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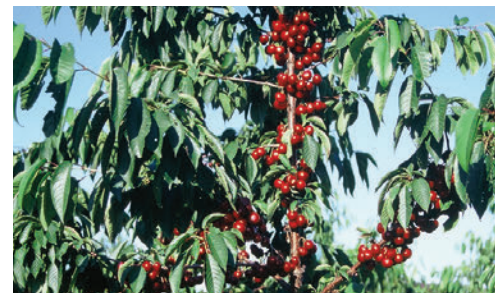
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The two-spotted spider mite is a tiny pest but a big problem for growers. It damages a wide range of crops by piercing the leaves and sucking out the juices, with pear leaves especially sensitive to damage. Now researchers have found the mite is building up resistance to miticides, forcing growers to find alternatives to control the pest. Find out more beginning on page 16.

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TJ MULLINAX/GOOD FRUIT GROWER

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A brown marmorated stinkbug is displayed in a vineyard near Walla Walla, Washington.

PHOTO BY  
TJ MULLINAX,  
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# QUICK BITES

People and industry in the news.

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## DuPont joins WSU team

Tianna DuPont admits right away she did not grow up on a farm. What's more, she learned to appreciate farming from, of all people, a politics professor.

However, DuPont has turned that brief, unlikely introduction into an agricultural research, outreach and education career that has taken her to Bolivia, Pennsylvania, California and back to her home state of Washington.

"I came to this area in part because it's just such an exciting industry," said DuPont, the new tree fruit extension specialist for Washington State University in Wenatchee, Washington.



Tianna DuPont

DuPont, who grew up in Issaquah, Washington, started on Nov. 1.

One of her first jobs is conducting an assessment to determine what information growers want and need. She passed out survey forms in late January at the North Central Washington Stone Fruit Day, Pear Day and Apple Day in the Wenatchee Convention Center.

She's still gathering input, but so far, growers have told her they want information about labor availability, regulations, organic transitions, succession planning and pests and diseases, such as spotted wing drosophila and little cherry disease.

DuPont traces her involvement with farming back to a politics professor at Whitman University, where she earned a bachelor's degree in environmental studies. That professor did a good job of getting students into the field, she said, "talking with farmers and ranchers and foresters, and gave me the perspective that 70 percent of our land is in agriculture and we all eat, so what else could be important to do."

She worked with wheat growers on her undergraduate research.

After Whitman, she went on to earn a master's degree in integrated pest management from the University of California-Davis, where she focused on soil nematodes. She spent two years in the Peace Corps, helping Bolivian farmers with apple, vegetable and chicken production. She has worked on farms in California, Pennsylvania and Oregon, and owned a community supported agriculture vegetable farm in Pennsylvania.

She is replacing Tim Smith, now semi-retired from a 40-year extension career, 33 of them in Wenatchee.

DuPont is right to start with the needs assessment, Smith said. "You don't tell people what they want to know," he said. "You ask people what they want to know."

One change is that she will work from the research center, in the same building as the scientists, instead of Smith's Chelan and Douglas County extension office across town. "I really believe in getting research-based information out to our growers, and it's really exciting to help create formats for that learning environment," she said. —Ross Courtney

## WSTFA contributes to food safety research

The Washington State Tree Fruit Association is contributing \$750,000 over five years to support food safety research.

The pledge is part of a \$20 million capital campaign to support the work of the Center for Produce Safety, which oversees a coordinated research effort to provide fresh fruit and vegetable producers with information they need about food safety.

The contribution demonstrates growers' commitment to ensuring that Washington apples, pears and cherries are not only healthy and delicious, but also remain among the safest food choices consumers can make, said Jon DeVaney, WSTFA president. "Our industry chose to make this investment in research through the Center for Produce Safety because of its strength in developing solutions to food safety questions that are practical, science-based and credible, while using research dollars effectively," he said.

The Center for Produce Safety is a

public-private partnership that brings together food safety experts in government, academia and the national produce industry to identify research needs, fund promising investigations and translate the results into real-world solutions.

More information can be found at [www.centerforproducesafety.org](http://www.centerforproducesafety.org).

## Fresh Fruit Cuts appoints new director

Fresh Fruit Cuts, processors of stone fruit, pears and grapes under the Woot Froot label, has named Melissa Blake as director of sales and marketing. Blake previously served as the value-added buyer for Fresno, California-based wholesale distributor OK Produce.

Fresh Fruit Cuts is a specialty processor and woman-owned business located in California's Central Valley. The company is entering its third year of production and will launch new pack styles in 2016. Visit [www.wootfroot.com](http://www.wootfroot.com) for more information.



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# Apple maggot in YARD WASTE

**Study shows apple maggot pupae can be killed in yard waste, but more research is needed.**

*by Shannon Dininny*

**A**pple maggot pupae in yard waste piles can be killed by insulating and heating the piles, according to a preliminary study, but experts say the results, while promising, require more research to ensure the pests will not survive to infest commercial apple orchards.

Apple maggot began appearing in the Northwest in the 1980s, which is when state officials began imposing quarantines to prevent it from infesting commercial orchards. The pest has proliferated in backyard fruit trees in urban areas that are now looking to compost yard

waste in a bid to recycle more and save landfill space.

Washington officials issued permits to several companies allowing them to transfer yard waste to composting facilities in pest-free zones, despite concerns from the industry that the pest could ride along. But when apple maggot turned up in a trap near one last year, they halted the practice until more research could be done to determine the risks to the state's \$2 billion apple industry.

Apple maggot has never been found in commercial fruit in Washington, yet it is a key pest of concern to some trading partners.

### Heating the pupae

Last fall, Dr. Wee Yee, research entomologist at the USDA's Agricultural Research Service laboratory near Wapato, Washington, began researching cost-effective ways to kill pupae in yard waste piles, with the idea being to kill pupae at the source before yard waste is transferred to a pest-free zone.

## Apple maggot life cycle

Apple maggot overwinter as pupae in the soil. Adults emerge in early summer, peaking in July, and once mature, females lay eggs under the skin of apples. The eggs hatch and the larvae feed within the apple, passing through three instars before the infested fruit falls to the ground and the larvae leave the fruit to burrow into the soil, molt into a fourth instar and overwinter as pupae.

In Washington, apple maggot was first detected in 1980 in Clark County in the southwest part of the state. Today, apple maggot is present in at least 22 of Washington's 39 counties, though much of the commercial apple production region remains pest-free.

Little research has been done on effective methods to kill apple maggot pupae, Yee said during an evening presentation at January's Apple Crop Protection Research Review in Wenatchee, Washington. A 2008 study showed that apple maggot larvae do not survive rearing at 104°F or hotter, so Yee elected to apply heat in his own laboratory tests on pupae. He found that 100 percent of the pupae died after three days when heated to 122.9°F.

He moved on to field tests last fall at the Terrace Heights Landfill east of Yakima, Washington. Yee built yard waste piles composed of 30 cubic yards of waste, with 60 to 65 percent moisture content, which is ideal for composting. Organdy bags each holding between 18 and 31 pupae were inserted into the piles — on the surface of the pile, at 5 centimeters deep and at 46 centimeters deep — with data loggers next to the bags registering the temperature over the course of the study.

*Continued on page 8*

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# Apple maggot, worries spread in Michigan

Apple maggot infestations seem to be on the increase in Michigan, so growers should have a summertime control program ready this year, reported Michigan State University entomologist Dr. Larry Gut at the December Great Lakes Fruit, Vegetable and Farm Market EXPO.

Numbers do appear to be on the rise, agreed Mike Haas, Michigan State University research assistant at the Trevor Nichols Research Center in southwestern Lower Michigan. “We have some evidence that they are becoming more prevalent, and that is primarily from adult catches on baited spheres,” he said. He has not yet completed a comparative analysis to provide a percentage population upturn, but indicated that the numbers have been “increasing moderately” over the past few years.

The upward trend in adult apple maggots probably relates to changes in control measures, Haas said. “When Guthion dropped out of the list of chemicals you could use for apple maggot, I think that had an impact. A lot of the newer materials aren’t adulecticides.” Specifically, he mentioned that some of the neonicotinoids can kill the larvae and eggs of apple maggots, but aren’t as successful against adults. Likewise, many diamides are listed for apple-maggot suppression only.

He added, “The big picture is we’re losing materials that have been very good against apple maggot, and while the injury in apples has not become a problem, it looks like it’s a possibility that populations are building among adults, and it could potentially become a bigger problem for growers.”

For the coming season, Haas said several materials can do a good job against apple maggots, and Gut suggested the use of such pesticides as Assail (acetamiprid) and Imidan (phosmet) against the insects when they arrive in orchards during the summer.

“The most important thing is to base the start of your apple-maggot program on monitoring,” Haas remarked. He added, “Use either yellow, ammonium-baited sticky cards (early) or red sticky spheres baited with a fruit essence blend (anytime). Check regularly starting at the end of June or when 900 degree-days have accumulated.” He noted that several applications will probably be necessary. —**Leslie Mertz**

Yee conducted several tests under varying temperatures and number of days and with piles uncovered or covered with tarps. Early results were promising on pupae deep in the pile, but he found that killing pupae near the surface of the pile was more challenging. So, he applied reflective insulation to keep the heat in the pile and came up with his best results:

After nine days, 100 percent of the pupae died in a pile covered with reflective insulation, with temperatures reaching 102°F at the surface, 111°F at 5 centimeters deep and 137°F at 46 centimeters deep, despite the test being done in December when mean ambient temperature was 36.5°F.

Yee also tracked oxygen levels in the pile. Ambient air is 21 percent oxygen by volume; as expected, he found that oxygen levels declined deeper in the pile.

“Oxygen levels may have had something to do with it too, but it’s mostly heat, I suspect, so pupae in and on the surface of waste piles can be killed by biogenic heat,” he said. “Insulating ground yard waste piles with a tarp or a tarp and additional insulation may be a simple, inexpensive way of killing apple maggot pupae during cold months at waste transfer stations.”

## Next steps

Washington officials hired three experts to gather information — including the results of Yee’s research — and study the threats composting facilities could pose to the state’s commercial apple industry. Those results of that overall study are due this spring.

These preliminary research results are promising, said Jon DeVaney, president of the Washington State Tree Fruit Association, but there remain many unanswered

questions about risks to the industry:

Will this be tested on a commercial composting scale? Will the composting industry and regulators accept and follow scientific guidance? Will yard waste be treated before being transferred to pest-free zones? Who will regulate and ensure intensive monitoring for apple maggot in pest-free zones, and who will pay for it?

Dr. Mike Willett, manager of the Washington Tree Fruit Research Commission, also stressed that Yee’s research results are preliminary. “More work and thought will have to be given as to how best to replicate

conditions encountered in feed stock piles,” he said. “Also, in my experience, the number of insects tested may have to be substantially higher.”

In previous work to validate quarantine treatments, such as for the fumigation of spotted wing drosophila in cherries to Australia, USDA researchers treated 30,000 fruit infested with pests that were at their most resistant phase in the life cycle.

“As Wee noted, his work used fewer than 100 pupae per treatment,” Willett said. “The promising news was that 100 percent mortality appears to be possible.” ●



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# Pests in the HEAT

**Last year's hot growing season gave researchers ideal opportunity to take a closer look at codling moth and obliquebanded leafroller.**

*by Shannon Dininny*

**P**ests posed a challenge to some growers in the record heat of 2015, but the heat presented an opportunity for researchers to learn more about how best to control two of them — codling moth and obliquebanded leafroller — when temperatures are high.

