

WINES & VINES

 [PRINT »](#)

 [E-MAIL THIS PAGE »](#)

 [CLOSE THIS WINDOW »](#)

Feature Article from the September 2008 Magazine Issue

Managing Pests Organically

Simple switch to chemical-free pesticides won't get the job done

by [Glenn T. McGourty](#)



*CJ Battey of the Kent Daane Laboratory at the University of California, Berkeley, releases *Anagyrus pseudococci*, a parasitoid that attacks second-, third- and adult-stage vine mealybugs.*

Organic winegrowers must deal with the same pests as conventional winegrowers. It is surprising to many that pest management is not a difficult task for most organic winegrowers, and that very effective strategies and organic pesticides are available. Yet at the beginning, most organic winegrowers undergo some very basic philosophical changes in pest management.

Dr. Ann Thrupp of [Fetzer Vineyards](#) sums it up best, "If you think all that you have to do is substitute organic pesticides for conventional pesticides, you are going to be disappointed and probably not very successful. You need to use a *systems approach*, where all of your efforts in the vineyard help you to ward off problems. Everything you do must help to balance the vines, so that you minimize their susceptibility to insect and disease attack."

Part II in a series on organic winegrowing

In this series of articles, we will present information for growers and wineries interested in farming their vineyards organically, based on the author's knowledge and experience during the past 20 years of working with organic winegrowers in Lake and Mendocino counties. Glenn T. McGourty is a winegrowing and plant

Organic winegrowers focus on several approaches to minimize pest problems in the vineyard:

Integrated Pest Management (IPM) approach:

IPM is a pest management strategy useful for any farming system. Organic growers are encouraged to know all of the life stages of vineyard pests and when they are most easily controlled; the pest population levels that are likely to cause problems (economic threshold) and if there are predators and parasitoids that are likely to control them.

science adviser with the University of California Cooperative Extension in Mendocino County, Calif. The four parts of the series are:

- [Going through transition and building your soil](#)
- [Pest management](#)
- [Disease management](#)
- [Viticultural practices](#)

[Welcome these 'friends' to your organic vineyard](#)

An effective organic pest management program involves understanding sampling procedures (when, where and what to look for), economic injury levels, cultural and biological controls as preventatives, and judicious use of chemicals. If at all possible, spraying is avoided. Even though most of the organic insecticides and miticides are not highly toxic, they are not particularly selective, and may also injure very helpful beneficial insects. You can find excellent information for vineyard pest management on the University of California Integrated Pest Management Program website, ipm.ucdavis.edu.

Create habitat for beneficials: Various strategies are used to make places for beneficial insects to live and feed. Dr. Steve Wratten, a biological control researcher from Lincoln University in New Zealand, who specializes in "ecological engineering for pest management," talks about a concept that he calls SNAP:

- S = shelter, or habitat for the beneficials to live in
- N = nectar, since many parasitic wasps use nectar as an alternative food source
- A = alternative prey for beneficials, such as having prune trees or blackberry vines in which the parasitic wasp *Anagrus epos* can find and feed on other species of leaf hoppers to build up their numbers before the grapevines are growing. (This remains somewhat controversial, because the populations of leaf hoppers on alternative plants may be overwhelmed in the fall by *Anagrus* wasps leaving the vineyard looking for other food sources.) By the time the grape leafhopper appears, there are significant numbers of the parasitic wasps ready to parasitize the leafhopper eggs.
- P = pollen, which is also another food source for beneficials, especially predatory mites which help to control Pacific mites--*Tetranychus pacificus* (McGregor) and Willamette mites *Eotetranychus willamettei* (McGregor).

Wratten is researching parasitic wasps and their effectiveness on leaf rollers whose larvae may

HIGHLIGHTS

- Integrated Pest Management systems help farmers understand what's at work in their vineyards.
- Making peace with beneficial insects is of particular importance to organic grapegrowers.
- New pests, such as the vine mealybug and the light brown apple moth, demonstrate the need for ongoing education about pests.

feed on grape clusters resulting in bunch rot and other damage.



"You need to use a systems approach, where all of your efforts in the vineyard help you to ward off problems."
--Dr. Ann Thrupp,
Fetzer Vineyards

"Planting cover crops like buckwheat, alyssum and phacelia is extremely cost effective, because the pollen they produce helps to increase the fecundity of some of our parasitic wasps six-fold. With pollen and nectar, the parasitic wasps also live almost three times as long--18 days compared to six days. When there is a good supplemental diet, the male-to-female sex ratio of the population changes, producing nearly a 2:1 ratio of females to males, compared to a 1:1 ratio when extra pollen and nectar aren't present.

