

Berry Notes

Prepared by the University of Massachusetts Fruit Team

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Crop Conditions:

Strawberry harvest is winding down in some locations. Hot weather really pushed what started as a late season so that it is ending 'right on time', or close to it. We had a nice twilight meeting at Nourse Farms last week. Turnout was a little low, growers had a hard time tearing themselves away from the field. Pictures and notes from the meeting will be posted on our website soon. Renovation is the next major activity now. See more on this below. Check fields for evidence of black vine weevil or strawberry root weevil feeding (notching on margins of the leaves) and take steps to control this insect before mowing for renovation. **Highbush Blueberries** are ripening and harvest should begin soon. Lowbush should be following soon behind. Blueberry maggot fly is active now. Check your traps. Also Japanese Beetle are beginning to emerge. See more on this below. **Summer raspberries** are also ripening with harvest started this week on early varieties. Fruitset looks to be excellent on varieties that didn't suffer winter injury. Check for sap beetle, two-spotted spider mite, Japanese beetle and potato leafhopper. Cane diseases will also be evident now. **Grapes** are in mid to post-bloom and canopy management activities are in full swing. Past issues of Berry Notes have discusses these practices. Continue scouting for grape berry moth and mites. Japanese beetles should be active soon. Powdery and Downey mildew are beginning to show up. Maintain a good post bloom disease management program to avoid late season problems.

Environmental Data

STATE WEATHER SUMMARY For the Week Ending Sunday, June 29, 2003

Prepared by AWIS, Inc. (available at <http://www.nass.usda.gov/weather/cpcurr/new-eng-crop-weather>)

STATE	AIR TEMPERATURES				PRECIPITATION	
	LO	HI	AVG	DFN	LO	HI
ME	48	100	72	+8	0.00	0.68
NH	41	100	72	+8	0.00	1.13
VT	48	99	72	+8	0.00	0.24
MA	50	95	72	+5	0.11	3.23
RI	55	93	72	+4	0.45	1.55
CT	51	97	72	+5	0.20	1.94

(Source: New England Ag. Statistics Service, Weekly Crop Weather Report, Volume 23, Number 11, June 30, 2003)

Strawberry

Strawberry Renovation

Bruce Bordelon, Purdue University

Matted row strawberry plantings must be renovated after harvest to establish new crowns for next year's crop. For best results, renovation should be started immediately after the harvest is completed to promote early runner formation. The earlier a runner gets set, the higher its yield potential. Renovation should be completed by mid-July in normal years. Harvest is winding down in southern areas so growers should begin renovation as soon as the last marketable berries are harvested. The following steps describe renovation of commercial strawberry fields.