Dr. Vince Jones, entomologist at Washington State University's Tree Fruit Research and Extension Center in Wenatchee, Washington, compared 2015 temperatures to those of a similar high-temperature year, 1958. The result: Summer was not hotter, but spring and fall were warmer, creating additional degree-days at key times and enabling an additional generation of both codling moth and leafroller.

"It's not just the total degree-day accumulation that's important; it's when the degree-day accumulation occurs," Jones told growers at the Washington State Tree Fruit Association Annual Meeting in December.

The hotter year overall means more codling moth generations will occur and higher numbers will emerge in 2016. The warm fall

also means more larvae that escaped diapause (the dormant stage that overwinters) in August would still make it successfully to the overwintering stage, which is true for both codling moth and leafroller.

These factors could make control difficult for growers again, and forecasters are predicting 2016 will be another hot year, Jones said.

## **Codling moth**

For roughly the past 50 years, growers have generally applied two sprays per generation to control codling moth in a year with average temperatures. The first spray occurs at 3 percent to 5 percent egg hatch — or roughly 425 degree-days — followed by a second spray 14 days later.

Following research by WSU entomologist Jay Brunner, some growers began using a delayed first cover approach to target the first and second generations. The idea is to put oil on just before egg hatch at 375 degree-days, then a second larvicide spray at 525 degree-days and a third spray 14 days later. Organic growers can follow the same method but substitute organic materials.

In 2015, Jones tested those treatments to determine efficacy in a warm year. He found that pesticide treatments alone have roughly

the same effectiveness as in a cooler year. "It's not to say they didn't work well, but remember, you have another generation to fight," he said.

However, adding a delayed first cover made the applications twice as effective overall and cut the codling moth population by half. "Unless you miss that first window, you really should be using this delayed first cover in almost every circumstance," he said.

Jones also found that all of the codling moth treatments worked better when paired with mating disruption. "Even a weak treatment program is better with mating disruption than a good, conventional plan without it," he said. And there's a bonus: Conventional codling moth treatments can also reduce incidence of obliquebanded leafroller by about 70 percent.

He advised growers to keep a close tab on

*"Even a weak treatment program is better with mating disruption than a good, conventional plan without it."*

*—Vince Jones*





A codling moth larva on a Gala apple.  
 PHOTO ILLUSTRATION BY TJ MULLINAX/GOOD FRUIT GROWER



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growing degree-days through the season, because being off by even one day can allow a significant number of larvae to enter the fruit.

#### Obliquebanded leafroller

Diapause induction is not as well studied for leafroller, but studies suggest there is a critical day length and heat factor crucial to determining the number of generations, Jones said. Some larvae go through five instars, others through six instars.

Jones determined there are four periods during the season that showed significant efficacy for targeting leafroller, and timing is everything. Shoot growth early in the season limits residual effectiveness, and in summer, residues last 30 to 50 days for treated foliage.

—Applying larvicide alone at 90 degree-days is an important step in controlling leafroller.

—Applying an ovicide with oil at 720 degree-days is helpful, but by itself provided the worst control of the four application windows.

—Applying larvicide plus oil at 900 degree-days is the most important step in controlling leafroller, and the one application growers absolutely should not miss.

—Applying larvicide plus oil at 1,800 degree-days can also be helpful, but it is more difficult to get coverage.

Growers can use any three of these four windows to similar efficacy, Jones said, and hitting all four is only marginally better. “Any three window treatments is better than the old standard timing,” he said.

Jones said control recommendations for oblique-banded leafroller will be updated for growers for the 2016 season on WSU’s Decision Aid System ([das.wsu.edu](http://das.wsu.edu)) following last year’s research. ●

# Seeking better

## Researchers are getting a head start on keeping codling moth resistance traits to insecticides in check.

by Shannon Dininny

**C**odling moths in Washington currently do not appear to be carrying resistance traits to the insecticides commonly used to control them, but researchers are a step closer to being able to identify that resistance quickly if and when it develops.

Three key insecticides have been used effectively in the region for codling moth control, but the possibility of the insects becoming resistant to these chemicals is a growing concern for orchardists.

A study by research geneticist Stephen Garczynski of the USDA Agricultural Research Service in Wapato, Washington, aimed to identify the codling moth’s proteins that are targeted by each of these insecticides and to identify potential detoxification enzymes in them that could lead to resistance.

Rather than using a laboratory colony of codling moths for the study, Garczynski and the research team gathered insects from the wild in the Yakima Valley. The study showed there don’t appear to be any resistance changes in codling moths currently, he told the Washington Tree Fruit Research Commission at the Apple Crop Protection Research Review, held in January in Wenatchee, Washington.



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# control for codling moth

*"We've provided all the targets and all of the enzymes so that we have these tools now to be able to determine resistance more rapidly than if we were starting from scratch, should the need arise. I'm hoping it doesn't arise."*

—Stephen Garczynski

"We've gotten a lot of information. We can't say what's going to cause resistance," he said. "But we've provided all the targets and all of the enzymes so that we have these tools now to be able to determine resistance more rapidly than if we were starting from scratch, should the need arise. I'm hoping it doesn't arise."

## Research results

The researchers worked to identify codling moth gene transcripts that are elevated in response to sublethal doses of three insecticides — the anthranilic diamide Altacor, the spinosad Delegate, and the neonicotinoid Calypso.

Altacor (chlorantraniliprole), targets the ryanodine receptor in the insect, a protein that is important in nerve and muscle function. Another insect, the diamondback moth, develops a point mutation that causes a single amino acid to change.

That change is associated with resistance to a chemical that also targets its ryanodine receptor. The researchers identified the ryanodine receptor in the codling moth, then cloned and sequenced the region in the diamondback moth. The researchers are working to develop a PCR assay that can be used to monitor for a similar mutation in codling moths that could lead to resistance, Garczynski said.

Delegate (spinetoram) targets nicotinic acetylcholine receptors that are key to the nervous system of the codling moth. Two different mutations have been found to confer resistance to spinosads, identified in mutations in the Western flower thrip and the silkworm.

Calypso (thiacloprid) also targets nicotinic acetylcholine receptors. Mutations in the brown leafhopper and the green peach aphid have resulted in resistance to neonicotinoids.

The researchers identified the location of the mutations that result in resistance to both spinosads and neonicotinoids, cloned and sequenced them, and developed PCR assays to monitor for similar mutations in codling moths that could confer resistance to the insecticides, he said.

Another way a codling moth can develop resistance is through an enzyme change that detoxifies the chemical control agent.

The researchers have identified the three major classes of detoxification enzymes in codling moths and cloned and sequenced some of them. Garczynski said PCR assays will be used in the future to quickly determine if resistant insects are using these enzymes to detoxify the insecticides. ●

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PHOTOS COURTESY DR. DAVID BIDDINGER/PENNSYLVANIA STATE UNIVERSITY

Long-lasting insecticides on bark wounds are effective for control of American plum borer. The pest, more common in Michigan and California than in the Northwest, has been causing some damage to cherry trees in The Dalles, Oregon, apparently attracted to trees damaged by a November 2014 freeze.

## Borers make THEIR MARK

**A**n opportunistic pest known to cause extensive damage in California and the eastern United States has arrived in Oregon's cherry orchards in the wake of a harsh freeze during November 2014, and growers are advised to be on the lookout for it.

### Northwest growers advised to watch for American plum borer.

by Ross Courtney

The American plum borer has been setting up shop in trees weakened by the historic cold snap that saw temperatures dip to minus 12°F in some places in Oregon's Columbia River Gorge.

"I think it's just going to be a pest to watch for," said Drew Hubbard, a research and development specialist for G.S. Long in The Dalles, Oregon.

Hubbard and researchers call the plum borer, a moth whose larvae feed on the cambium under the bark, "opportunistic." They are attracted to compromised trees, perhaps with injuries or places of soft tissue.

After the freeze, growers pruned way back to the leaders, sometimes to the trunks, to encourage their trees to start all over again building their

structure. The "succulent" new growth attracted the borers, Hubbard said.

In early August last year, growers and field representatives noticed new shoots becoming frail and falling off trees. They also found plum borer larvae and their frass, or droppings, and caught up to 20 adult moths per trap per week toward the end of that month in low-lying pockets where temperatures dipped the most. Hubbard collected samples of the larvae and asked Dr. Peter Shearer, an entomologist with Oregon State University Mid-Columbia Agricultural Research and Extension Center in Hood River, to identify them. The plum borer, a native to North America, has little history in the Northwest, Shearer said.

"This insect is a major pest elsewhere (Michigan, California, New York) but has never been a big problem here," Shearer said in an emailed statement. Local integrated pest management guides don't mention it.

Growers and field representatives found small populations in 2010 after a lesser freeze, while Dr. Elizabeth Beers, an entomologist at Washington State University's Tree Fruit Research and Extension Center in Wenatchee, spotted them attacking graft unions two recent years in Washington — in 2013 in Malaga and in August 2015 in East Wenatchee.



The moth larvae have a unique purple-like color.



Larvae overwinter in white, fuzzy cocoons under the bark.





*“In mechanically harvested tart cherries in Michigan, we figure it reduced the life of an orchard by about one-third.”*

—David Biddinger

However, Michigan has struggled with borer since the 1970s, said Dr. David Biddinger, an entomologist with Pennsylvania State University Fruit Research and Extension Center in Biglerville. He wrote his 1985 thesis on the moth after it had been “devastating” Michigan cherry trees for 12 years or so.

In a self-deprecating email, Biddinger describes himself as “probably the world’s expert on this pest, but that is not saying much outside of Michigan.” He blamed most of Michigan’s problems on the advent of mechanical harvesting of tart cherries.

The plum borer gets under the tree’s bark through wounds — in Michigan’s case, caused by the harvester’s clamps — to feed on the cambium just beneath.

“In mechanically harvested tart cherries in Michigan, we figure it reduced the life of an orchard by about one-third,” Biddinger said. “They can girdle a scaffold limb in only two to three seasons and an entire tree in five to seven years depending on the age of the trees when attacked and the pest pressure. (American plum borers) prevent wounds on fruit trees from healing and enlarge them so that diseases can enter for secondary infections.”

The borer has two generations per year in northern states, three in the South, Biddinger said. The overwintering larvae pupate in early spring and emerge as adults right before bloom. The second generation comes out just after harvest, attracted to the fresh harvester wounds.

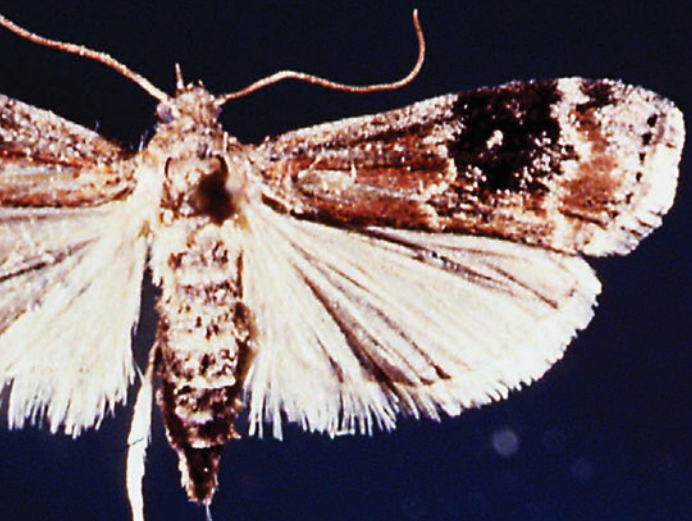
“For you guys, I think it’s just going to be a nuisance,” Biddinger said. In the Northwest, sweet cherries are picked by hand, not machines.

