



Berry Notes

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Prepared by the University of Massachusetts Fruit Team

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Message from the Editor:

Winter is a time for recovering from the past growing season and preparing for the next. For some, this means taking advantage of some of the meetings, workshops and conferences that are offered near and far. This issue of Berry Notes contains an expanded list of these opportunities with contact information for seeking out more details. Please call me if you need additional help in finding out more about a particular conference or meeting.

Growers are increasingly gaining access to web-based information for help with growing practices, pest management practices, diagnostics and other resources. Sometimes the best information is found at a local source like the home state University Extension Programs. Sometimes, a search can take you to a site outside your home state, region or even farther afield to other countries. From time to time, I'll provide some suggested links that contain high quality information that I think will be of interest to growers. This month, I'm suggesting a site at PennState University that provides informational fact sheets on fruit and vegetable cropping systems plus more. <http://agalternatives.aers.psu.edu/crops/Crops.html>. Let me know what you think. If you have a favorite site and want to share it with a larger group, let me know and I'll include it next time.

Strawberries

Cold Acclimation in Strawberries: How Strawberries Get Ready For Winter

Pam Fisher, OMAFRA

The process of developing tolerance to cold temperatures is called acclimation. Cold acclimation in strawberries begins when days get shorter in late summer. Short days alone will trigger strawberries to develop tolerance to -2°C or -3°C. For further acclimation, plants must be subjected to cold temperatures, i.e. days of about 10°C and nights around 0°C. Photosynthesis is also required for cold acclimation to occur, so plants which are mulched before these conditions have been met will not be as winter-hardy.

Even when fully acclimated, or "hardened-off for winter," strawberry plants are not as tolerant of cold

temperatures as other perennial fruit crops. Cold injury to crowns appears as browning of crown tissue. Crowns will be killed at temperatures of minus 12°C to minus 14°C in the crown, but even tissue temperatures of minus 6°C can lead to reduced leaf number, leaf distortion, and fewer flowers and fruit.

The extent of cold-temperature injury in strawberries is determined by many factors. These include the extent of cold acclimation, the cultivar, the part of the plant affected, the rate and duration of freezing, and cultural practices. Rapid freezes, when tissue temperatures drop 2-3 degrees per hour, are fatal. Although the duration of freeze also affects how

much injury occurs, most injury occurs in the first 24 hours of damaging temperatures. Freeze/thaw/freeze cycles will also cause more injury than consistently cold temperatures, if the thaw lasts more than 2-3 days.

Nutrient and water status of strawberry plants also affects cold acclimation. Excess or deficient nitrogen will inhibit acclimation, while optimum levels of

phosphorous promote acclimation. Plants acclimated under dry conditions fare better than plants that are not water-stressed. Mulching is also important to prevent cold-temperature injury. Raised beds can be 4-6°C colder than flat beds, but mulching overcomes most of this negative effect. (*Source: The All Ontario Berry Grower, Volume #0.10 - October/2001*)

Winter Mulch for Strawberries

Patrick Byers, University of Missouri

Fall is here, and an important fall job in a strawberry planting is mulching. While commercial strawberry production extends into colder climates, such as the northern US and Canada, the strawberry plant is actually vulnerable to cold injury at relatively warm temperatures. The key to consistent production in cold climates, such as Missouri, is mulching. Research in Ohio and elsewhere has shown that the crowns of non-mulched strawberry plants can suffer damage after winter temperatures below 12°F. Unprotected strawberry plants are also vulnerable to desiccation damage from drying winter winds. The disease black root rot is more severe in non-mulched plantings.

Winter mulch offers several benefits for a strawberry planting. The mulch protects plants from severe cold. Desiccation is a problem, especially after winter temperature fluctuations, and mulch will protect plants from drying out. Mulches will also protect plants from injury caused by soil heaving, which results from freezing/thawing cycles during the winter.

When should the strawberry grower plan to apply mulch? Research from Illinois suggests that a good guide is to apply mulch after three consecutive days with a soil temperature of 40°F. This soil temperature usually occurs after several frosts, and the plants have slowed growth in response to cooler temperatures. Apply mulches before the soil freezes. In Missouri, mulches are usually applied in late November.