- 1. Weed control:** Annual broadleaf weeds can be controlled with 2,4-D amine formulations. Check the label, as only a few products are labeled for use on strawberries. (e.g. Formula 40 [2,4-D alkanolamine salts plus 2,4-D Triisopropanolamine salt (4 lbs/gal)] or Amine 4 [Dimethylamine salt of 2,4-D (3.74 lb/gal)] at 2 to 3 pts/acre in 25-50 gallons of water applied immediately after final harvest. Be extremely careful to avoid drift when applying 2,4-D. Even though the amine formulation is not highly volatile, it can volatilize under hot, humid conditions and can cause damage to desirable plants a considerable distance from the site of application. Some damage to strawberries is also possible. Read and understand the label completely before applying 2,4-D amine. If grasses are a problem, sethoxydim (Poast) will control annual and some perennial grasses. However, do not tank mix Poast and 2,4-D. See the Ohio Commercial Small Fruit Spray Guide [Ed. Note: for New England Growers, see the *2003-2004 New England Small Fruit Pest management Guide online at www.umass.edu/fruitadvisor* and the product label for rates and especially for precautions.]
- 2. Mow the old leaves off** just above the crowns 3-5 days after herbicide application. Do not mow so low as to damage the crowns.
- 3. Fertilize the planting.** A soil test will help determine phosphorus and potassium needs, but foliar analysis is a more reliable measure of plant nutrition. (For foliar analysis, sample the first fully expanded leaves following renovation.) Nitrogen should be applied at 25-60 lbs/acre, depending on vigor. It is more efficient to split nitrogen applications into two or three applications at regular intervals, rather than apply it all at once. A good plan is to apply about half at renovation and half again in late August.
- 4. Subsoil:** Where picker traffic has been heavy on wet soils, compaction may be severe. Subsoiling between rows will help break up compacted layers and provide better infiltration of water. Subsoiling may be done later in the sequence if soils are too wet now.
- 5. Narrow rows:** Reduce the width of rows to a manageable width based on your row spacing, the aisle width desired, and the earliness of renovation. A desirable final row width to attain at the end of the season is 12-18 inches. Wider rows lead to low productivity and increased disease pressure. This means that rows can be narrowed to as little as 6 inches during renovation. Use a roto-tiller or cultivator to achieve the reduction. Since more berries are produced at row edges than in the middle, narrow rows are superior to wide rows. Narrow rows will give better sunlight penetration, disease control, and fruit quality.
- 6. Cultivate:** Work in straw between rows and throw a small amount of soil over the row by cultivation. Strawberry crowns continue development at the top, and new roots are initiated above old roots on the crown, so 1/2 to 1 inch of soil on the crowns will facilitate rooting. This also helps provide a good rooting medium for the new runner plants.
- 7. Weed control:** Pre-emergence weed control should begin immediately. Dacthal, Sinbar, or Devrinol are suggested materials. See the Ohio Commercial Small Fruit Spray Guide [Ed. Note: for New England Growers, see the *2000-2002 New England Small Fruit Pest management Guide*] and check the product labels carefully. Devrinol must be incorporated by irrigation, rainfall, or cultivation to be effective. Rate and timing of Sinbar application is critical. If regrowth has started at all, significant damage may result. Some varieties are more sensitive to Sinbar than others. If unsure, make a test application to a small area before treating the entire planting. Use 2 to 6 oz/acre/application and no more than 8 oz/acre/year total. Sinbar should not be used on soils with low organic matter, or on sensitive varieties like Guardian, Darrow, Tribute, Tristar and possibly Honeoye. If Sinbar gets onto strawberry leaves, irrigate to wash it off.
- 8. Irrigate:** Water is needed for both activation of herbicides and for plant growth. Don't let the plants go into stress. The planting should receive 1 to 1-1/2 inches of water per week from either rain or irrigation.
- 9. Cultivate to sweep runners into the row** until plant stand is sufficient. Thereafter, or in any case after September, any runner plant not yet rooted is not likely to produce fruit next year and is essentially a weed and should be removed. Coulter wheels and/or cultivators will help remove these excess plants in the aisles.

10. **Adequate moisture and fertility during August and September** will increase fruit bud formation and improve fruit yield for the coming year. Continue irrigation through this time period and fertilize if necessary. An additional 20-30 pounds of N per acre is suggested, depending on the vigor. (*Source: Facts for Fancy Fruit 2002-08, June 19, 2002*)

Renovation and Weevil or Cyclamen mite Control Strategies

Diane Kaufman, Oregon State University

Research by OSU Berry Specialist, Bernadine Strik suggests that the best time to renovate ‘Totem’ and ‘Redcrest’ is 2 to 4 weeks after harvest (early to mid-July). Since the presence of old leaves inhibits new growth, renovation (renovation = leaf removal, row narrowing, application of fertilizer and necessary fungicides, insecticides, herbicides, and irrigation) is important because it helps promote new growth. Vigorous leaf growth during late summer is important because next years flower buds are initiated from August through October (and possibly later during mild winters) in the axils of these newly formed leaves.

Although the idea of a few weeks “rest period” (it is best if plants are not severely water stressed during this time) for strawberry plants has been generally accepted for many years, there is some thinking that leaf removal immediately after harvest would be an effective strategy in fields threatened by root weevils, particularly when there are newly planted berry plantings in adjacent areas of the field which need to be protected from weevil invasion.