Still, field representatives aren’t sure what to expect or what to do, though they advise pulling out dead trees and spot spraying with some registered chemicals, Hubbard said.

Growers in other states have used long-lasting insecticides at the site of wounds and crotches of young trees, Shearer said. Websites of Penn State and Cornell University in New York suggest timing treatments around petal fall. University of California-Davis pest management guidelines mention the use of Lorsban Advanced (chlorpyrifos), Diazinon 50W (diazinon) and Sevin 4F (carbaryl).

Observation will be job one, Hubbard said. “To a certain degree, it’s going to be a lot of monitoring this year to keep watching.” ●

In northern states, the borer has two generations per year, with the first adults emerging right before bloom.



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## Pest Management

# PEAR MITES developing resistance to CHEMICALS

**Growers may be forced to take different steps to control pests as resistance buildup continues.**

*by Ross Courtney*

**T**he days of simply spraying the two-spotted spider mite may be waning, even with six miticides available to control them.

Dr. Elizabeth Beers advises pear growers to start talking to their chemical representatives about some other way to keep the pests at bay, because the mites are building resistance to nearly all

chemicals currently labeled for control.

The two-spotted spider mite pierces the leaves and sucks out the juices. The mite also attacks apples, hops, vegetables and many other crops. Pear leaves, however, are more sensitive to mite damage than apple leaves, developing black patches on leaves called transpiration burn when combined with water stress. Anjou pears are the most at risk, showing symptoms more quickly than others. Beers called them the "canary in the coal mine" cultivar.

"We are getting sort of toward the end of our rope," said Beers, a research entomologist at the Washington State Tree Fruit Research and Extension Center in Wenatchee, Washington.

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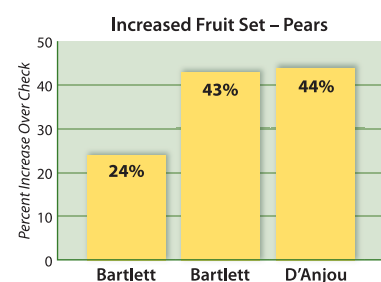
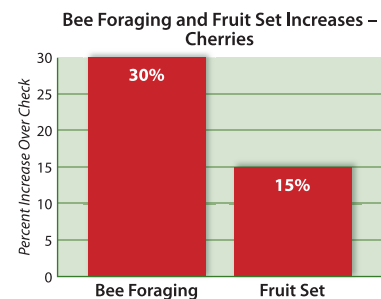
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*Bee-Scent research data obtained from  
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### A history of miticides

Pest resistance to chemical controls has been common knowledge for a century. In fact, a WSU researcher named A.L. Melander first documented the concept that insects develop tolerance for sprays with a 1914 paper in the *Journal of Economic Entomology*.

Growers have learned to work around resistance by rotating between two or three different chemicals year to year. In fact, some modern pesticide labels allow for only one application a season.

Pear growers, like everyone else, have faced the resistance problem for decades, burning through a list of 24 or more miticides since World War II. In recent years, however, growers appeared to have it good, with six different chemicals labeled for mite control — Agri-Mek (abamectin), Acramite (bifenazate), FujiMite (fenpyroximate), Envidor (spirodiclofen), Onager (hexythiazox) and Zeal (etoxazole).

“Six seemed like a luxurious number by comparison to what we’ve had in the past,” Beers said.

However, at the request of one of the companies, FujiMite, Beers tested all over the West Coast for resistance and found high levels of resistance in one sample population in central Washington’s Wenatchee Valley. Meanwhile, field representatives and growers in the area had been sharing anecdotal observations that miticides weren’t working as well as they used to.

“That had us scratching our heads,” she said.

### Growing resistance

In 2013, Beers started a two-year research project comparing the resistance level of all six miticides, funded by a \$48,310 research grant from the Washington State Tree Fruit Research Commission. For her study, she collected 700 female spider mites from four Washington orchards in Chelan, Douglas, Okanogan and Yakima counties, put them on a bean leaf and applied increasing doses of miticides.

The mites showed resistance to all but one: Envidor, an ovicide and the most recently labeled of the six chemicals. Onager and Zeal also are ovicides, the rest are adulticides. Among the five remaining chemicals where resistance is an issue, the level increased by statistically significant amounts — up to 127,000 times the resistance of a control group from Cornell University, reared for 15 years with no pesticide exposure at all.

The mites developed higher levels of resistance to the adulticides than to the ovicides. They showed the most resistance to Agri-Mek, not surprisingly the oldest of the six chemicals, used in pears since the late 1980s. In second came Acramite.

“Agri-Mek and Acramite are predicted to provide little control in the field,” Beers said, though Agri-Mek maintained some efficacy in a field near Yakima, where resistance was lower.

The resistance buildup could spell drastic changes for growers trying to control mites. “It’s thrown a serious wrinkle into our thinking about resistance management,” she said.

Complicating the problem is that many of the sprays used for mites also work on psylla. In fact, attempts to control psylla largely caused the mite problems, she said.

Beers suggests the industry start looking for “soft” methods of pest control, including relying on natural predators to help. Other than that, she admits she has no magic prescription.

“I don’t have any silver bullets for the growers, and I’m sorry to say that,” she said. ●



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COURTESY OF THOMAS BURR

Crown galls develop following cold injury to trunks on Riesling vines in the Finger Lakes region of New York.



# Controlling CROWN GALL

**Keys to combating crown gall disease in wine grapes are clean plants, avoiding freeze damage and pairing appropriate varieties to sites.**

by Shannon Dininny

Researchers are making strides in efforts to combat crown gall disease and to develop clean plants free of the pathogen that causes it, but there's still much to be learned about how to prevent, diagnose and eliminate it in grapevines.

That said, if there's any place that should be able to grow disease-free vineyards, it's Washington, with its desert, sandy soils and lack of the wild grapevines that serve as reservoirs for the disease elsewhere, said Dr. Thomas Burr, Cornell University professor of enology and viticulture.

"You have a real advantage in Washington," he told attendees at the inaugural Ravenholt Lecture Series at the Ste. Michelle Wine Estates WSU Wine Science Center in Richland in January. "If you can plant a vineyard with clean plants, you certainly are not going to eliminate the presence of crown gall forever, but if you can get a healthy vineyard started, you're way ahead."

The pathogen that causes crown gall disease, *Agrobacterium vitis*, can live silently in the vines until an injury initiates an infection, most commonly those caused by freezing temperatures or at graft unions. The infection causes galls that crush the vascular tissue of the plant, restricting the movement of water and nutrients, and impede the vine's ability to heal the wound. The infection also can cause necrotic lesions on roots.

The disease kills young vines that develop it at graft unions and can stress older vines, depending on the level of

infection, significantly reducing vigor and yield. Once established in a vineyard, there is no chemical control.

### New knowledge about *A. vitis*

Researchers at Cornell took cuttings from 10 different grapevines in the winter of 2014, sampled from nodes and internodes, starting at the base and working their way out through the cane. They hypothesized that the pathogen would be at its highest level at the cane base and at nodes, Burr said.

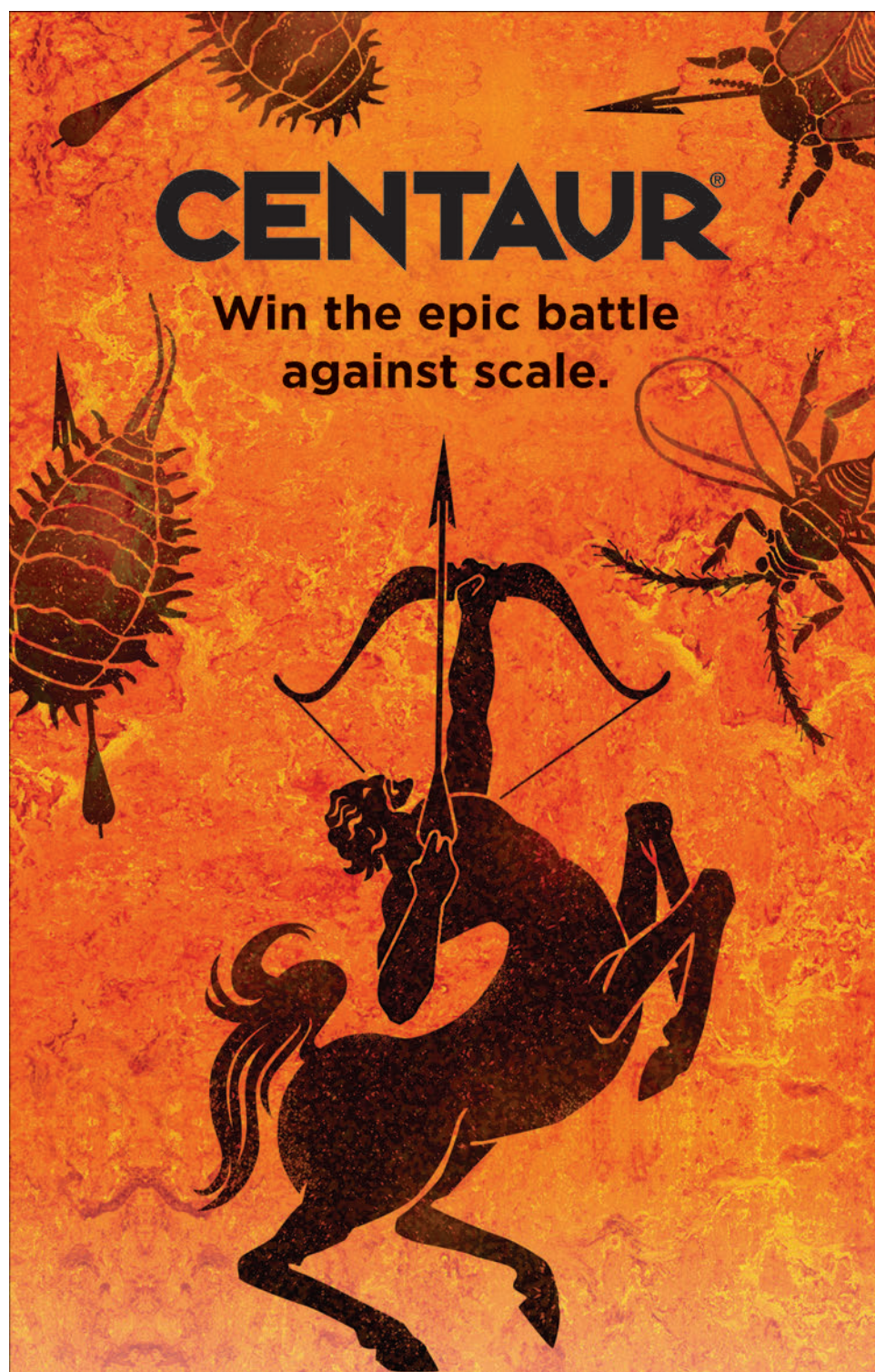
They were wrong. It turns out the bacterium can be randomly distributed in dormant grape canes.

"It's not only at nodes, but it's also at internodes. It's not only at the base, you can find it way out," he said. "It's not what we wanted, obviously. If you're going to be sampling a certain block for a grower, you want it to be simple."

That means that if a sample is positive, researchers can positively say that crown gall is present. But if it's negative, they can't say for certain that it's not present somewhere else in the vine. "The more we study this bacterium, the more places we find it," he said.