Production systems for strawberries in Missouri are undergoing changes that affect mulching. Plants on raised beds, for example, are more vulnerable to cold injury than plants in level plantings. Annual production systems, such as fall planted plasticulture, may utilize less hardy or disease susceptible cultivars. As we will see, mulching practices must adapt to these new systems.

The traditional mulching material for strawberries in Missouri is straw. Straws from wheat, rice, oats, or Sudan grass work well. Straws coarser than Sudan grass are not recommended. A good straw source will deliver straw that is clean, free from weed seed, and contains a minimum of grain seed. Strawberry growers can produce their own mulch, often cutting the straw before the grain seed is viable. Store straw for mulching in a dry area.

Occasionally, grain seedlings can become a weed problem the following spring; an application of sethoxydim will give good control.

A traditional, level matted row planting will require 2.5 to 3 tons of straw per acre for a 2 to 3 inch deep mulch. This equates to about 300 small bales of average weight. Raised bed plantings may require twice this amount for adequate coverage. Smaller plantings may be mulched by hand. Larger plantings often use bale choppers to break up the straw bales and distribute the straw over the bed. Choppers are available for both small bales and large round bales. Plasticulture plantings of cultivars such as Chandler are usually not mulched with straw.

A recent development of great interest to strawberry producers concerns floating row covers. These covers are composed of a plastic such as polypropylene, spun-bonded into a fabric that is permeable to light, air, and water. Research and growers' experiences demonstrate that these covers are useful for winter protection of strawberry plantings. While floating row covers are available in several weights, only the heavier weights are recommended for winter protection. At present a widely available weight recommended for winter strawberry protection is 1.25 oz/yd² (42 g/m²). A variety of fabric widths are available, with common widths ranging from 15 feet to 60 feet. This material currently costs about 4 cents per square foot. With proper care, this heavier fabric should last 3-4 seasons. Floating row covers are widely used to protect annual plasticulture plantings.

Row covers are best applied on still days. Be sure to line up sufficient labor to place the row cover. If possible, use wider widths for more efficient application. The row cover edges must be anchored, as must areas where two covers overlap. A variety of methods are used to anchor the edges. Edges may be anchored with posts, rocks, or tube sand. The edges may also be covered with soil.

Once the mulch is in place, the job is not done for the winter. Monitor the planting frequently. If straw has blown off areas, replace at once. Watch the edges of row covers, and adjust anchors if needed. Repair any rips or holes as soon as possible. (*Source: The Berry Basket, Vol. 4, No. 3, Fall 2001*)

Blueberries

Lime Sulfur

Gary Pavlis, Rutgers University

I have recommended the use of lime sulfur for Phomopsis control. The fall application should go on when 2/3 of the leaves drop. Some growers have balked at using this material because of its corrosive nature. A grower from Massachusetts wrote to me and says he has a solution to this problem. He says that, "before applying the lime sulfur, I first spray the tractor and sprayer with a light oil and then the lime sulfur comes off when I wash the equipment after application. What works best,

believe it or not, is "PAM", which is a combination of vegetable oil and lecithin which are biodegradable and therefore not the environmental hazard that motor oil would be. Generic brands of this cooking oil are cheaper and are equally effective. I can cover my equipment with 3-4 cans for a total of about 6-7 dollars." Sounds like a good idea to me. I wouldn't want to do this for a weekly spray but lime sulfur is applied just once in the fall and once in the spring. (*Source: Blueberry Bulletin, September 29, 2000 Vol. XVI, No. 22*)

Ribes

What's new in Gooseberries and Currants

Ed Mashburn, Northumberland BerryWorks, Northumberland. PA

Several years ago I spoke on gooseberries and currants for growers in this area. There have not been a great deal of new cultivars added since then, but there have been some new trials and there will be some new introductions in the near future. This is not because there is no interest in ribes, but the wheels turn slow and development takes quite a while. I have about a dozen varieties that should be released from plant quarantine this year, they are some promising varieties from Europe. It takes about 4 to 5 years to "clear" imports from Europe.

Black Currants:

The standard varieties for production at this time are Titania, Ben Sarek and Ben Lomand.

Titania - A very good variety that is fully resistant to White Pine Blister Rust and Powdery Mildew. It is a heavy yielding variety, berries are large but lack the full flavor that is generally found in the commercial juicing berries. It is very good for PYO and fresh market

Ben Sarek - A compact growing plant that is moderately resistant to WPBR and Mildew. It is very high yielding and has very large berries. The flavor is full and this variety is used mainly for PYO and home use. It is not suitable for commercial juice production.