"The females do the parasitizing, so having more of them is an advantage. Finally, we found that when we planted every ninth row middle with a buckwheat, alyssum and phacelia mix, we had less than half the damage to grape bunches compared to the control treatment of no cover crop. The cover crops helped to keep the crop well under the economic threshold that would

need treatment--all of this for around \$15 an acre to seed in the cover crop. It is very cost effective." (Wratten presented this information in a talk entitled Biodiversity in Vineyards for Sustainability and Profit at the Second EcoWinegrowing Conference held Aug. 22, 2007, in Hopland, Calif.)

Integrated canopy management and vine balance: Everything you do to keep the vines well balanced and the fruiting zone aerated with dappled sunlight also will help your pest-management efforts. Vines that are excessively vigorous (pumped up on water and nitrogen) are very attractive to leaf hoppers (*Erythroneura sp.*), powdery mildew and bunch rot.

On the other extreme, vines that are drought-stressed in a dusty environment are very susceptible to mites, including Pacific mite and Willamette mite; sunburn, poor coloring and shriveling, creating unbalanced wines that can have high alcohol, high acid and harsh tannins. Maintaining vines in a healthy state in which there is a reasonable crop load, adequate canopy and sufficient but not excessive nutrients and water is the first step in pest management by not making the vines attractive and susceptible to pests.

Leaf removal shortly after fruit set is also useful for reducing the number of leaf hoppers in the first instar (developmental) stage, while creating conditions less favorable for powdery mildew.

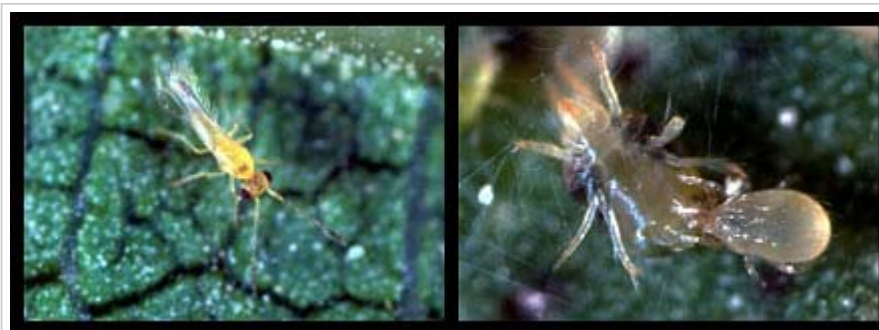
Don't worry, be happy!

The surprising reality is that the transition from conventional growing to organic growing from a pest management perspective is not that difficult for most growers, at least in coastal vineyard areas. Since most organic growers use cover crops, have modest production goals and therefore don't over-water or apply high levels of nitrogen, they are well on their way to creating vine balance and habitat for beneficial insects. They are often pleasantly surprised that the need for spraying vineyard pests is not as daunting as imagined initially.

"We haven't sprayed insecticides in our vineyards since I've been here," says Randy Krag, a vineyard manager for Lake County, Calif.-based Beckstoffer Vineyards, which has 80 acres in organic transition. "Our original vineyard manager, Frank Anderson, had a philosophy that

insecticides were not going to be part of our program." The 600 acres of vineyard is in the upland area of Red Hills near Clear Lake that is planted in red volcanic soils laced with black obsidian rock, mostly to Cabernet Sauvignon.

Krag, who has a degree in pest management from the University of California, Davis, relies on numerous beneficial insects that live in the vineyard to keep pest levels in check. "In the past, I think our bias was to over manage things. Frank encouraged me not to worry about every single pest. It was sort of liberating. Pests (and their enemies) are sort of part of the *terroir*, and I've learned to let the vines make peace with their location. They can stand up well and are remarkably strong individuals. I've learned to watch the hot spots where pests are likely to occur, and then spend some time thinking about what might have happened to encourage the pest conditions--too much sulfur dust, an overly vigorous canopy--and avoid the problem in the next year. Meanwhile, I find lots of beneficial insects and spiders, including minute pirate bugs, *Anagrus* wasps, predatory mites--and I know that we have a healthy situation."



Anagrus epos wasps (above left) parasitize grape leafhopper eggs. Predatory mites (above right) attack spider mite populations.

Mites do require management. "Under our warm and dry conditions," Krag says, "mites are something we have to pay attention to. Early in the year, Willamette mites are present, but they tend to fade out as the weather gets hot. Then Pacific mites may become a problem. Some varieties, like Zinfandel, are very prone to mites. In a research project that we have done with UC, we have found that by reducing the use of sulfur in our vineyards and releasing beneficial mites early in the season, we are not having the problems we used to have. It is now a routine practice for us to release *Galendromus occidentalis* predatory mites at the rate of 2,500 mites per acre in June. It seems to be working.