That includes in wild grapevines. In another study, researchers sampled wild grapevines in New York in 2013 and 2014 for tumorigenic strains of the pathogen, finding that roughly one-third were positive for it — 18 of 54 samples in 2013, and 12 of 41 samples in 2014. Similar tests of wild grapevines in riparian areas in California showed 24 of 87 positive samples in 2014 and 2015, he said.

"It's a bit shocking, but good to know



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Dr. Thomas Burr talks about crown gall disease at the inaugural Ravenholt Lecture Series at Washington State University Tri-Cities in January.

## WSU begins historic Ravenholt Lecture Series

**Posthumous donation makes wine science lecture series possible.**

by Shannon Dininny

The crown gall workshop hosted by Washington State University Tri-Cities in January marked the inaugural event in the Ravenholt Lecture Series, made possible by a posthumous donation from the Albert Victor Ravenholt Foundation.

Albert Ravenholt was a founding partner in Sagemoor Vineyards in Pasco, Washington, in the early 1970s, establishing vineyards where no industry existed. Ravenholt died in 2010 at the age of 90, after a long career that included serving as a war correspondent for United Press International during World War II and, later, UPI bureau chief in China, and three decades as a fellow of the Institute of Current World Affairs. Following his death, the remaining Sagemoor partners sold the vineyards to Allan Brothers of Naches.

Ravenholt's surviving family members manage his foundation and donated \$400,000 to the Ste. Michelle Wine Estates WSU Wine Science Center and \$100,000 to endow a lecture series for the WSU Viticulture and Enology program.

Kent Waliser, general manager of Sagemoor Vineyards, knew Ravenholt for the last eight years of his life. At the event, Waliser said to those gathered, "My privilege was to know him. Your privilege is to benefit from his surviving estate.

"It is my hope that, through this gift, our industry can bring to Washington many speakers from all over the world so that we may learn from them and they from us," Waliser said. "We will create ambassadors for Washington wine." ●

that it is an important source of the pathogen in the environment," he said. But what researchers still don't know, he added, is whether it can survive in other places in the environment, such as water, soil, weeds or other plants that could serve as reservoirs for it.

### Finding and controlling *A. vitis*

Researchers have been studying this pathogen for more than 30 years but have never had a good method for detecting the bacterium that causes it. Tests to ensure plants are clean and to identify infected plants can take weeks.

However, a new test developed at Cornell University by plant pathologist Kameka Johnson would shrink that time to just three to four days. Magnetic capture hybridization involves probing material

for a specific DNA sequence to determine if the bacterium is present. For crown gall, that involves the virD2 gene in the bacterium, which is essential for infection.

"This technique can only be used if you're looking for a specific target," Burr said. "Because agrobacterium needs virD2 to form galls, it really was just the perfect method for detecting crown gall in grapevines."

The assay avoids the detection of bacteria that are present in vines and do not cause crown gall, Burr said.

Researchers also see gains in biological control of crown gall. Another strain of *A. vitis*, F 2/5, is a non-tumorigenic strain that originated in South Africa. Researchers discovered that applying F 2/5 along with a tumorigenic strain to inoculate the plant, crown gall would not materialize.



However, F 2/5 still causes necrosis of the roots, so researchers worked to see if they could develop a derivative of F 2/5 that was necrosis-free. They knocked out the gene tied to causing the necrosis and found that it still maintains the ability to knock down the tumorigenic strain of *A. vitis*. They are working to develop the practice for commercial use.

“This is something that could be quite useful, both for treating grafts and treating dormant cuttings before rooting, two sites that could be infected with crown gall,” he said.

#### Advice for growers

In the meantime, growers should take steps to try to prevent crown gall in vineyards, Burr said. These include planting certified clean material and varieties that are more tolerant of the disease — all *Vitis vinifera* are susceptible, but some more so than others — in sites with good air circulation and well drained soil.

Two sites in the National Clean Plant Network provide the best options for

*“If you can plant a vineyard with clean plants, you certainly are not going to eliminate the presence of crown gall forever, but if you can get a healthy vineyard started, you’re way ahead.”*

—Thomas Burr

plant materials for Washington growers: Clean Plant Center Northwest and the Russell Ranch in California, which is at lower risk for the disease than other out-of-state centers but is not risk free, said Michelle Moyer, Washington State University plant pathologist. That’s because plants that are produced in a warm location could be infected and not show symptoms until they are exposed to a freeze after being planted in Washington.

Growers should reduce likelihood of cold damage by hilling around the trunks and train with multiple trunks, Moyer said. “The galls don’t appear until after bloom — after you’ve pruned — so keep some of those suckers as an insurance policy if you’ve had a cold snap,” she said.

Burr added that growers should manage vine growth with minimal amounts of water, while keeping vines in good shape heading into winter to protect against freeze damage as much as possible.

Kevin Judkins of Inland Desert Nursery made a similar point. Some growers are pushing the limit on what they can grow where — such as Cabernet Sauvignon in too cold an area. They need to be more selective about pairing growing sites and varieties and follow good management practices to prevent cold injury, he said. ●

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# Allan Brothers expands, purchases Gamache Vineyard

**Sale of historic vineyard includes  
180 acres of wine grapes, but not  
the Gamache Vintners winery.**

by Shannon Dininny

One of Washington's earliest commercial vineyards has been purchased by one of the state's oldest apple growing and packing companies, which continues its expansion into the wine grape business.

Allan Brothers announced the purchase of historic Gamache Vineyard, located on the White Bluffs in the Columbia Valley American Viticultural Area, in late January. The sale includes 180 acres of wine grapes and a 30-acre stone fruit orchard, but not the Gamache Vintners winery. Terms of the sale were not disclosed.

Brothers Roger and Bob Gamache developed Gamache Vineyard near Basin City, Washington, over 34 years, turning it into one of the state's premier vineyards. The vineyard is particularly known for its Riesling, planted in 1983, and 30-year-old Cabernet Sauvignon and Sauvignon Blanc blocks that have produced noteworthy fruit since the 1980s. Other varietals grown there include Merlot, Cabernet Franc, Syrah, Malbec, Pinot Gris, Chardonnay, Viognier and Roussanne.

Gamache Vineyard will be managed by Sagemoor Vineyards, a subsidiary of Allan Brothers.

"Gamache Vineyard is known for their attention to detail in the vineyard and providing award-winning fruit to over 35 different wineries across Washington, Oregon and Idaho," Sagemoor Director of Vineyard Operations Kent Waliser said in a statement. "We look forward to integrating our operations and growing with our customers."

Sagemoor Vineyards is composed of four properties — Sagemoor, Bacchus, Dionysus and Weinbau vineyards — comprising more than 900 acres. The vineyards sell to over 75 Washington wineries; Gamache and Sagemoor share many of the same customers.

Miles Kohl, CEO at Allan Brothers, said the new vineyard complements the goals established with the purchase of Sagemoor Vineyards nearly two years ago. "Acquisition of legacy vineyards with the reputation of Gamache Vineyard provide our winery customers

premium grapes to grow their brands," Kohl said.

Bob Gamache retired from the wine industry as a grower last year. Roger Gamache is starting a new endeavor on Washington's Red Mountain with 5 acres planted in Cabernet Sauvignon grapes.

He also will provide viticulture services through his custom business and will continue to serve on the board of directors of the Washington Wine Industry Foundation.

"The viticulture team at Sagemoor Vineyards are top notch, and we couldn't have asked for a better group to take on the legacy that has been built at Gamache Vineyard for the last 34 years," Roger Gamache said.

Roger Gamache also remains the managing partner of Gamache Vintners. His daughter Jessica, who joined the winery last year, continues to serve as general manager. The winery produces about 3,000 cases each year,

*"We couldn't have asked  
for a better group to  
take on the legacy  
that has been built at  
Gamache Vineyard for  
the last 34 years."*

—Roger Gamache



including its Heritage series honoring vineyards and viticulturists who "truly understand how to make wine in the vineyard," Roger Gamache told *Good Fruit Grower*.

Over the years, the winery has sourced grapes from Jim Holmes' Ciel du Cheval vineyard on Red Mountain and from Paul Champoux's vineyard in the Horse Heaven Hills, as well as the Gamaches' own vineyard.

Gamache Vintners will continue to source grapes from the vineyards purchased by Sagemoor. "We remain totally focused on the quality," Gamache said. "(Sagemoor) was willing to work with us so we can still continue to get our high quality fruit the way we want it harvested and grown for our own label."

The winery will keep rolling, he said.

"My brother, Bob, and I had a good run, considering we started our partnership in 1982," he said. "He has time now to spend with the grandkids and do some things he really enjoys. I'm slowing down a little bit, but I'm not going to sit on my laurels." ●





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# STINKBUG'S TMMARE



A *Trissolcus japonicus* parasitoid wasp emerges from a brown marmorated stinkbug egg at the USDA-APHIS Quarantine Facility in Corvallis, Oregon.

PHOTO ILLUSTRATION COURTESY CHRISTOPHER HEDSTROM

## A wasp no bigger than a flea could be the best tool against brown marmorated stinkbug.

by O. Casey Corr

If brown marmorated stinkbugs have emotions, they must be terrified of a baby killer named *Trissolcus japonicus*.

Growers might be fine with that given the threat posed by brown marmorated stinkbugs (BMSB). These stinkbugs, which are not native to North America, are voracious eaters that damage fruit, vegetable and ornamental plants. They also reproduce well: The stinkbugs overwinter as adults and emerge in the spring to begin mating, and a single female can deposit hundreds of eggs in her lifetime.

A parasitic wasp, *Trissolcus japonicus*, could be the perfect weapon to defeat them.

About the size of a flea, *T. japonicus* visits stinkbug egg clusters, attracted by the scent left by glands on stinkbug feet. *T. japonicus* jabs its ovipositor, a tube-like organ, into stinkbug eggs and injects its own eggs. The wasp's larvae gain nourishment by eating baby stinkbugs before they hatch.

If this reminds you of the science fiction *Alien* movies, scientists agree. In the movies, the alien larvae consume their hosts from within and eventually burst out.

*T. japonicus* does something similar, which makes it a surprisingly efficient killer of stinkbugs.

"They're pretty amazing creatures," said Dr. Kim Alan Hoelmer, an entomologist and acting director of the U.S. Department of Agriculture Overseas Biological Control Laboratories. He knows growers would be happy to see *T. japonicus* authorized as a stinkbug control, a step subject to federal review. So far, tests of chemical controls have not been promising, in part because stinkbugs can overwinter in protected places and move in and out of orchards. (See "Stinkbug continues its spread," *Good Fruit Grower*, December 15, 2015.)

The *T. japonicus* lifecycle is correlated to stinkbugs, but the adult wasps can live independently for months just on water or flower nectar. When a female *T. japonicus* finds a stinkbug egg mass, it deposits one of its eggs in each of the host eggs. The emerging *T. japonicus* are just 1.5 millimeters long, so tiny that scientists need microscopes to examine body parts. Males develop faster than females and emerge first and wait for their mates. When females emerge, the two mate, fertilizing the females, and off they go. "It's a rather strange but fascinating life cycle," Hoelmer said.

Scientists have not clocked the speed of their flight but *T. japonicus* has enough strength to make progress against wind. "These wasps are kind of muscle-bound," he said.

Hoelmer's interest in *Trissolcus japonicus* began after brown marmorated stinkbugs were discovered on the East Coast in the mid-1990s. A Cornell University entomologist, Richard Hoebeke, in 2001 determined that BMSB had come from Asia. BMSB has proven to be a much





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more severe pest than any of the stinkbugs native to the United States; annual damage to apple orchards alone is measured in the tens of millions of dollars, and BMSB is gaining territory. In 2013, a Vancouver, Washington, apple grower documented the first known BMSB damage in the Pacific Northwest. In Michigan, BMSB is now widespread. (See "Have you seen this stinkbug?" at right).