Ben Lomand - The "standard" for commercial juice production for many years. A large robust plant that produces very high yields of large berries. This variety is fairly susceptible to WPBR and to Mildew. The berries and production are not greatly affected by these diseases and the fruit may be used for home use, and commercial production of jam, jelly, juice and for fresh market sales.

At the present time, there is very little commercial production of juice in this country and most of the berries go to wine makers and to the fresh market. All the above are suitable for that. Black currants are

generally used as a processed fruit and few are used raw from the plant. Most people are not attracted to the strong flavor of the raw berries.

In the past few years there have been several varieties of Russian origin that have been much more palatable and acceptable to fresh raw use. I have trialled several of these and will start increasing two or three selections this year. They have produced large berries that are sweeter and very palatable right off the bush. I think that there is a market for these berries as fresh fruit and they would be very good for home use and for small scale commercial production.

The Ribes breeding program from the University of Maryland has also produced some good selections that we will start increasing and trialling in some other locations. This program is in the 5th year and is going well.

There are a number of other varieties of Black Currants available to the market but none that are generally in use for anything other than home use. The breeding of new varieties is controlled by commercial processors of juice in Europe and they do not make the varieties available to the general public that are not in contract production.

Red Currants:

Production of Red Currants is much smaller and goes mostly to Jelly and to wine. There is not a great deal of difference in the varieties except in time of ripening and to some extent in yield. There are a couple newer varieties that have very high yields and are less prone to disease than the older varieties.

Rovada - This is a late season variety that is very good, it produces large berries, high yields and is resistant to most disease. This variety is a little slower coming into full fruit than other varieties and the plant is a little smaller. It is an excellent variety for PYO and home use, it has large strigs of very good berries. Detvan - A release from Slovakia that is a very large plant with very heavy production. The strigs are very long and well filled, the berries are large and mid-

season. The berries are a little lighter color but still have that very beautiful red that is common to this fruit.

Tatran - A sister of Detvan, a very large plant, very heavy production and the berries are larger than any that I have seen on any variety of red currant. This is a very late season variety and will hold on the plant into late August. Both of the latter varieties are about one to two years later in coming into full production. There will fair production two years after planting and full production in the 4th and 5th years. These varieties will probably out-produce any other variety at that time.

Most Red Currants are fairly susceptible to wind damage in the second and third year. The breeding program is not presently working on Red Currants but there are some plans to improve the taste and to reduce the size of the seeds. Seed size is a real problem with red currants, that is why most are made into jelly instead of jam.

Gooseberries:

There is an increased interest in gooseberries everywhere. At the present time there are just a few varieties that are of real interest for commercial production.

Invicta - This is by far the best of the varieties for fresh table use at this time. It is a large sweet berry that has a very good flavor. The plant is very thorny but is resistant to Mildew and WPBR. It is a strong upright plant that can be grown without support. It is high yielding and fairly precocious, giving some production the year after planting. It is not real good for processing and for wine as the flavor is diminished in the processing.

Hinomakki Red or **Lepaa Red** - This is a dual use berry that is resistant to Mildew and WPBR. It is a good red color and produces large amounts of berries. The fruit is

somewhat smaller than Invicta and a ruffle more tart, though they are pretty sweet when fully ripe. The berries can be processed when less than fully ripe and will retain good flavor. The plant tends to be a bit "weepy" in habit and is best supported on a wire trellis.

Amish Red - Another dual purpose red fruited variety, resistant to WPBR and somewhat so to Mildew. A very productive variety with good flavor berries. These are pretty sweet and usable from the time that they color up and can be used for fresh or processing. This plant is best supported on wire also.

Pixwell - This is a variety that I have been reluctant to recommend for any use. The flavor, when ripe, is bland and there is not much redeeming features for this variety except that it makes very good wine. It needs to be harvested just a little under-ripe for that. The plants are erect and fairly strong and do not need support.

I think that there will be several new varieties of gooseberries on the market pretty soon. The problem with getting these at this time is that there is some dispute over marketing rights and who will be the propagators. Some of the new varieties are almost spineless and have large berries. Gooseberries are generally very susceptible to mildew and there is not much available (labeled) for that problem. I have about a dozen varieties that will become available to me this year and some will be used in the breeding program to induce resistance to mildew.