There are 3 species of root weevil that attack strawberries: the black vine, rough strawberry, and strawberry root weevil. Of these, the black vine is earliest to emerge and usually begins emerging from its pupal case in the soil around the end of May. Newly emerged weevils feed for about 3-4 weeks before they begin to lay eggs (weevils that emerge earlier in the season usually feed for a slightly shorter period before they begin laying eggs). Given these timings, black vine weevils probably began laying eggs around the second to third week of June. The rough strawberry and strawberry root weevil usually begin to emerge during strawberry harvest (early to mid June) and would be expected to begin laying eggs around the last week of June/first week of July. In our “pit traps” in strawberries at NWREC this year, we saw our first newly emerged adult strawberry root weevil on 6/ 13. Given this scenario, the time immediately after the last pick is a strategic time for root weevil control. OSU Entomologist, Glenn Fisher has found that early topping of strawberry plants can result in high mortality of root weevil adults from exposure to heat, dryness, and hunger, particularly when temperatures are high. A welltimed application of Malathion, Guthion, or Brigade on a warm, still night would reduce root weevil survival even more. Because root weevils can burrow under the soil surface to escape the heat, it is advisable to apply the insecticide at night and within 1 or 2 days of mowing, when weevils are still exposed.

Cyclamen mites: Early mowing of strawberry leaves would also increase mortality of the cyclamen mite, which is once again apparent in many fields. The cyclamen mite is usually only a problem every few years. Evidence suggests that cyclamen mites come in on the plants. Growers first begin to see symptoms of damage around the time of the first picking year. Affected leaves look crinkled, thick and leathery; leaf petioles often have small bumps or tooth-like projections on them. Although we don’t become aware of cyclamen mites until we see these signs, the actual damage occurred many months prior (during fall – early spring) when these leaves were nestled in buds deep in the crown. The cyclamen mite does not like bright light, heat, or dryness and, therefore, lives in bud scales deep within the crown. Cyclamen mites damage cells of leaves while still in the bud; as leaves expand the damage becomes apparent. By the second year, leaves begin to become small and crinkled and fruit size is reduced.

The 2 lb ai rate of Thiodan has proven effective at reducing cyclamen mite populations. However, for the insecticide to be effective, it must be able to penetrate deep into the crown where cyclamen mites live. For this reason, the best time to apply Thiodan is within a few days after mowing. Another application may be necessary in early spring (before new leaf growth has begun), especially if the winter has been mild. Because penetration is the key to control of the cyclamen mite, use of adequate water is extremely important. The PNW Handbook recommends application of Thiodan in 400 gallons of water per acre. In research conducted by Gina Koskela and myself in the mid-1990’s, we found 200 gallons to be as effective as 400 gallons. High pressure (60 to 80 psi) is also necessary. Applications made later in the spring, once the canopy is full are not generally effective because it is difficult to get adequate penetration to the crown and the damage has already been done (remember that the actual feeding damage occurred when flowers were in buds deep in the crown). Although the 2 lb ai rate of Thiodan provides good control of the cyclamen mite, that rate is harmful to the predator mite *Neosieulus fallacis*. Because of this, it may be a good idea to scout for two-spotted spider mites in late summer and/or the following spring.

Growers interested in biological control of cyclamen mites may wish to consider purchasing one of the following predators: *Amblyseius cucumeris*, *Neosieulus fallacis*; or the predatory six-spotted thrips (*Scolothrips sexmaculatus*).

The first two are predatory mites. *N. fallacis* is native here, thrives in strawberries, and is an excellent two-spotted spider mite predator. Many strawberry growers have already had experience with *N. fallacis* for two-spot control. *N. fallacis* definitely prefers two-spots to cyclamen mites, but it will kill and eat cyclamen mites if hungry enough. The 2 lb ai rate of Thiodan is highly toxic to *N. fallacis*, so it may be advisable to wait a week or two after an application before releasing *N. fallacis* or any other predator. Good results on cyclamen mite have been reported in California with *A. cucumeris* and the six-spotted thrip. I tried a release of *A. cucumeris* for biocontrol of cyclamen mite in field plots a few years ago and found them to be somewhat effective (compared to the untreated controls). (Source: June 2003 OSU Strawberry Newsletter)

Strawberry Sunscald

Pam Fisher, Ontario Ministry of Agriculture and Food

The extreme heat is adding another layer of difficulty for berry growers who have been harvesting this week. Some fruit are showing signs of sunburn or sunscald (Figure 1). This injury is pale, and mushy at first. It will dry down to a distinct firm bleached out lesion. It is sometimes confused with leather rot or anthracnose.