Since the brown bug came from China, Hoelmer and other researchers at several universities and agencies looked there to learn more about this stinkbug, including its natural predators. Researchers found several species of parasitic wasps that kill stinkbug eggs, with *T. japonicas* by far the most lethal threat. *T. japonicas* kills up to 90 percent of stinkbug eggs, but does not sting or harm humans or pose a threat to other plants or animals.

Researchers in 2007 brought *T. japonicas* to the U.S. for study in quarantine labs. Federal laws seek to prevent the escape of insects under review for fear of harm to the environment. In the labs, Hoelmer and others studied how *T. japonicas* lived, fed and died.

What did it eat? In China, *T. japonicas* primarily ate pest stinkbugs but not much was known about its appetite for non-pest species. In the USDA labs, researchers presented different stinkbugs to *T. japonicas*. Almost always in the tests, *T. japonicas* preferred brown marmorated stinkbugs. That gave weight to the theory that *T. japonicas* could work as a natural BSMB control.

Then came a big surprise.

The research populations of *T. japonicas* were kept under tight controls but in 2014, some wasps were discovered in the wild, just outside of Washington, D.C., in a Maryland suburb. No one knew how those wasps had

*"It's a rather strange but fascinating life cycle."*

—Kim Alan Hoelmer

entered the U.S., but the possibilities included arriving from Asia within stinkbug eggs laid on plant material on a cargo ship or hitchhiking on the clothing of a traveler. This discovery caused a hunt for more *T. japonicas*, which was found in the district, northern Virginia and other parts of Maryland. Then in October of last year, *T. japonicas* was found in two small clusters in Vancouver, Washington, by a field technician with Washington State University.

Researchers wondered if the *T. japonicas* found on both coasts were the same, but genetic analysis showed the two groups came from different populations and were unrelated to those under quarantine study, Hoelmer said. Clearly, *T. japonicas* is a savvy traveler.

These discoveries meant scientist are now studying *T. japonicas* on two tracks — those in quarantine and those in the wild.

Hoelmer said growers are hopeful that *T. japonicas* can be authorized as an agent to control brown marmorated stinkbugs. However, that step requires a review and permitting process, and it's unclear how long that would take. It's possible, he adds, that *T. japonicas* itself may bypass the process simply by proliferating in the wild.

And isn't that what happened in *Alien*? ●

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# Have you seen this stinkbug?

## Public responds to help track BMSB spread in Michigan.

by Leslie Mertz

If its pace of movement in other parts of the country is any indication, the brown marmorated stinkbug is only about five years away from becoming a prominent menace to Michigan fruit growers. To determine if that timeline is holding true, a Michigan State University expert decided to reach out to the public to learn just how widespread the stinkbug is. The results took her by surprise.



PHOTO BY LESLIE MERTZ


Julianna K. Wilson, Ph.D., tree fruit integrated pest management outreach specialist in the MSU Department of Entomology, felt brown marmorated stinkbugs in Michigan might be more pervasive than trap data suggested, and put out a call to the public to help gather a better picture of its spread. She was shocked by the response.

"The brown marmorated stinkbug was first detected in the mid-Atlantic states back in 1996, and just 10 years later it was a massive agricultural pest there. In Michigan, the first detection was in 2010, so we're now in the middle of that 10-year period," said Dr. Julianna Wilson, tree fruit integrated pest management (IPM) outreach specialist in the MSU Department of Entomology.

To track the pest, MSU extension professionals in 2014 and 2015 set pyramid traps at 60 sites, mainly in southwestern lower Michigan where the first stinkbugs were found. Those traps picked up stinkbugs — often just one or two — in 22 of Michigan's 83 counties, but Wilson suspected that the insect was much more widespread and numerous than the trap data suggested. "I was

kind of frustrated because we were doing all this work running around checking traps, but we were getting hardly any. That's because unless the bugs are in the vicinity of the traps, they don't come to the traps," she said.


Then she came up with an idea: She would issue a wanted poster of sorts. She wrote an article about the invading insect and put the question to the public: Have you seen this stinkbug? On Sept. 25, she posted



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PHOTO BY LESLIE MERTZ

Even novices can distinguish the invasive BMSBs from native stinkbugs, which was one reason Wilson sought public input. Above, Wilson explains that an adult BMSB (lower right corner) has several identifying features, such as striped antennae and legs, that are not present among native species (the four in the lower left corner). At right, the stripes on the antennae and legs are easily identifiable.



the article, “Report Sightings of Brown Marmorated Stink Bugs in Your Home or Business,” on the MSU Extension website ([bit.ly/1P1u8V0](http://bit.ly/1P1u8V0)). The article asked citizens to submit findings to the Midwest Invasive Species Information Network (MISIN), which collects reports about all kinds of non-native species.

The plea to the public made sense for a couple of reasons. First, BMSB is the only stinkbug species in Michigan that will congregate in large numbers inside houses during cold weather. In other words, if they are present in the area, homeowners will probably know about it, she said. Second, the adult BMSB is easy to distinguish from other stinkbug species because it has more rounded, smoother “shoulders,” distinctive white bands on its antennae and legs and a characteristic pattern on the margin of its abdomen. The combination of unique behavior and white banding on antennae make it easy for even novices to make a positive identification.

#### An overwhelming response

Wilson posted the article to the MSU Extension website on a Friday and shared it on her personal Facebook page. The webmaster contacted her Monday morning to tell her the article had gained traction; at one point, there were 100 people viewing it per minute, Wilson said with a still-incredulous drop of the jaw.

She said she believes the real boost in readership came from the Michigan

Master Gardener Association sharing her Facebook post, which led to more than 100 additional shares. Currently, the article has been viewed more than 100,000 times. “Clearly the timing was perfect,” she said. “The stinkbugs were coming into the houses, people were seeing them, and they were really eager to tell somebody about it, so I gave them the opportunity.”

All in, the number of MISIN reports of BMSB rose from eight prior to publication of the article to more than 2,500 as of mid-January. That flood of data showed that the pest had made its way into 46 counties, more than twice the number evidenced by the traps and sporadic samples that came in to the MSU Plant Diagnostic Lab. “If you look at the MISIN map that has been built from all of those records, you can see that they’re

in houses all over in the southern half of the Lower Peninsula,” she said, noting that some have also been discovered in the northern half of the Lower Peninsula, and one was even reported in the western Upper Peninsula.

This indicates that the BMSB has become a nuisance pest for homeowners, which mirrors the halfway point in the invasion timeline seen in the mid-Atlantic states.

#### The message for growers

Growers should take heed, she said. “Over the next few years, we expect it’s going to just become a bigger and bigger issue. We’re basing that on the pattern of infestation in the East, where it only took about 10 years before everyone was pulling their hair out because these bugs were just everywhere and causing so

*“If growers catch 10 in a trap (or a tray) within a week, they should be concerned.”*

—Julianna Wilson

much real economic loss.”

Unlike mid-Atlantic growers, who were caught off guard by this fruit-destroying pest, Midwest growers have time to circle the wagons and prepare a strong defense, she said. To help that process along, Wilson and her MSU cohorts are putting together a booklet that describes the biology of BMSB, how to monitor for it, and the best





PHOTO COURTESY GARY BERNON, USDA APHIS

management practices. That booklet should be available in June.

At present, only a handful of growers in the southwestern corner of the state are fighting major infestations. For most growers, fortunately, it probably won't be a serious pest in the coming growing season, she said. "However, I think that anyone who is in the southern part of Michigan probably should be scouting for it if they haven't already been." She recommends placing traps, which have been baited with aggregation-pheromone lures, at orchard margins where the stinkbugs are more likely to be found. Another option is to simply place a tray under a tree limb during the day and bump the limb.

This dislodges the stinkbugs, which will fall into the tray. "If growers catch 10

in a trap (or a tray) within a week, they should be concerned," she noted.

This information will also help in tracking the pest's spread in the state and in the country. "Right now, it seems to be confined between certain northern and southern latitudes, and Lower Michigan falls within that range. Whether there's some limiting factor preventing it from moving farther north or that it just hasn't expanded into those areas yet, we'll just have to wait and see," Wilson remarked.

She added, "In the meantime, we're just trying to help growers be in the know and in the loop, so the brown marmorated stinkbug doesn't cause a major disruption as it has in other places." ●

*Leslie Mertz, Ph.D., is a freelance writer based in Gaylord, Michigan.*

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*"If you're only trapping your own orchard, you might be missing the big picture."*

—David Haviland

# Searching for SPOTTED WING DROSOPHILA

**Experts say growers should look beyond orchards for SWD.**

by Leslie Mertz

**Y**ou've heard of spotted wing drosophila and the devastation it can cause to thin-skinned fruit, and you've seen the predictions that this pest may soon be coming to your area. As a cherry grower, you do the prudent thing: set out traps and monitor your orchard for the tiny flies so you can mount a timely defense, if necessary. As the season progresses, the traps remain empty, your fruit starts to color, and you think it's clear sailing.

Then one of your traps catches a few flies. You quickly check the cherries and

find they're already infested. What went wrong?

"If you're only trapping your own orchard, you might be missing the big picture," said David Haviland, entomology adviser for University of California Cooperative Extension in Kern County. The "big picture" is that the flies were living and reproducing happily nearby in other plants, their numbers were building, and when your cherries developed to the stage that attracts SWD, the insects made a beeline for your orchard and descended en masse on your fruit. The trigger for SWD is the assemblage

of volatile chemicals that the cherries release as they mature, he said. "As soon as the flies can smell those volatiles, they will start to move into the cherry orchard."

To truly stay on top of SWD, growers need to think outside the box, and in this case, that means outside the orchard in noncrop host plants, Haviland said. "The recommendation is to make sure you're trapping in any area surrounding the orchard that might be harboring spotted wing drosophila."

*Continued on page 32*



# Danger from SWD?

**Researchers are concerned that rising spotted wing drosophila numbers could cause problems for sweet cherries.**

by Leslie Mertz

Researchers hypothesized early last year that spotted wing drosophila populations wouldn't reach high enough levels by mid-July to impact the tart cherry harvest in Michigan, but they did: Loads of fruit were rejected, dumped or juiced.

Could the same thing happen to Michigan sweet cherries in 2016?

That was the question posed by extension specialist Nikki Rothwell, coordinator of the Northwest Michigan Horticulture Research Center, during a talk at the December Great Lakes Fruit, Vegetable and Farm Market EXPO.

Rothwell explained that although SWD didn't experience an exponential increase until August, populations did undergo an earlier-than-expected rise in July and therefore had an impact on tart cherries. Her concern is that SWD numbers could reach a critical point even sooner and cause a similar problem for sweet cherries, which are harvested about 10 to 14 days earlier than tart cherries.

In addition, she noted research that has found sizable numbers of SWD larvae in wild-growing, noncrop hosts adjacent to commercial blocks of both tart and sweet cherries (see "Searching for spotted wing drosophila" at left). This included Michigan studies showing heavy populations of SWD larvae in mulberry and honeysuckle in mid- to late-July, which coincides with late sweet cherry harvest. Traps in those noncrop hosts, however, were catching no adults at that time, suggesting that adults had already migrated to other hosts, including cherries. "These data, to me, indicate that we do have potential to have infestation in sweet cherries," she said.