"When I look, I find predatory mites, and the pest species are not present in damaging numbers," Krag explains.

He has replaced early applications of wettable sulfur with JMS stylet oil and is limiting sulfur dust by alternating with other compounds acceptable for organic winegrowing.

Ron Bartolucci also farms organically in Lake County, with properties both in the upland Red Hills area (planted mostly to red Bordeaux varieties) as well as in the Big Valley area, where the vineyards are planted on flat fertile soils to both red and white varieties including Chardonnay, Sauvignon Blanc and Viognier. These vineyards are an important source of fruit for the Bonterra brand processed in nearby Hopland in Mendocino County. Bartolucci is a pioneer of organic winegrowing, and he helped Fetzer Vineyards when it started transitioning vineyard acreage to organic in the late 1980s to become the largest organic grapegrower in the United States. (Sister brands Fetzer and Bonterra now farm more than 1,700 certified-organic acres.)

Bartolucci is a strict believer in IPM and depends on weekly pest scouting performed by pest control advisor (PCA) Mike Boer of Ag Unlimited. "We keep track of both leaf hoppers and mites on a weekly basis. We are looking for beneficials and pests alike. We avoid spraying. We do leaf pulling early, and careful canopy management to maintain an open canopy. Experience has shown us that pulling the leaves also reduces leaf hopper problems, since the first instars are often on the leaves, and they die when we throw them on the ground. We know which blocks are likely to have a problem, and we tend to treat early if we see pest numbers climbing. We use mostly JMS stilet oil for mites and Pyganic for leaf hoppers. The amount of acreage we treat is usually less than 10% of all of our acreage."

In nearby Potter Valley, Guinness McFadden farms around 100 acres and was one of the first growers in California to certify his vineyards as organic in the mid-1980s. "Our conditions are pretty fertile, since we use compost and cover crops almost every year. We often have big canopies, and big crops, particularly with our Sauvignon Blanc and Chardonnay. I rely on local PCA Devin Gordon to check our vineyard weekly. Usually, nature takes care of our pests. The one exception is Gewürtztraminer, which is highly susceptible to leaf hoppers. When we have had problems with leaf hoppers, applications of Pyganic have been pretty impressive in their ability to control the pests."

Pierce's disease

Pierce's disease is a chronic problem in California's North Coast region. At Bonterra's beautiful McNab Ranch, which is farmed Biodynamically and is also certified as organic, Pierce's disease (PD) severely damaged vines in 2001 and 2002. "We lost almost 18% of the vines along McNab Creek," according to vineyard manager Chad Bordman.

In consultation with UC area pest management adviser Lucia Varela, Bordman and his crew removed all of the vegetation likely to host Pierce's disease, including Himalaya black berry, California mugwort and other plants known to host the bacterium *Xylella fastidiosa*. The riparian areas are sizeable on the McNab Ranch and required considerable expense to treat. Only the host plants were removed, so the area was minimally disturbed. Next, Bordman and I began a four-year study to evaluate if Surround (kaolin clay) would discourage feeding by the blue green sharpshooter.

"We discovered that the blue green sharpshooter was outnumbered by willow sharpshooters almost 10:1," Bordman recalls. "Willow sharpshooters are also known to vector PD. Surround definitely discouraged feeding, but didn't stop it altogether. We also found that most of the feeding from the riparian area happens from around late March to early June, and is confined to the first 250 feet from the edge of the vineyard. We are treating the end of the rows in this area. Between our vegetation management and the Surround sprays, we have really reduced the problems that we used to have," Bordman says.

"We are also trying to revegetate and stabilize our riparian areas. We have been working with local Natural Resource and Conservation Service conservationist Carol Mandel, and we've made some real major improvements based on her advice. This property was formerly a sheep ranch, and there was a lot of damage to the riparian areas from uncontrolled grazing and other poor land use practices. We have prime salmonid habitat, and we are participating in Fish Friendly Farming. We value the riparian areas as important habitat for plant and animal biodiversity, and we are happy to see the improvements over time of the health of these areas."

Insectary plantings

Some organic growers and many Biodynamic growers like to use insectary plantings as part of their strategy to control pests. Many are designed as reservoirs for generalist predators and parasitoids. Insectaries are often quite attractive, and are planted with numerous flowering species that provide habitat, pollen and nectar, and prey for beneficials.