There has been a real increase in interest for homemade wine production, and there is a market for fresh fruit at this time. There are a number of other varieties that are used, but none that I would consider of commercial potential at this time. (*Source: Proceedings of the 2002 Mid-Atlantic Fruit & Vegetable Conference*)

Grapes

Researchers Unearth New Clues to Cause and Spread of Young Vine Decline

Patricia Bailey, UC Davis News Service

Plant disease experts at the University of California, Davis, report that they have identified the fungi responsible for a perplexing grapevine ailment known as "young vine decline" and are getting a clearer picture of how the disease spreads.

Young vine decline usually appears as a slowdown in vine growth, smaller trunk size and reduced foliage. At one point the fungal disease was nicknamed "black goo" because the sap of infected vines may turn dark brown or black. If the problem is identified early, vines can be coaxed back to health but many growers have found it more economical to remove the affected vines and replant the vineyard.

"Young vine decline is very complex," said Doug Gubler, a UC Davis Cooperative Extension plant pathologist who is leading the research effort. "It appears, however, that the fungi that cause this disease are not new and, most likely, have evolved with the grapevines. They can live in

a grapevine without causing damage until some type of stress triggers them to cause disease in the vines." Inadequate irrigation, poor planting or producing a crop of fruit on very young vines may make grapevines susceptible to young vine decline, he said.

Gubler and colleagues have identified five types of fungi that cause young vine decline. These include one species of a fungus known as *Phaeomoniella* and four species of a fungus known as *Phaeoacremonium*. These fungi have been found on grapevines in Italy, South Africa, Australia and Portugal, as well as in California. The disease was first reported in Italy around 1900. The earliest report in California occurred in the late 1950s.

The UC Davis research team has:

- * Isolated the five fungal species that cause the symptoms typical of young vine decline.

- * Determined that the fungi are generally found on aboveground parts of the plant as well as in rootstock.

* Demonstrated that these fungi all are capable of infecting through pruning wounds on the grapevine and are very effective at invading the vines' vascular tissue, which transports water and nutrients throughout the plant.

* Trapped air-borne (water-splashed) spores from three of the fungal species on both young and very old grapevines in California's North Coast region, Lodi and Delano.

* Demonstrated that the spores can be transmitted by splashed water, including rainfall.

* Placed as many as 80 million fungal spores in 9-inch vine cuttings and six months later found the vines grown from those cuttings to be free from symptoms. This suggests that the mere presence of the fungus does not necessarily mean the disease will develop.

Because the fungi that cause young vine decline can be found almost anywhere, the UC Davis researchers are not recommending that commercial nurseries and the university's own Foundation Plant Materials Service remove healthy plants that carry the fungi. "It may not be possible to produce vines that don't have these fungi, which have the ability to survive both in the soil and plant tissue and can invade the plant in so many ways," Gubler said.

Vineyard surveys by the UC Davis researchers suggest that roughly 1 percent of California vineyards are affected by young vine decline. The disease is most prevalent in Sonoma County. "In recent years many of the vineyards in the Sonoma region have been replanted with new rootstocks that we don't know much about,"

Gubler said. "Some of those rootstocks have the tendency to actually slow the growth of the vines, which could make them susceptible to the young vine decline fungi."

When planting a vineyard, he urges growers to take the following precautions:

- * Purchase healthy plants from a certified nursery.
- * Make sure the roots are oriented down during planting.
- * Provide adequate fertilizer and irrigation water.
- * Keep fruit off of the vines until the plants are at least three years old. Encouraging a crop earlier may provide income from the vineyard sooner, but could stress the vines so much that they become susceptible to diseases like young vine decline.

"If growers suspect a problem, we'd like to know about it," Gubler said, inviting vineyard managers to either contact him or their county farm advisors. "We try to look at all vines that are sent to us or visit the vineyards personally."

The UC Davis researchers are investigating the biology of the young-vine-decline pathogens in order to better understand the disease and develop control strategies. They hope to identify the source of the fungal spores and determine what causes the fungi to switch from a latent state to a disease-causing mode. (*Source: UC Davis News, May 16, 2001*)

[**Editors Note:** This vine decline has been observed recently on the East Coast. For grape growers wishing to look into this topic further, go to <http://yvd.ucdavis.edu/> for additional information, or call me at 423-545-4347 or Dr. Frank Caruso at 508-295-2212]

General

Phytophthora Root Diseases of Berry Crops

Michael Celetti, University of Guelph

The wet and cool conditions experienced this spring were ideal for infection and development of berry crops by the soilborne pathogens *Phytophthora spp.* Red stele of strawberries and Phytophthora root rot of raspberries are two diseases that thrive in wet, cool soil.