Rothwell said, "SWD adults are successfully reproducing in many noncrop hosts adjacent to sweet cherries, but (as of 2015) they were not building populations early enough to cause problems in commercial sweet cherry orchards." That said, she asserted that if mated females are reproducing successfully in noncrop hosts next to orchards just a bit earlier in the season, "it's not a long flight to be moving into your commercial blocks."

Rothwell and other extension agents will be keeping a close watch on SWD in 2016 to gain a better understanding of the fly's population arc, its migration from noncrop hosts into cherries, and possible control measures, including the removal of host plants from the orchard's periphery and the best timing for pesticides. She said she hopes these efforts will provide needed guidance as growers in the state adjust to this intensifying pest. ●

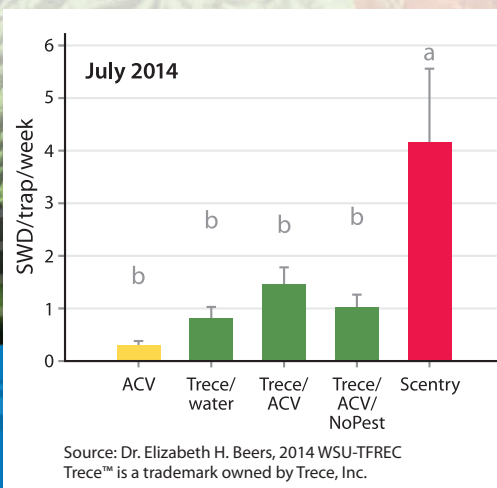
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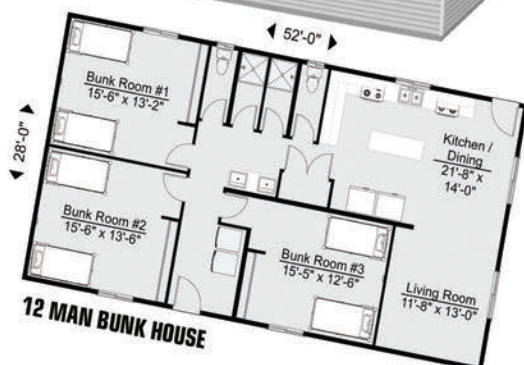
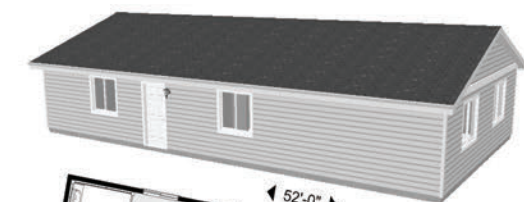


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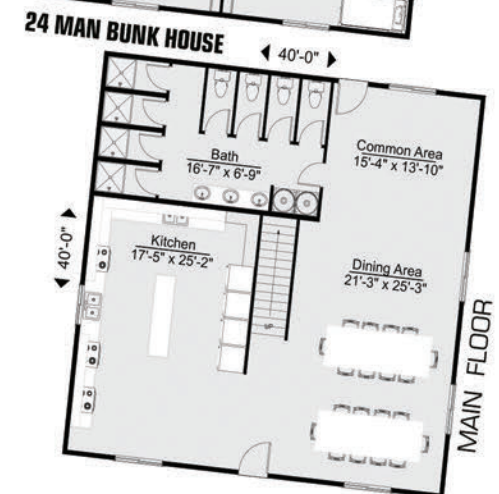
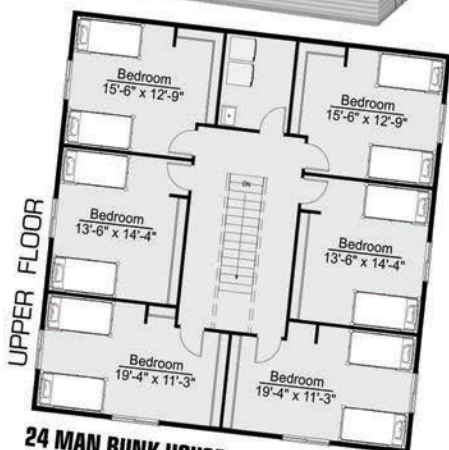
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PHOTO COURTESY KAREN POWERS

Nikki Rothwell, coordinator of the Northwest Michigan Horticulture Research Center, and fruit integrated pest management educator Emily Pochubay (right) use microscopes to scout for spotted wing drosophila larvae.

*If you catch  
one fly, that's  
the signal that  
you need to  
start protecting  
your fruit.*

—Nikki Rothwell

The culprit in Haviland's area of the country, which includes part of California's San Joaquin Valley, has only recently been identified. "In 2010, spotted wing drosophila had not been recognized in my county, but we were looking for it because we had heard about it farther north in the state. So we encouraged growers to go and put out spotted wing drosophila traps," he said.

Some of the participating cherry growers also managed citrus and thought oranges might be appealing to SWD.

Their hunch was right. The traps in citrus caught flies. This was an unexpected discovery, because SWD are unable to get through thick peels and have absolutely no impact on orange crops. Further investigation revealed that the flies ignore both whole and rotting oranges, but they will take up residence in oranges if they can access the pulp through splits in the rind. Almost every tree will have a few split oranges, he said, and that's enough to support SWD populations.

In the southern San Joaquin Valley,

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split oranges are now recognized as the primary reservoirs for SWD before they move into cherries, he said. "In our area, spotted wing drosophila is active all winter long, so it's really in the citrus from November until about March, and then it moves over into the cherries in March and April as they start to get ripe."

Other parts of the country will have different SWD reservoirs, Haviland noted. "It might be a riparian area with various host plants, or it might be a forest that's around your orchard."

#### Reviewing reservoirs

That's exactly what researchers are finding, according to extension specialist Nikki Rothwell, coordinator of the Northwest Michigan Horticulture Research Center. She presented information about SWD reservoirs during a talk at the December Great Lakes Fruit, Vegetable and Farm Market EXPO in Grand Rapids, Michigan. She mentioned Cornell University research that described numerous noncrop hosts for adult SWD, including barberry, buckthorn, choke cherry, honeysuckle, laurel, mulberry, pokeweed and many others.

With that in mind, she and other Michigan extension personnel put together a trapping effort in northwestern Lower Michigan to determine the prevalence of adult and larval SWD in noncrop hosts adjacent to both tart and sweet cherry orchards. This included mulberry and honeysuckle, which are common wild plants in the area.

They conducted weekly checks of 21 traps, harvested the fruit of those host plants as soon as it started to ripen,

gathered any larvae in the fruit, and then reared the larvae so they could verify whether they were SWD. The project confirmed that adult and larval SWD were indeed present in good numbers. "And we were getting a lot of larvae out of very few fruits," she said, noting that they found their first 48 SWD larvae in just 60 fruits collected from a mulberry tree right next to a sweet cherry orchard.

These results indicate that SWD does build up in noncrop hosts and therefore can migrate to nearby commercial blocks and attack salable fruit, so growers should definitely be trapping for SWD in these potential reservoirs, she said. "What's your threshold for taking action? Here's my threshold: one." She added, "If you're trapping and you catch one fly, I think that is the signal that you need to start protecting your fruit if it has lost that green color."

Trapping in nonhost plants is a good strategy, Haviland agreed. "We've had growers make the mistake of thinking that they don't have any spotted wing drosophila because they don't see them in their traps in the orchard. By the time they do find something in a trap, they've already got damage. That's because they didn't understand what was coming their way."

Growers everywhere can learn from that lesson, he added. "Every orchard is going to be different, and each pest-control advisor needs to think where flies might be coming from. If they trap those areas, that will give them a better indication of the threat that spotted wing drosophila poses to their cherries than if they only trap in their orchards." ●



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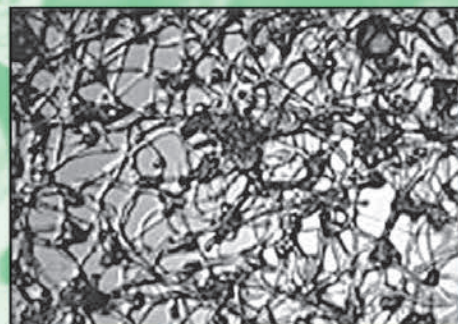
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# New peaches show promise

**Ontario's stone fruit industry collaborates for best varieties.**

*by Peter Mitham*

A reinvigorated industry is on the horizon for Canada's Ontario stone fruit growers, three years after the formation of a committee that puts industry stakeholders in the field alongside the breeder in test plots.

Stone fruit research in Ontario languished following the retirement in 1995 of Dr. Richard "Dick" Layne, who had overseen fruit breeding activities at the federal research station in Harrow, Ontario. Some of the most promising selections were transferred to the provincial research station in Vineland, but little was done with them. The discovery of plum pox virus (PPV) in 2000 effectively halted breeding and propagation activities, as well as the work of the Ontario Fruit Testing Association (OFTA), which had previously received plant material for testing.

During the past two decades, just four peach varieties have been released: Vollie, on the occasion of the centennial of the Vineland station in 2006, Vee Blush, Virtue and White Knight, all designed to fill gaps in the market. Of these, the early season variety Vee Blush has attracted the most interest.

Now, a host of new peach and nectarine varieties could be ready as early as 2018, thanks to the efforts of the Ontario Tender Fruit Evaluation Committee, established in 2012 with money remaining from the OFTA to guide breeding and commercialization activities.

The committee officially formed as a partnership between the Ontario Tender Fruit Growers (OTFG), the University of Guelph, and the Vineland Research and Innovation Centre, which now operates the Vineland research facility. Committee members who are engaged in outreach to stone fruit growers include Jay Subramanian, a professor of tree fruit breeding and biotechnology at the University of Guelph in Vineland who oversees the breeding activities; OTFG general manager Sarah Marshall; and Michael Kauzlaric, a researcher with the Vineland Research and Innovation Centre. The committee meets weekly during the growing season, reviewing about 60 varieties a year. The meetings usually attract 15 growers and industry members from nurseries to packers who provide feedback, bringing them into the discussions.

"They look at it from a different angle than what we as breeders look at it," Subramanian said. "It's not what I like that is important, it is what the growers like."

*Continued on page 37*





COURTESY ONTARIO TENDER FRUIT EVALUATION COMMITTEE

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## What's wanted?

Several challenges helped renew interest in finding new varieties of stone fruit for Ontario. The discovery of plum pox virus in the Niagara region in 2000 led to the removal of 377,400 peach and nectarine trees, compounding a shift that took place through the 1990s as acres of stone fruit orchards shifted into more lucrative fruit, such as wine grapes. With the closure of the CanGro Foods Inc. processing plant in St. Davids in 2008, the industry knew it had to turn its attention to fresh market fruit.

"A lot of the focus was in the processing area," said Michael Kauzlaric, a researcher with the Vineland Research and Innovation Centre engaged in outreach to stone fruit growers. "Then, about five or six years ago, there was a lot of excitement from pluots and plumcots that were being grown in California and exported to Ontario. That's when a lot of people got to thinking about new varieties."

Rather than compete directly with fruit from the U.S., growers in Ontario sought to focus on early season varieties that could provide local fruit to the market before the onslaught of summer's bounty. A sign of things to come: Vee Blush, a new, yellow-fleshed variety with redder skin and fewer split pits than Harrow Diamond, which is a longstanding mainstay of fresh market growers in Ontario.

Harrow Diamond doesn't get as nice a red color as Vee Blush, Kauzlaric said. "Consumers want to see a nice piece of red fruit instead of 70 percent red and 30 percent green."