They also serve another important ecological function as habitat for pollinators, both introduced (honeybees) and native. "There is a crisis going on in California with the loss of our native pollinators," according to Dr. Gordon Frankie, a bee expert from UC Berkeley. "Between loss of habitat, accidental death from pesticide poisoning and diseases, pollinator numbers are really down."

Even in vineyards, pollinators may be important, especially if winegrowers are using self-seeding cover crops. Many are dependant on pollinators for seed production. Frankie has evaluated insectary plantings at the Bonterra and Fetzer properties near Ukiah and Hopland, Calif.

"It's pretty impressive. We have seen incredible diversity of species in the Ukiah area, maybe as many as 85 different pollinators, one of the most diverse populations we have seen in garden areas in the state. This represents another ecological service that vineyards can perform, and we need to help stabilize and improve pollinator numbers in our state."

Monitoring by researchers such as Miguel Altieri and Clara Nichols (UC Berkeley) and Michael Costello (California Polytechnic University in San Luis Obispo) has shown that greater numbers of beneficial insects can live in the vineyard close to the insectary area, and that their numbers can decline as you move away.

"We can certainly find beneficials in vineyards where insectaries are planted, but it is kind of hard to predict the outcome of how effective they will be in keeping your pests under control," Costello explains. "To the extent that insectaries are attractive to look at and also promote biodiversity, they are useful. They certainly won't guarantee a pest-free vineyard on their own."

Phylloxera resistance

Another interesting phenomenon has been the effect of organic winegrowing in vineyards planted on AXR-1 rootstocks infested with phylloxera. While phylloxera may be present in large numbers on the root system of these grapevines, the vines don't seem to be as affected as those grown in conventional vineyards. Many acres of organic vineyards on AXR-1 rootstock in Mendocino County have had phylloxera for more than 14 years and are still producing economically viable crops.

Work done by Don Lotter, Ivana Picciau and Dr. Jeffrey Granett from UC Davis has shown that these vines are damaged, but the fungi found in the tuberosities (lesions that form from phylloxera feeding that allow plant pathogenic fungi eventually to kill the vines) are not nearly



Insectaries produce beneficials such as predatory mites and wasps and sell them to farms.

PHOTO: Sterling Insectary

as virulent as pathogenic strains found in conventional vineyards that eventually succumb to these root injuries.

Professor of entomology Jeffrey Granett (retired) explains, "We don't know the exact mechanism that keeps the AXR-1 root systems alive. Phylloxera population numbers on the roots are certainly as high as those found in conventional vineyards. But when we have isolated strains of pathogenic fungi from the organic vines and compared them to pathogen strains from conventional vineyards by infecting root pieces in the lab, the strains from organic vineyards do less damage. There may be some competitive mechanism between fungi in the soil when compost and other organic matter is added to the soil."

Ultimately, these vines will need to be replaced, but organic farming has extended the lives of the vines, giving the growers more time to plan vineyard replacement. "Organic farming is not a cure for phylloxera, but it buys the growers time to make replant decisions," Granett explains.

Challenges and the future

While many growers in California are having success with organic winegrowing and the pest management strategies that are available to control vineyard pests, the single greatest threat in the future is the introduction of new exotic pests. Vine mealybug and light brown apple moth are examples of how there eventually would be questionable effective options for organic pest management. UC researchers are well aware of this, and are looking for good biological control agents that would work for both conventional and organic growers. Pheromone confusion also is being evaluated for both pests. Long-term, most IPM specialists agree that biological control is the most sustainable option for all of our vineyard pest management problems.

For winegrowers who are facing the "usual suspects" in the vineyard, there are good options for pest management strategies to keep organic vineyards productive and profitable while producing high-quality fruit.

[Return to article](#)

Welcome these 'friends' to your organic vineyard

Remember that having a healthy and diverse group of predators and parasitoids in good numbers is going to help you control pest problems in your vineyard. Minimizing sulfur sprays, dusts and any insecticides (even the organic ones) will improve the chances of these helpful little creatures surviving.

Creating extra habitat in the form of flowering cover crops in the vineyard and insectary plantings alongside the vineyard also is helpful. The following is a partial list, which I compiled with the help of Dr. Michael Costello of California Polytechnic University in San Luis Obispo, of very useful "friends" to have in your organic vineyard.