Phytophthora spp. are sometimes referred to as water molds, however they are not classified in the "Mold" family. They survive as resistant oospores (persistent sexual resting spores) in soil for long periods or as mycelium (mold) in recently infected plant debris. During favorable conditions, the mycelium and oospores germinate to produce a structure called a sporangium. Under moist but not wet conditions, roots can become infected if they come in contact with the sporangium. However, when soils become saturated for a sustained period of time (30 minutes to 6 hours), sporangium produce and release many zoospores with tails that swim toward and infect the root tips of berry plants. This is why plants growing in poorly drained; heavy, wet soils

are at more risk of becoming infected by *Phytophthora spp.*

Berry plants infected with *Phytophthora* frequently appear stunted during the second or third year of growth and occur in patches. They wilt very quickly under hot weather conditions. Symptoms are first noticed in low areas of a field or row where water accumulates for extended periods after irrigation or a heavy rain. Eventually the disease moves along the row from the initially infected plants.

It is relatively easy to diagnose red stele by digging up the roots of infected strawberry plants and slicing them longitudinally. The vascular tissue (sometimes called the stele) of infected roots will appear blood red surrounded by white cortex tissue hence the name "red stele". The secondary roots are often pruned significantly giving the root system a "rat tail" appearance. Healthy roots should appear white throughout were as other root diseases such as black root rot or Verticillium wilt will not reveal the blood red core.

Raspberry plants infected with Phytophthora root rot may be a little more difficult to diagnose. Infected plants produce few primocanes. The few floricanes and primocanes produced often appear wilted with leaves looking scorched along the margins, between veins. Eventually the leaves turn completely yellow as the disease progresses over the seasons. Scraping the epidermis of infected raspberry roots will reveal a reddish-brown tissue with a distinct margin where it meets the healthy white tissue. This reddish-brown tissue may also extend into the crown.

[*Editor's note:* The management section of this article has been replaced with New York (and New England) guidelines by Dr. Bill Turecheck from Cornell University and focuses on autumn practices]

On strawberry, Ridomil Gold (mefanoxem) 4EC (1 pt/treated acre) and Aliette (fosetyl-AI) 80WDG (2.5-5 lb/A) are labeled for control. However, neither will be completely effective if susceptible varieties are grown in wet soils. The application of both fungicides should be confined to areas of the field where disease occurs or is suspected. Ridomil Gold should be applied in September

or early October after the soil begins to cool but before heavy rain fall begins. A second application can be made in Spring after the ground thaws but before bloom. Ridomil can be banded over the row and should provide the same level of protection for red stele as a broadcast application. Broadcasting, however, may provide better control of leather rot. Aliette should be applied in early fall when the weather turns cold and wet and can be applied 30 days later.

On Raspberry, Ridomil Gold 4EC (4 fl oz/1000 ft of row) and Aliette 80WDG (5 lb/A) are labeled for control. Ridomil Gold tends to be more effective than Aliette. Like strawberry, neither fungicide will be completely effective if susceptible varieties are grown in wet soils. Ridomil Gold should be applied only to portions of the planting where the disease has been diagnosed or is suspected. Ridomil Gold should be applied as a 3-foot-wide band over the affected row in early fall and again in late spring. Moreover, Ridomil Gold is also recommended as a preventative treatment for new Titan plantings except for those on the very well-drained soils. (*Source: The All Ontario Berry Grower, Volume 8, August 2002*)

Organic Matter Application-Can You Apply Too Much

M.D. Orzolek, PennState University

Fall is an excellent time to clean-up fields and plan for future crop nutrient requirements as well as increasing soil organic matter content for your farm field management program. Since most vegetable crops have already been harvested, growers should consider the broadcast application of a non-selective herbicide to 1) eliminate both perennial and difficult annual weeds in the field, 2) increase the efficiency of retrieving plastic mulch and 3) help establish a cover crop. Fall is also an excellent time to add soil amendments to increase soil organic matter. Why increase soil organic matter? High soil organic matter (greater than 3.5%) will increase the water holding capacity of soil, increase soil nutrient reserves, increase soil microbiological activity and increase soil tilth.