However, Vee Blush matures in late July, whereas four new peach varieties being prepared for release will ripen earlier in the month.

—Peter Mitham



Harrow Diamond has been a mainstay of Ontario peach growers.

PHOTOS COURTESY ONTARIO TENDER FRUIT EVALUATION COMMITTEE

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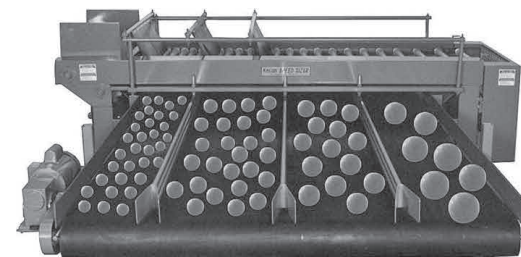
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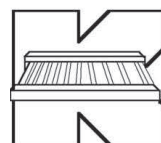
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Vollie, a yellow-fleshed peach, was released to mark the centennial of the Vinland research station in 2006.

Subramanian said of the four peach and four nectarine varieties on trial in commercial orchards right now, two might not have made the cut without feedback from industry.

"I might have very well removed them because they weren't in any way comparable to Vee Blush in terms of quality," he said. "But the point the industry made was, 'Yeah, that's true, Jay, but look at those fruits — they're large and they come a good week to 10 days before Vee Blush, which means we have that window and any fruit that goes early into the market will give us that extra dollar.'"

It's not only growers who stand to profit from participation in the variety selection process; the more appealing a variety release, the greater the uptake and, in turn, the greater the licensing fees it generates. This makes for a more cost-efficient selection process from start to finish.

"It's the way that Ontario wants to see new varieties being brought on. It's a three-year filtering process, and after the third year, it's a go or no-go, essentially," said Kauzlaric, who helps growers identify new varieties on behalf of Vineland, which commercializes the new varieties on behalf of the breeders (fulfilling a function similar to that of Summerland Varieties Corp., formerly the Okanagan Plant Improvement Corp., in British Columbia).

With eight new stone fruit varieties nearing release, Kauzlaric is keen to offer new, locally developed varieties alongside existing selections from programs at Rutgers and in Michigan. He said the committee hopes within 12 months to have a handful of varieties named and available for commercial planting in 2018.

That's good news to Phil Tregunno of Tregunno Fruit Farms Inc. near Niagara-on-the-Lake and chair of the Ontario Tender Fruit Growers. "The evaluation committee brings marketers, growers, nursery operators and researchers all together to share information which has been very beneficial in ramping up production," he said. "Vineland varieties of peaches and nectarines, as well as fire blight-resistant pears and improved varieties of apricots, are all being planted, which give growers a longer production season and consumers a wider choice of local fruit replacing imports." ●

*Peter Mitham is a freelance writer based in Vancouver, British Columbia.*

## Plum pox virus control zone

Getting local fruit varieties into local orchards is a particular challenge in Ontario because breeding work takes place within the Niagara region, where the movement of plant material is limited in an effort to prevent the spread of plum pox virus (PPV). While the industry established a mother block for propagating clean plant material outside the quarantine zone near Windsor, north of Detroit, Michigan, budwood must first go to the Canadian Food Inspection Agency's key plant health laboratory in Sidney, British Columbia, on Vancouver Island, for cleanup.

"That's a three- to four-year process, so all of a sudden, if variety X looks good, then a grower almost has to wait six or seven years to start testing it or look at it on their commercial site," said Michael Kauzlaric, a researcher with the Vineland

Research and Innovation Centre who works with growers seeking new varieties.

To give growers a head start, the evaluation committee won a relaxation of the quarantine rules. Growers within the PPV control zone are able to receive plant material from Vineland and develop plantings of new varieties on a limited basis.

Commercial orchards in the Niagara region now have trial plantings totaling approximately 1,200 trees of eight peach and nectarine varieties now moving through final testing and registration. "We're doing virus cleanup in parallel to commercial testing," Kauzlaric said.

"Growers (will) have had four or five years of experience with the variety at their own site, and they can say yes or no, and then — boom! — 10,000 or 20,000 trees can get planted ... instead of waiting another three or four years after it arrives in Windsor." —**Peter Mitham**

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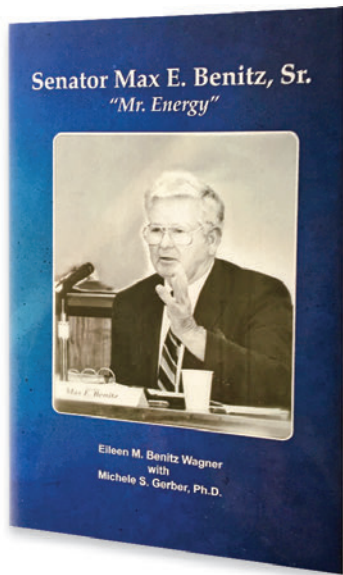


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# GOOD STUFF

A selection of the latest products and services for tree fruit and grape growers



## Late fruit grower's children publish book about father

The children of Max E. Benitz Sr. have published a book about their late father, a Washington state senator and one of the pioneer fruit and wine grape growers in the Roza Irrigation District.

*Senator Max E. Benitz, Sr.: 'Mr. Energy'* chronicles the life and career of Benitz, who helped create Washington State University, Tri-Cities, and worked with the late Dr. Walter Clore to plant some of the early wine grape vineyards in Washington. The book, published by NorTex Press of Fort Worth, Texas, was written by his daughter, Eileen M. Benitz Wagener, of The Woodlands, Texas, and Dr. Michele S. Gerber, a Richland, Washington,

historian and author hired by the family. Wagener's four siblings also contributed.

Benitz, who moved to Washington in 1934 from Wathena, Kansas, first planted crops near Prosser in 1946, growing more than 700 acres of hops, wine grapes and tree fruit over 45 years. He served as the state Farm Bureau president and on the National Farm Bureau board of directors.

Benitz, a Republican from Prosser, Washington, represented the 8th District in the state House of Representatives from 1968-1974 and the state Senate from 1974-1990. He co-sponsored several pieces of legislation that encouraged growth in the state's wine industry, including the 1987 bill that created the Washington Wine Commission.

He died on Aug. 29, 1990. The library at WSU, Tri-Cities, is named in his honor.

The book sells for \$19.95 on Amazon.

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Fine Americas has released a new formulation Exilis 9.5 SC as its leading post-bloom thinning agent for apples and pears based on the active ingredient benzyladenine.

The new formulation is five times more concentrated than current formulations on the market to improve handling and mixing, reduce storage space and reduce environmental impact, while still providing fruit thinning and increased fruit size. It is sold in 1-quart containers, compared with Exilis Plus in 1-gallon containers.

Fine Americas worked with leading industry researchers over a number of years to develop this advanced formulation. "Our research has shown that growers will get the same top-notch performance in terms of thinning with Exilis 9.5 SC that they saw with Exilis Plus," said Jim Scruggs, technical services manager for Fine Americas.

Company representatives are currently offering measuring cups to assist in accurate mixing as growers adapt to the new formulation.

For more information, visit [www.fine-americas.com](http://www.fine-americas.com).



## LiftGator releases battery-charged liftgate

LiftGator, based in Atascadero, California, has released its LiftGator XTR, a full-size liftgate that is capable of lifting up to 1,200 pounds and features a self-contained battery system.

The battery system allows the LiftGator XTR to be attached to any truck at any time, making it an optimal solution for users with multiple trucks. More than 30 lifts can be completed from a single charge, and the battery can be recharged from a truck's seven-pin trailer connector or a 110-volt wall outlet.

For more information visit [www.LiftGator.com](http://www.LiftGator.com), email [info@LiftGator.com](mailto:info@LiftGator.com) or call 805-448-7183.

## Farm Fuel Inc. offers mustard seed cover crops

Farm Fuel Inc., a research and development firm that provides consultation to farmers and orchardists, is promoting the increased use of mustard seed cover crops for soil biofumigation and weed control.

Farm Fuel is a distributor of Pacific Gold and IdaGold cover crop seeds, which are sold under the brand name Mighty Mustard by Davidson Commodities of Spokane, Washington.

A Pacific Gold mustard cover crop, grown for eight to 12 weeks, releases glucosinolates when irrigated after it is chopped up and either incorporated or left on top of the soil. These glucosinolates, which are the "heat" of the mustard plant, aid with control of unwanted pests like root knot nematodes and fungal diseases.

IdaGold shades out unwanted weeds and eventually emits its own type of heat into the soil when chopped and irrigated to suppress weed seeds.

For more information, contact Ellen Farmer at 831-763-3950.



PHOTO BY FERNANDO GARCIA

## New distributor for Shur Farms

Shur Farms Frost Protection has a new distributor serving Canada and the northeastern United States: Provide Agro Corp. of Ontario, Canada.

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# GOOD TO GO

For a complete listing of upcoming events, check the Calendar at [www.goodfruit.com](http://www.goodfruit.com)

## Farm worker training workshops scheduled

The Washington State Tree Fruit Association is hosting a series of educational training workshops for farm workers in collaboration with its industry partners: Washington State Department of Agriculture (WSDA), Washington State Department of Labor & Industries (L&I), Washington State University Extension and sponsors.

The sessions are intended for Spanish speakers, but if English-speaking registrants reach 50 percent of the class, additional classes will be added in English.

The sessions are scheduled as follows:

—**March 1:** WPS Hands-On Training for Pesticide Handlers at the Washington Apple Commission, 2900 Euclid Ave., Wenatchee, Washington (WSDA/L&I).

—**March 11:** Spray Application Equipment Best Management Practices at Washington State Tree Fruit Research and Extension Center, 1100 Western Ave., Wenatchee (WSDA/WSU Extension).

—**March 22:** Recall Ready – Holiday Inn Downtown, 802 E. Yakima Ave., Yakima, Washington (United Fresh).

—**March 23:** Recall Ready – Confluence Technology Center, 285 Technology Center Way, Wenatchee (United Fresh).

For more information, please contact Joanne Thomas at 509-665-9641 or visit [www.wstfa.org/events-calendar](http://www.wstfa.org/events-calendar).

## MARCH

**March 1-2:** Fruit Ripening & Ethylene Management Workshop, Davis, California, UC Davis Campus, [postharvest.ucdavis.edu/Education/fruitripening](http://postharvest.ucdavis.edu/Education/fruitripening).

**March 2:** Cherry Day, Stockton, California, sponsored by the California Cherry Growers and Industries Foundation, California Cherry Advisory Board and California Cherry Export Association.

**March 14:** New Technology in Apple Scab and Fire Blight Management, Hyde Park, New York, [www.redtomato.org/summit](http://www.redtomato.org/summit).

## Cherry Day in California

The California Cherry Growers and Industries Foundation, California Cherry Advisory Board and California Cherry Export Association will hold Cherry Day on Wednesday, March 2, in Stockton, California.

The program includes a panel of speakers on a variety of subjects of interest to California cherry growers. The event is being held at the Waterloo Gun and Bocce Club at 4343 N. Ashley Lane in Stockton.