Spiders

Spiders are an abundant and diverse group of predators found in organic vineyards. They are the most commonly observed predators in both vine canopies and the vineyard floor. There are more than a dozen families and numerous species. Important families include:

■

- *Miturgidae* (prowling spiders), and *Corinnidae* (ant-mimic spiders) (These two formerly were grouped together as the *Clubionidae*, and the *Salticidae* (jumping spiders.)
- *Oxyopidae* (lynx spiders)
- *Theridiidae* (cobweb weavers)
- *Araneidae* (orb weavers)

Spiders prey on a wide range of insects and do not feed solely on pests. They are somewhat limited, in that they produce only a single generation per year. Spiders that have been observed controlling vineyard insect pests include: *Trachelas pacificus* (*Corinnidae*) and *Cheiracanthium inclusum* (*Miturgidae*) preying on omnivorous leafroller and Metaphidippus vitis (*Salticidae*); other jumping spiders prey on grape (but not variegated) leafhopper nymphs.



Cobweb Weaver
PHOTO: Jack Kelly Clark/©
The Regents of the University
of California Vineyards

```
< img
src="/content/image/wv_2008
-09_Beneficial_Wasp.jpg"
alt="Organic Predators and
parasitoid, Insectary" />
Beneficial Wasp
PHOTO: Bonterra Vineyards
```

***Anagrus epos* wasps**

These are very tiny wasps that parasitize the eggs of the grape leafhopper *Erythroneura elegantula*. They over-winter in parasitized eggs of other leafhoppers found in prune and plum trees and blackberry vines planted nearby, hatch and then parasitize grape leafhopper eggs in adjacent vineyards. When grape leafhopper eggs are parasitized, they turn red, which is a good way to see if the wasps are present. Sulfur sprays and any insecticides (such as Pyganic) are quite toxic to *Anagrus* sp. and should be avoided if you are relying on this useful parasitoid to help control leafhoppers.

***Phytoseiid* mites**

Phytoseiids are predatory mites. They are oval to teardrop shaped, pale yellow to buff colored, shiny and very energetic, moving quickly compared to plant feeding mites. The western orchard predatory mite *Galendromus occidentalis* is widely distributed, but more than a dozen species have been found in North Coast vineyards alone. On winegrape varieties with very few leaf hairs, such as Grenache, *Galendromus* can quickly overtake a spider mite population if 50% of leaves sampled show at least one predatory mite. On varieties with considerable leaf hairs such as Zinfandel, it takes longer for the predatory mites to find and control spider mite populations. *Galendromus occidentalis* is available commercially for release and has been used successfully to control mites, especially if sulfur fungicides are not used in the vineyard.

Six-spotted thrips

Unlike the related plant eating western flower thrips, the six-spotted thrips (*Scolothrips sexmaculatus*) is a predator of spider mites, feeding on all stages, including eggs. You can recognize the adult thrips by the three dark spots on each fore-wing. Immatures are white, with a slightly more bulbous abdomen than western flower thrips nymphs. Six-spotted thrips are voracious feeders that can reduce a spider mite population even more rapidly than *Galendromus*.

They are particularly effective in controlling Pacific mites *Tetranychus pacificus*.

Minute pirate bugs

These small, true bugs (*Orius sp.*) with a black X on their wings are found in organic vineyards early in the season, sometimes abundantly. Their favorite foods are thrips and whiteflies, which are not widespread pests of grapes. Minute pirate bug nymphs also may be observed feeding on Willamette or Pacific mites.



Minute Pirate Bug
PHOTO: Jack Kelly Clark/©
The Regents of the University
of California Vineyards

Lacewings

Although lacewings (*Chrysopa sp.*) are well recognized as generalist predators, they are not a very abundant predator in most vineyards. Lacewing eggs are a fairly common sight, but for whatever reason, the population does not seem to build to very high levels. Lacewing larvae are very fond of mealybugs, although high numbers of lacewings have not been associated with grape or obscure mealybug infestations. Lacewing larvae have occasionally been observed feeding on leafhopper nymphs.

Black hunter thrips

These very small, jet black thrips (*Aelothrips sp.*) are common in the Sierra Foothills and North Coast regions. There are no detailed observations on what vineyard prey they consume, but they have been observed in orchards feeding mostly on thrips and mites.

Spider mite destroyer

Spider mite destroyers (*Stethorus picipes*) are very small, black lady beetles (family *Coccinellidae*), which specialize in spider mites. They are more common in North Coast vineyards.

G.H.M.

Glenn T. McGourty is a winegrowing and plant science adviser with the University of California Cooperative Extension in Mendocino County, Calif. He wishes to give special thanks to Ann Thrupp, Dave Chaney, education coordinator for the UC Sustainable Agriculture Research and Extension Program, and Ray Green of the CDFA for information on certification and registration.

 [PRINT »](#)

 [E-MAIL THIS ARTICLE »](#)

 [CLOSE THIS WINDOW »](#)

WINES & VINES

415.453.9700 | Fax: 415.453.2517

info@winesandvines.com