Organic matter has long been known to improve soil fertility and tilth, which in turn, have increased crop yields. "Organic matter composts", however, is a poorly defined term used for a wide variety of materials - all of which impact soils differently. Therefore, prior to recommending the use of a specific organic compost for a specific purpose it must be tested to determine the nutritive value of the material and the total maximum amount of material to apply per acre. Organic compost/manures can consist of a variety of materials including: chicken - beef - hog - sheep - horse manures, straw, leaves, sawdust, table scraps, treated sewage sludge, peatmoss, etc. Addition of organic composts to soil should take into account; soil type, affect on soil pH,

nutrient content of compost, crops to be planted in rotation after addition of compost to soil, and rainfall or total water application through irrigation.

The recommended soil pH range for optimum plant growth, nutrient availability and best bacterial activity is 6.5 to 7.2. The soil pH affects nutrient availability and at a pH of 5.0 to 5.5, both iron and boron become more available to plants causing potential toxicity symptoms while phosphorus and potassium are less available to plants and may result in nutrient imbalances in the plant.

While liberal applications of organic composts (5 to 10+T/A) has been a rule of thumb for many growers in the last decade, it has lead to some very difficult problems in the fields where the organic compost was applied. The most serious problem has been a large release and availability of nitrogen resulting in almost all cases of very extensive vegetative growth at the expense of reproductive growth (reduced fruit production and quality). There has been an extreme build-up of phosphorus in the soil especially with the use of animal manures at rates greater than 5 T/A; resulting in soil P levels in excess of 1000 lbs./A - potential for opening phosphorus mines in PA. Also the high P levels in soil probably contribute to the high P levels in the Susquehanna River and ultimately, the Chesapeake Bay. There also can develop an imbalance in the ratios of soil K-Mg-Ca availability which will have a profound affect on the quality for fruit produced in the field (poor color, soft tissue, blossom end rot, poor shape).

Therefore, important to a good fertility program is calculating the total nitrogen availability in the soil from all potential nitrogen sources. Nitrogen sources include; graded fertilizers (10-10-10 would contain 10% nitrogen per 100 lbs. material), legume cover crops (hairy vetch produces the equivalent of 100 lbs N/A), animal manures (need to know N-P-K analysis before field application) and organic composts (peanut hulls, straw, etc). Plants generally respond to nitrogen when there is low organic matter in the soil, soil consisting of a large percentage of sand, and/or a cold, wet growing season (much like 1996). How much nitrogen should be applied for the crop to be grown? The crop nitrogen requirement equals the recommended rate of nitrogen application minus the contribution from the previous crop (residual N), minus the contribution from cover crops (especially legumes) planted in rotation, and minus the contribution from manure. Using this method to calculate a crop's nitrogen requirement will reduce/eliminate runoff and leaching of nitrogen and other elements from the soil.

An example of organic matter application is given below in reference to a pumpkin fertility program based on the nitrogen requirement for the crop. A grower

plants pumpkins on ground that was in soybeans last year; was planted to hairy vetch after the soybeans were harvested; and 3 tons/A of chicken manure (6-4-3 analysis) was broadcast and incorporated in the spring prior to seeding pumpkins. How much nitrogen should the grower apply to the pumpkin crop? Since the recommended nitrogen application for pumpkins grown on heavy soils is 60 lbs per acre, the grower needs to subtract 25 lbs residual N produced by the soybeans, 60 lbs N produced by the vetch (killed vetch in late March) and 18 lbs N from the manure application. $[60 - (25+60+18) = \text{surplus } 43 \text{ lbs/A nitrogen}]$. The grower will not have to add any nitrogen to the pumpkin crop since he has a surplus of 43 lbs/A N over and above the required 60 lbs/A nitrogen recommended for pumpkin production.