The very warm weather is favourable for the development of anthracnose fruit rot. The spores of this disease can multiply and spread throughout the field without infecting the fruit. If we get rain, or especially heavy splashing rain, after this warm week of weather, there is a good chance that anthracnose fruit rot will show up. Cabrio EG fungicide is a new product for strawberries, and is very effective for anthracnose control. It is a good choice at the green fruit stage where there has been a history of problems with this disease, or when conditions are extremely favourable. Cabrio has a preharvest interval of one day. (Source: The Ontario Berry Bulletin, June 27, 2003)

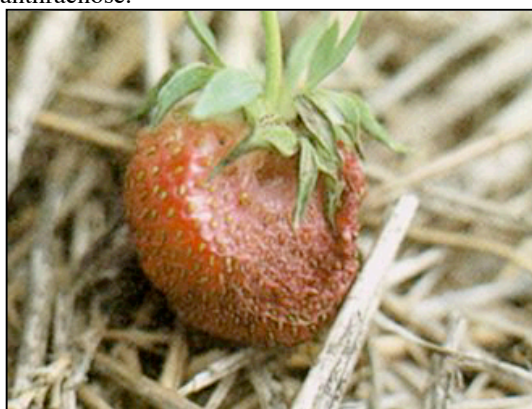


Figure 1. Sunscald.

Blueberry

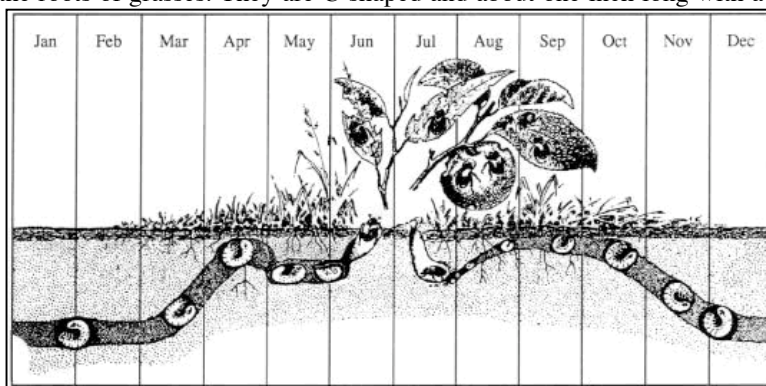
Japanese Beetle in Michigan Blueberries

Nikhil Mallampalli and Rufus Isaacs, Michigan State University

The Japanese beetle, *Popillia japonica*, is a scarab beetle species accidentally brought to the U.S. in shipments of plants from Japan in 1916. It was first reported in Riverton, New Jersey. Since then, it has slowly spread westward, first arriving in Michigan in the 1950's.

Life cycle and biology

The larvae (or grubs) inhabit the soil, feeding on the roots of grasses. They are C-shaped and about one inch long with a tan head. Larvae of this species can be distinguished from those of other soil-dwelling scarabs by the pattern of hairs on the hind end. The Japanese beetle has one generation per year in Michigan with the larvae overwintering in the soil. In the spring, they move closer to the surface, resuming their growth and feeding until late June when they pupate. A larva and a pupa are depicted in the accompanying photograph. Adults begin emerging about two weeks later, usually in early July, and rapidly aggregate on favorite host plants to feed and mate. This process is aided by the production of a chemical (an aggregation pheromone) that aids in finding other individuals of their species. Females lay up to 80 eggs, two to four inches under the soil surface near their food plants in batches of one to six eggs.



