and *Agrotis vetusta* — were predominant. Both have one generation per year; moths mate in late summer to early fall, followed shortly by egg laying and hatching.

Larvae feed and develop to second or third instars before overwintering under leaf litter or in the soil. The instars emerge the next spring and restart the process.

The impact from the cutworm research has saved the industry millions in reduced pesticide costs. Labor savings associated with worker monitoring have not been estimated.

At the time of the research in the mid-2000s, WSU estimated that the industry achieved \$15 million annually in pesticide cost savings and increased yields.

Growers saved \$33 per acre by switching from the more expensive Lorsban (\$40 per acre) to inexpensive pyrethroids (\$7 per acre), not including savings in mixer-loader time from spraying less material.

At 28,000 acres, the size of the wine grape industry then, annual savings to the industry was nearly \$1 million.

However, growers saw an increase in production of half a ton per acre from the more effective cutworm control.

With an average crop value then of \$1,000 per acre, this resulted in about \$14 million annually. Today’s annual savings, given the state’s 50,000 acres, would be nearly double that amount.

Additionally, the targeted cutworm control has enabled growers to certify their vineyards under the LIVE program (Low Input Viticulture and Enology).

## Spillover effect

James has also conducted spider mite research funded by the state's wine industry. He agrees with Walsh that eliminating Lorsban from Washington vineyards has had a profound effect on IPM programs.

Spider mites are generally considered a secondary pest and flare up when there's been disturbance to the environment and natural predators.

In Washington vineyards, spider mite populations are generally very low and are now uncommon, James said.

"Spider mites, principally two-spotted mite and McDaniel's mite, were significant pests in Washington vineyards in the late 1990s and early this century," he reported. "The decline in their pest status appears to be associated with the reduced use of broad-spectrum insecticides like Lorsban and Sevin (carbaryl)."

Before Lorsban elimination, growers frequently had to control mites all season, which resulted in two to three miticide applications, he explained.

"Nowadays, the occasional mite outbreak can be controlled with a single miticide application."

Eliminating the need for season-long control saves growers up to \$100 per acre annually in miticide costs (average miticide application cost of \$35 per acre).

With 50,000 acres of wine grapes in the state today, reducing miticide applications from three to one saves the industry about \$3.5 million annually in pesticide costs.

In a mite population survey of Washington vineyards from 2013 to 2015, James found spider mites in about half of the vineyards surveyed, but the majority — greater than 75 percent — had nondamaging levels.

"The few vineyards that had damaging populations may have created mite outbreak situations by regularly using neonicotinoid insecticides," he surmised. Previous work done by James found that neonicotinoids can increase the fertility of spider mite.

Although isolated outbreaks of rust and bud mites since 2005 have occurred, he noted that their impact was short-lived due to strategic applications of sulfur before bud-burst, which kept populations below damaging levels.

"Currently, spider, rust and bud mites can be considered occasional, minor pests. But the potential for local problems still exists if broad-spectrum sprays are used or natural enemy populations decline."

His mite research turned up two mite species new to Washington vineyards with potential threat: Willamette spider mite and a new eriophyid blister mite.

Willamette mite is present in some central Washington vineyards and was responsible for more than half of the damaging mite populations observed in his study.

The confirmation of Willamette mite — the first record of the mite in central Washington — is surprising because Willamette mite is known to prefer cool climates like Oregon's Willamette Valley.

The diversity of predatory mites found in Washington vineyards by James is further proof of successful IPM programs.

In half of the surveyed vineyards, James found about a dozen species of predatory mites, which he believes is in part responsible for low spider mite populations. •

– by *Melissa Hansen, Research Program Manager for the Washington State Wine Commission.*

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## ABOUT THE AUTHOR: MELISSA HANSEN

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Melissa Hansen is the research program manager for the Washington Wine Commission. Hansen previously was an Good Fruit Grower associate editor from 1996 through 2015. **Read her stories:** [Author Index](#)

## 3 COMMENTS

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**Paul Vandenberg** March 8, 2016 at 12:14 pm - Reply

Hi Melissa,

Congrats on the new job, I'm glad you are working for me!

I've been thinking about getting in touch with you under your Good Fruit hat, but your new hat may be even better. I have been working on the goal of zero pesticides and think I've arrived. I have Sangiovese pesticide free since 2007 and everything since 2013.

I'd like to spread my results around to encourage others.



**O. Casey Corr** March 8, 2016 at 2:13 pm - Reply

Paul, We're thrilled to see Melissa join the wine commission. She'll be a leader in getting research information to wine grape growers and we'll work closely with her to spread the news.

**Integrated Pest Management (IPM) in Washington's Wine Grape Crops – Emmetts** March 31, 2016 at 11:05 pm - Reply

[...] A secondary problem of spidermites has also been reduced "The decline in their pest status appears to be associated with the reduced use of broad-spectrum insecticides like Lorsban and Sevin (carbaryl)" which was used to treat cutworm. Before Lorsban elimination, growers frequently had to control mites all season, which resulted in two to three miticide applications. "Nowadays, the occasional mite outbreak can be controlled with a single miticide application." Melissa Hansen March 1, 2016 <<http://www.goodfruit.com/hansen-wine-grapes-an-ipm-success-story/>&gt; [...]

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