In conclusion, a sound, well planned organic matter management program will provide; 1) optimum fertility for maximum crop yields and quality, 2) minimize runoff and leaching of water soluble elements, and 3) reduce total fertilizer costs over time. (*Source: The Vegetable and Small Fruit Gazette, Vol. 6, No. 10- October 2002*)

Multi-colored Asian lady beetle in fruit crops

Rufus Isaacs, Michigan State University

Background

The multi-colored Asian lady beetle is a beneficial insect that has become established throughout the eastern United States. Originally introduced to help manage tree fruit pests, it has become a nuisance for homeowners and for some agricultural crops. In recent years, it has caused problems for growers of fall-ripening fruit, who find the beetles on and in their fruit during harvest. However, this insect also helps fruit growers during the summer months when adults and larvae provide biological control of many soft-bodied insects, including aphids and leafhoppers. During the fall when the adult lady beetles begin to search for energy and sheltered sites for overwintering, fruit crops can provide both of these resources and large numbers of beetles can infest fall-ripening fruit. Raspberry, blackberry, grape, and peach are particularly affected.

Identification

As their name suggests, adult Asian lady beetles can take on many different color forms, varying from yellow to orange and red. Their spots may be dark on the wing covers or they may be faded or absent. Even the number and size of the spots varies. Many beetles have a straw-colored pronotum (top covering of middle body part) with markings that fuse into a regular- to irregularly-shaped "M" if viewed from the front, or "W" if viewed from behind. (Pictured at left to show an "M")

The adult beetles are approximately a quarter-inch long, with a domed, round to oval shape. They are similar to

many of the native species of lady beetles that do not cause homeowners or fruit growers problems. Native lady beetle species typically overwinter in sheltered sites outdoors and do not seek homes during the fall.

Immatures (larvae) are covered with tiny, flexible spines that do not sting. (See photo at right of larva eating aphids.) Their body is alligator-shaped and they can rapidly move over leaves and branches, where they eat aphids and other soft-bodied insects. Eggs are yellow, oval-shaped, and occur in clusters of about 20, usually on the undersides of leaves.

Biology

The multi-colored Asian lady beetle is similar to native lady beetles in many ways. It also feeds on soft-bodied insects such as aphids and leafhoppers. However, some of its habits are different from those of native species. To find out more, including how to distinguish the introduced species from our native lady beetles, visit our web page about biology.

Damage

Fruit growers and MSU Extension agents first reported direct feeding damage by adult Asian lady beetles in Michigan during fall 2001. The greatest number of reports was from fall raspberries and on over-ripe grapes in the southern half of the Lower Peninsula, though the beetle is present through much of Michigan. It is still unclear whether the beetles are starting this damage or whether they are exploiting berries that have already been split for other reasons. Either way, their presence is most unwelcome at harvest.

A more serious issue for growers selling fresh berries is the potential for contamination with adult Asian lady beetles. If berries are picked with beetles and then placed in cold storage, the beetles seem to move away from the cold, and this typically means that they burrow deeper into the berry. Once out on the fruit stand, beetles may warm up and fly out of the container, but they could also be bought and eaten.

When disturbed, the adults release a noxious yellow-orange liquid from their legs. This is called reflex bleeding and is meant to prevent birds and other predators from eating the beetle. The defense secretion is extremely bitter and unpleasant tasting with a strong odor. Preventing beetles from being harvested is important to avoid contamination that can lead to customer complaints and off-flavors in juice or wine. Learning more about the biology of the Asian lady beetle can help in understanding how to prevent their infestation into a fruit planting, and this is briefly reviewed below.

Management

Growers that find their fruit infested with a few adult beetles immediately before picking can instruct hand pickers to carefully avoid them. This may not be economically feasible on a large planting, however, and growers may have to resort to other tactics. Camphor and menthol have recently been shown to repel adult beetles, but their activity lasted for only a short time and no commercial formulations are yet available.

Ladybeetles are efficient predators of pest insects for the majority of the growing season, and most chemical controls for this introduced beetle will also kill native predators. If beetles reach pest levels in a fruit planting before harvest, insecticides applied for other near-

harvest pests may allow growers to achieve insect-free fruit during harvest. Pesticides applied for control of other beetle pests such as Japanese beetle are likely to control Asian lady beetle infestations. The waiting period restrictions will vary by crop, so the labels should be checked carefully before any product is used near to harvest, to allow pickers to re-enter and harvest to proceed.

Pesticides should be applied only to infested areas to minimize chemical exposure and to avoid causing outbreaks of other plant-infesting pests because these products also kill beneficial insects. Many pesticides are labeled for use only by certified, licensed applicators that have received specialized training on the use and disposal of pesticides. These pesticides should not be applied by unlicensed homeowners, and at all times, their use should be in accordance with the label.