Pest status in blueberry

In the past five years, the populations have increased many hundred-fold in the main blueberry regions of the state with a large peak in adult abundance in mid-July. Adult beetles feed on a wide range of plants, including ornamentals and fruit crops. In blueberries, they remove leaf tissue and chew on the sides of fruit, which can increase the development of soft rots. This crop is particularly at risk of contamination because over 60 percent of the Michigan crop is mechanically harvested and harvesters cannot sort berries from beetles. If not removed, beetles may end up in fruit for sale if not detected by mechanical or human sorters.

Biological control

Some biological control agents, such as pathogens, nematodes, flies and beetles, attack the larvae in the soil. There are currently efforts underway to study and introduce effective natural enemies as a long-term strategy for control of Japanese beetle in Michigan.

Effect of row-middle management

To better understand the density and distribution of this species in blueberries, soil samples were taken from 15 blueberry farms throughout the main growing regions of the state during spring 2001. At each site, samples were taken at the grassy perimeter and in the row middles. Fields were chosen that were either rotovated or were maintained with a permanent ground cover, usually composed of grass. The number of grubs found was much higher outside the fields than inside.

Highest abundance was in the permanent sod outside the field (five grubs per square foot), while the lowest was inside the field in rotovated middles (0.25 grubs per square foot). These results suggest that maintaining clean row middles reduces Japanese beetle populations in blueberry fields. However, grassy areas just outside plantings will still support high grub densities, requiring control of beetles moving into the planting. This study will continue in the coming years to develop recommendations for using row-middle management and repellent cover crops to minimize the abundance of beetle larvae within blueberry fields.

Chemical control

Because adult beetles emerge from the soil during blueberry harvest time, control prior to harvest is essential to minimize contamination of blueberries. However, pre-harvest intervals and re-entry restrictions limit the utility of many insecticides during this period. To maximize the effectiveness of insecticides for Japanese beetle control, coverage should be excellent, and the full-labeled rate should be used. The pH of spray water can have a significant impact on insecticide efficacy, especially for Imidan (optimum pH 6), which is one of the main tools used for Japanese beetle control. Consult MSU Extension publication E-154 for recommendations on insecticide options labeled for blueberry. (*Source: Michigan State University's Fruit Crop Advisory Team Alert Vol. 16, No. 14, July 10, 2001*)

Blueberries May Help Old Folks Keep Their Smarts

Anne Harding, Reuters Health

BOSTON (Reuters Health) – A cup of blueberries a day may keep “senior moments” away, new findings suggest.

A team of Massachusetts and Florida researchers has shown that the fruit reduces aging-related damage in rat brains, and can also prevent mental decline in mice genetically engineered to develop Alzheimer’s – like plaques in their brains.

The findings, along with early results from human study, suggest a healthy diet can go a long way toward preventing the mental decline that often accompanies aging. Dr. James A. Joseph of the Center on Aging at Tufts University in Boston and USDA Human Nutrition Research told Reuters Health.

Joseph presents his findings here Monday at the American Chemical Society’s annual meeting.

Cell-damage products on normal metabolism known as free radicals can injure tissue, and effect known as oxidative damage. Antioxidants – found in several fruits and vegetables, including blueberries – help prevent this damage, which has been implicated in a number of conditions including cancer, Alzheimer’s and heart disease. Oxidative damage is also a factor in aging.

Aged rodents that consumed the human equivalent of one cup of blueberries a day showed less oxidative damage in tissue from two distinct brain regions, Joseph and his team found.

To evaluate whether this effect might extend to behavior, Joseph and colleagues David Morgan, Gary Arrendash and David Diamond from the University of South Florida, put mice through a three-armed maze.

Half of the mice were genetically engineered to develop Alzheimer's-like plaques in their brains, while the rest were not. In each group, half of the animals were given blueberry-based pellets.

Testing began when the mice were young, before the genetically modified animals had developed plaques. The study lasted a year.

The mice with pseudo-Alzheimer's that didn't eat blueberries performed worse and worse on the maze over time. But the genetically modified animals given blueberries showed no decline, they performed just as well as normal mice, even though they still developed plaques.