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## Orchard-Rite® PRODUCT REVIEW



# WINE GRAPES: an IPM success story

**Integrated pest management research has saved Washington's wine grape growers millions in pesticide costs.**

*by Melissa Hansen,  
Washington State Wine Commission*

**W**ashington'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.



MELISSA HANSEN

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

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. ●

*Melissa Hansen is Research Program Manager for the Washington State Wine Commission.*



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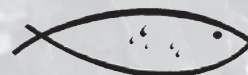
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**THE NORTHWEST HORTICULTURAL** Council (NHC) is seeking applicants for the position of vice president for scientific affairs. The NHC is a trade association, based in Yakima, Washington, that represents the tree-fruit industry of Idaho, Oregon, and Washington on federal and international policy issues. Information about the NHC may be obtained at [www.nwhort.org](http://www.nwhort.org). A candidate should possess a strong academic record and hold an advanced degree in a scientific field, such as biology, food safety, chemistry, horticulture, or plant pathology. He or she should be an able public communicator, both in terms of writing and speaking. We are looking for an active problem-solver, one who can lead and work cooperatively on commercially important projects with universities, federal and state agencies, and private industry. A candidate must have five or more years of post-university work experience. Preference will be given to candidates with deciduous tree-fruit production or handling knowledge and strong project-management expertise. Letters of application should be submitted to the NHC at 105 S 18th Street, Suite 105, Yakima, WA, 98901 or to [general@wahort.org](mailto:general@wahort.org) and will be accepted until the position is filled.

**WE ARE SEEKING** a Marketing Content Manager to help grow revenue, product, and brand recognition within the Irrigation Management market. The successful candidate will collaborate with the product development team to create a marketing and sales strategy for new and existing products. They will lead a marketing team to create and deliver marketing projects in line with the market strategy and goals. In addition to marketing and leadership skills, the successful candidate will have copy writing experience and be willing to contribute these skills to the marketing team. For further information, call 509-332-5581. To apply for the position fill out an application at <https://decagon.applicantpro.com/jobs/330972.html>.

**GOOD FRUIT GROWER**, a magazine based in Yakima, Washington, that covers the tree fruit and wine grape industries, is looking for an exceptional person to serve as Audience Development Manager. This person will oversee our circulation-fulfillment system and will bring an entrepreneurial leadership to development and implementation of campaigns to strengthen and grow audiences on print and digital platforms. The Audience Development Manager will be expected to increase subscriptions and profitability of reader-related services. Required skills: A Bachelor of Arts in a related field; experience in circulation and marketing and use of circulation databases; proficiency in Excel. Highly desired: Proven success in relevant marketing campaigns across print and electronic channels; familiarity with agriculture and growers; fluency in Spanish and English. This exempt position calls for some travel to trade shows within Washington State and to shows elsewhere, such as Oregon, Michigan and New York. Application materials are due March 15. Applicants should submit a resume and a cover letter describing relevant experience and accomplishments in audience development/circulation fulfillment. Applicant materials must be submitted to [goodfruitjob@outlook.com](mailto:goodfruitjob@outlook.com). Details about the job and hiring process may be found at <http://www.goodfruit.com/were-hiring-audience-development-manager/>. *Good Fruit Grower* was established in 1946 and is headquartered in Yakima, Washington, in the scenic center of one of the world's top tree fruit and grape growing regions. Published 17 times a year and distributed to 50 states and 50 countries, *Good Fruit Grower* covers the growing, packing, handling, marketing, and promotion of tree fruits (apples, pears, cherries, apricots, peaches, nectarines, prunes, and plums), as well as juice and wine grape production. This position is exempt and offers a competitive salary with strong benefits. *Good Fruit Grower* staff are employees of the Washington State Fruit Commission, a state agency. The commission is an equal opportunity employer and does not discriminate on the basis of race, color, gender, religion, age, sexual orientation, national or ethnic origin, disability, marital status, or veteran status in accordance with state and federal laws.

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## Joe Brandt

grower / Wapato, Washington

age / 33

crops / Apples, peaches, nectarines, apricots, cherries, pears

business / E.W. Brandt & Sons

**family background** / Joe returned to the 1,500-acre family farm after working in finance and manages domestic and export sales and marketing for the company. He is the grandson of Everett and Ada Brandt and the son of Allen and Carol Brandt.

### How did you get your start?

“When you grow up in this industry, you aren’t really paying attention to what’s going on. When I left for college, I didn’t want anything to do with coming back. My first couple years back was pretty rough. Thankfully, my dad put me in the right position. I learned what kind of fruit customers wanted. I had to learn to keep my ears open, my mouth shut and pay attention to what’s going on because something that doesn’t make sense now will at some point start to come together.

### What is the focus of your job?

“Part of being successful is knowing your customer base, being able to gather data from your buyers and cross-reference that against data from the fruit shippers, then putting the two together to find common ground. Another thing is staying up to date with countries that grow apples. Knowing what type of volume they have, where they’re shipping, do they have a logistical freight advantage, figuring out the numbers and then getting with your customers to figure out what dollar figure you’ve got to be at to move your fruit. You need to have the skills to gather data from different areas to create that strategy.

### How do you see data being used in the coming years?

“Data is going to play a lot bigger role than it has in the past, because the generation that’s coming into the industry is in tune with technology and tools that are at our disposal regarding numbers. Having the ability to work with the technology that’s out there today is important.

### Why did you want to work in the industry?

“This industry is unlike any other. I can be talking with someone from Chicago, then I’m talking with someone from New York, then India or China — the list just goes on and on. So when I’m traveling for my job I get to meet a lot of really good people and see the different cultures — all while working in perishables, which is very stressful. But in the end it’s really gratifying. It’s something that gets me going. I love it.

“Going forward, I think we’ll lean on data more than ever.

by TJ Mullinax

More from this interview and other Young Growers at [goodfruit.com/yg](http://goodfruit.com/yg).



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Apple growers need to do many things early season at the same time to ensure quality fruit at harvest. Four of the most important early seasons tasks are 1) maximizing calcium uptake into the developing fruit, 2) improving fruit size 3) managing terminal growth and 4) managing tree fruit load. System Cal from Agro-K can improve the performance of the most important PGR tools used for sizing, thinning and managing terminal growth that are critical to maximizing fruit quality and grower profitability. **Now you can do all these critical tasks while also supplying systemic calcium during peak demand. System-CAL<sup>®</sup>, Agro-K's foliar calcium is the perfect apple PGR tank-mix partner.**

## Effects of System-Cal & Maxcel on Size of McIntosh Apples

Treatments		
Petal fall	10 mm	fruit wgt (gr)
Untreated Control	Control	156 c
Carbaryl 1 lb/100 gal + NAA 7.5 ppm	Carbaryl 1 lb/100 gal + MaxCel 100 ppm	191 b
Carbaryl 1 lb/100 gal + NAA 7.5 ppm + System-CAL 2 qts/100 gal	Carbaryl 1 lb/100 gal + MaxCel 100 ppm + System-CAL 2 qts/100 gal	255 a

Trial conducted by Duane Greene, University of Massachusetts 2010

## Effects of System-Cal on Size of Gala Apples

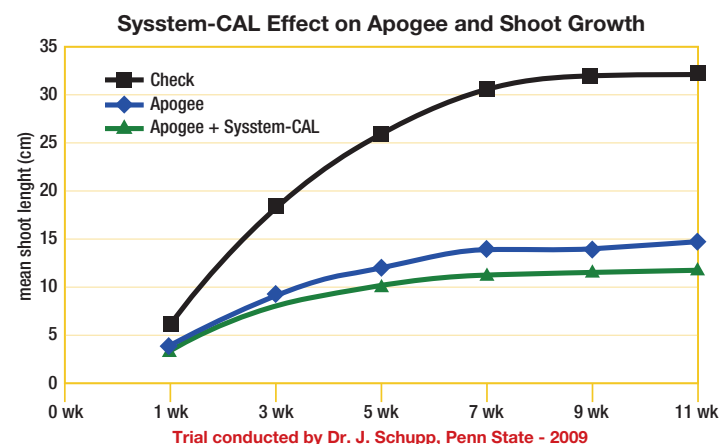
Treatments		Fruit Size		
Petal fall	10-13 mm	<2.75"	2.75" -3"	>3"
Carbaryl 24 oz	Carbaryl 24 oz + Maxcel 2qts	46.0	41.0	13.0
Carbaryl 24 oz + System-Cal 2qts	Carbaryl 24 oz + Maxcel 2qts + System-Cal 2qts	39.0	37.0	24.0

Trial Conducted by Reality Research, Wayne Cty, NY - 2010

Large, firm apples, free from bitter pit generate the highest per acre return. Private and university research shows System-Cal's positive effects on size. Dr. Duane Greene, UMass stated, *"clearly System-CAL when combined with MaxCel<sup>®</sup> had a profound effect on increasing fruit size."* Not only does System-CAL aid in maximizing fruit size, but it also supplies needed calcium at the same time for better firmness and storage life.

In 2011 Dr. Fallahi (Univ. of ID) saw similar results as Dr. Greene (UMass) and had these comments: *"Un-treated controlled had smallest fruits. But those with System-Cal<sup>TM</sup> 2Qts + MaxCel<sup>®</sup> 128oz at 5-10mm@200G/A had the largest fruit of any of the*

*treatments. Fruit from trees receiving Grower's Treatment (Sevin and NAA) had lower firmness at harvest as compared to control and the System-Cal<sup>TM</sup> and MaxCel<sup>®</sup> treatments. Enrichment with Ca from System-Cal<sup>TM</sup> could have also contributed to higher firmness in System-Cal<sup>TM</sup>-treated fruits."*



Apples need early season calcium for best quality. Growers want early applications of Apogee<sup>®</sup> to manage terminal growth, but calcium can be antagonistic to Apogee<sup>®</sup>. University research from WSU, Penn State and UMass as well as private researchers have documented that System-CAL<sup>TM</sup> does not interfere with Apogee<sup>®</sup>, allowing it to control terminal growth and help growers manage fire blight more effectively.

The unique formulation of System-CAL links calcium to a highly systemic phosphite. This patent-pending technology provides rapid calcium penetration and translocation into the fruit where calcium is most needed. System-Cal maximizes calcium and cell wall development, resulting in reduced bitter pit and improved pack-out while maximizing storage and shelf life. Call **800-328-2418** or visit **www.agro-k.com**.

**Science-Driven Nutrition<sup>SM</sup>**

## Effects of System-Cal<sup>TM</sup> (Sys) and MaxCel<sup>®</sup> (Max) Yield and Fruit Quality

Treatment	Avg. Weight (g)	Yield Kg/Tree	Sunburn %	Firmness 2.5mths Storage	Rotten %	Ca (ppm)
Control	188.2	29.77	8.2	6.950	5.82	5.45
Maxcel 128oz PF	217.7	29.67	11.1	6.953	8.04	6.02
System-Cal + Maxcel 128oz 5-10mm	227.1	46.17	6.7	6.699	5.56	6.25
Grower Std.(Sevin & NAA)	221.6	36.78	8.4	6.146	10.71	6.05

Dr. Essie Fallahi, Univ. of Idaho, 2011

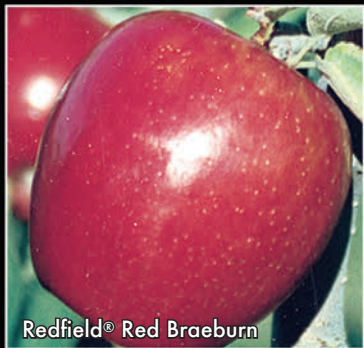


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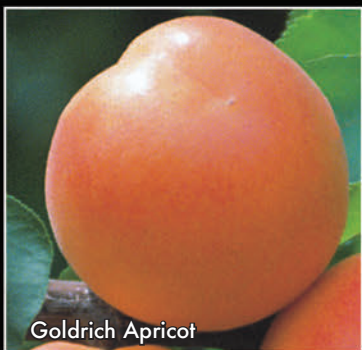
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