Information cards about Asian lady beetle for distribution to U-Pick customers and others We have created information cards with color photos and a brief summary of the information offered at this web site. The cards fold in half to be "business card" size (3.5" X 2.25") and encourage people to visit this web site for updated additional information. Michigan fruit growers can call the MSU IPM Program (517-432-2203) or email pattersj@msue.msu.edu to request packets of 100 cards while supplies last. The cards can be distributed to farm market or U-Pick customers who have questions about the beetles. Go to www.msu.edu/ipm/pdf/ladybeetleCard.pdf to see a pdf file of the card. Similar information is available in this pdf file of an article that may be copied in newsletters (*Source: Michigan Fruit Crop Advisory Team Alert, Vol. 8, No. 18, September 24, 2002*).

Upcoming Meetings

November 2 & 3, 2003

Franklin County CiderDay 2002 – a celebration of cider, sweet and hard. Schedule and directions: www.ciderday.org.

November 7-9, 2002

Southeast Strawberry Expo

at the Greenville Hilton in Greenville, North Carolina. For a complete schedule and registration brochure or information on exhibiting at the Expo trade show, contact the NC Strawberry Association, 1138 Rock Rest Rd., Pittsboro, NC 27312, phone 919-542-3687, fax 919-542-4037, e-mail: ncstrawberry@mindspring.com. Reservations at the Greenville Hilton may be made by calling 919-355-5000. Please mention the "Strawberry Expo" to receive the special conference rate.

November 17 – 19, 2002

The Soul of Agricultural -New Movements in New England Food and Farming

University of New Hampshire. Contact El Farrell at 603-862-4088 or El.Farrell@unh.edu or visit www.sustainableunh.unh.edu.

January 15-17, 2003

Ohio Fruit & Vegetable Growers' Congress & Ohio Roadside Marketing Conference

Toledo SeaGate Convention Centre and Radisson Hotel. Contact Jennifer Hungerford at 614-249-2424 for more information.

January 22-25, 2003

North American Strawberry Growers Association Annual Meeting

Puerto Vallarta, Mexico. Contact Erin Griebe at 810-229-9407. Email: NASGAHQ@aol.com.

January 27-29, 2003

Indiana Horticultural Congress

at the Adams Mark Hotel in Indianapolis. Contact Peter Hirst, Purdue University, 765/494-1323, <http://www.hort.purdue.edu/hort/ext/hortcongress/>

January 29, 2003

New York State Berry Growers Association Annual Meeting (in conjunction w/ *NY Farmers Direct Marketing Association*)

The Sheraton Inn Conference Center in Saratoga Springs, NY. For more information or for registration materials contact the NY Farmers Direct Marketing Association at 315-475-1101. Or send inquiries to 7350 Collamer Road, East Syracuse, NY 13057.

February 18-19, 2003

The Niagara Peninsula Fruit & Vegetable Growers' Association and the **Ontario Horticultural Crops Conference** have joined together to bring you the **Ontario Fruit & Vegetable Convention (OFVC)**

Brock University, St Catharines, Ontario, Canada. Theme "Growing Together". Contacts: Chairman: Tony

Sgambelluri - 905-945-1713 (Cell 905-651-1264); Vice Chair: Bob Cobbedick - 905-945-9057; Trade Show Chairmen: Ross Parker - 905-562-4136 and Ralph Troup - 905-563-826

February 20-22, 2003

VITICULTURE 2003

This premier educational program and trade show is designed for grape growers in Eastern North America. It has been put together by a very capable group from the grape industry as well as academia. It will be held in Buffalo NY, at the Buffalo Convention Center and Buffalo Hyatt Regency Hotel. Presented by the New York Wine and Grape Foundation. For program and registration information visit: www.viticulture2003.org.

March 12-13, 2003

3rd Annual New England Farmers' Direct Marketing Conference & Trade Show

Holiday Inn Boxborough Woods, Boxborough, Mass. Contact: Charlie Touchette, (413) 529-9100, or e-mail info@massfarmstands.com.

Massachusetts Berry Notes is a publication of the University of Massachusetts Extension Fruit Program which provides research based information on integrated management of insects, crops, pests and marketing on Massachusetts Farms. No product endorsement over like products are intended or implied.