Joseph said he believes the berries' brain-protecting power goes beyond its known antioxidant and anti-inflammatory effects. Blueberries seem to "directly influence the way neurons communicate," he told Reuters Health.

Preliminary results from a new study, he added, show that people who ate a cup of blueberries a day appeared to be protected from aging-related mental decline. Joseph expects the study will be published late this fall.

The next steps, the Boston researcher said, will be to do more tests in transgenic animals, evaluate which chemicals in blueberries find their way into the brain, and study how the fruit might be protecting the brain. (*Source: The Blueberry Bulletin, Vol. 19, No. 11; reprinted from Dixie Blueberry News, Georgia Blueberry Growers Association Newsletter, Vol. 2, No. 3.*)

Raspberry



Raspberry Winter Injury and Crown Gall

Pam Fisher, Ontario Ministry of Agriculture and Food

The raspberry crop is developing rapidly and, where plants are not injured, the crop is quite good. Some yellowing continues on the Nova. Expect fruiting canes with sub-lethal injury to die back as the crop load increases. Keep raspberries well irrigated during this critical time.

Raspberry growers may be seeing signs of crown gall, and cane gall. Both are caused by a soil-borne bacteria that invades raspberry tissue through wounds. Infected plants are less thrifty and stunted. Foliage is sometimes yellow. Crown gall rarely kills the plant however. Crown gall eruptions on the lower part of fruiting canes are showing up now, causing warty bumps, "growing from the inside out" (Figure 2). The cane galls do not show up every year, even in infested plantings. There are no controls for this problem. Crown gall bacteria stay in the soil a long time, and spread by moving soil, surface water or plant material. (*Source: The Ontario Berry Bulletin, June 27, 2003*)

Figure 2. Crown gall eruptions.

Bramble Update

Pam Fisher, Ontario Ministry of Agriculture and Food

This is the time when raspberry crops start to decline: just as harvest begins! Canes die back, leaves turn yellow and dry up. Although the symptoms are similar, there are many causes of this problem. Here are just a few:

Crown borer: Larvae are feeding and tunneling in crown. Dig up plants and look for reddish brown powder (frass) and larvae.

Cane blight: An invisible lesion under the bark. The fungus invades at a wound. Severely infected canes die over winter. Partially infected canes die back now. Infected canes are weak and brittle or bend easily. Tissue under the bark is brown instead of green (scrape with knife). Confirm this disease by sending samples to the pest diagnostic clinic (www.uoguelph.ca/pdc/).

Crown gall: Dig up plants and look for hard brown galls on roots.

Phytophthora root rot: Plants will have few new primocanes, or primocanes will wilt as well. Scrape bark in the crown area and look for reddish brown (instead of white) discoloration. (*Source: The Ontario Berry Bulletin, June 27, 2002*)

Grape

Grape Pest Update

Alice Wise, Cornell University

Reports have filtered in of black rot, downy mildew and phomopsis, not surprising given the weather. Nothing yet on powdery. Vigilance on the part of vineyard managers has kept the damage to a minimum. Potato leafhopper is around. Expect grape berry moth soon in susceptible blocks. New Grape Guide: From Mark Chien: "The new edition of the Oregon Viticulture is finally out. Ed Hellman, who was the extension viticulturist at the time, edited this latest version and it's the best one yet. This is still one of the best practical, hands-on guides to grape growing that I know of. Yes, its Oregon, cool climate viticulture, but I argue that 90% of viticulture is basically the same no matter where you are. You'll find a lot of useful information in this book that applies to Mid-Atlantic vineyards. The cost is \$44.95. University of Oregon Press. ISBN 0870715542. You can find it in Internet book stores as well."

Post Infection Disease Control: Given the difficulties of getting tractor work done this season, inevitably vineyards will have to be treated in a post infection mode. There are several materials with "kickback" protection. Note that many of these materials work well for post infection protection but have limited or no forward protection. This point must be taken into consideration when planning control options. Final comment: scout your vineyard so that if infections do occur, action can be taken as soon as possible. It is difficult to impossible to stop a raging infection. All of this is easier said than done in a season like this but we can all have goals.

Powdery mildew (PM) – There are several options to clean up powdery mildew infection including JMS Stylet Oil, Nutrol (monopotassium phosphate) and potassium bicarbonate products like Kaligreen and Armicarb 100. Stylet Oil provides some forward protection, up to four days in one of the only research projects to address this issue. Wayne Wilcox points out that the other three products do not provide any forward or residual protection. Thorough coverage is necessary for these products to work. Also, don't expect these materials to clean up and sanitize infected fruit – they will only kill the PM colonies thus halting the spread of infection.

Downy mildew (DM) – Copper has been the most popular method of both "burning out" existing DM infections as well as providing some forward protection. Note that the risk for phyto from copper is highest under cool, slow drying conditions i.e. now. Be sure to observe all cautionary statements on the label, use spray lime where recommended. The Ridomil products are excellent protectants that also provide some curative action. While they function in this capacity, it is a dangerous practice since use of Ridomil on existing DM infections is the recipe for creating resistance. The phosphorous acid (PA) products (ProPhyt, Phostrol and Aliette) function well as DM post-infection materials but they do not provide residual control.

Black rot (BR) – The sterol inhibitors – Nova and Elite – provide good post-infection control of BR. The sterol inhibitors Rubigan and Procure provide fair-poor control of BR.

Phomopsis – There are no post-infection materials for phomopsis. Fortunately, if you made it thus far with a minimal amount, it shouldn't get a whole lot worse. Especially if there is more infection than usual, be sure to keep susceptible rachises protected at least through fruit set.

Improving Deposition With Airblast Sprayers: In a season like this, good deposition of material is critical. In the June 3, 2003 Finger Lakes Vineyard Notes, Cornell Ag Engineer Dr. Andrew Landers makes this point: "Deflectors of all shapes and sizes have been developed to direct air into the canopy. The addition of small metal plates at the lower end of the air outlet will greatly enhance penetration into the canopy and reduce ground contamination. Deflectors on the top of the sprayer have improved deposition by 30% ..." This is a very simple yet very effective way to make an airblast sprayer much more efficient. While doing sprayer modifications right now is very low on the priority list, this job should absolutely be scheduled for winter. Landers' article makes a number of very good points, we can fax a copy for those interested. (*Source: LI Fruit & Vegetable Update No. 14, June 20, 2003*)

Bloom Time Petiole Testing for Wine Grapes

Joe Fiola, University of Maryland

We are right around bloom time in vineyards throughout MD at this point and this is a final reminder that it is a critical time to take petiole tissue samples. These samples can be used to identify potential problems in the vineyard as well as to set up a nutrient management program to best serve your vineyard. As you already know, MD has a requirement for all commercial vineyards to have a nutrient management program in place. The following are some guidelines for taking

and handling the samples. It is important to collect the samples as close to bloom as possible as the nutrient levels start changing quickly after fruit set making it more difficult to standardize the interpretation. The samples can be PROCESSED AND SUBMITTED any time after sampling, but the timing of SAMPLING/COLLECTING is critical. Please call or email if you have any questions. As you know I recommend a petiole analysis program which would involve a regular sampling of soils and petioles. To make the information obtained available to help growers across the state, I would like to coordinate, along with the County Extension Educators of MCE, a petiole analysis program which would involve a regular sampling of soils and petioles. Each year we will cover a different area of the vineyard, coordinated by cultivar or type, on a three to four year cycle. This year, since 'Seyval Blanc', 'Vidal Blanc' and 'Chardonnay' are the most widely grown French Hybrid and vinifera cultivars in the state, I would suggest we start with them. Of course if you do not grow any of these or have sampled them recently, please choose another white hybrid and/or vinifera, or a specific area of the vineyard which you deem appropriate. Good luck and take care.

SAMPLING GUIDELINES

Accuracy of the recommendations depends on the representative sample. The size of the block that constitutes a representative sample depends on the uniformity (soil, slope, etc.) of the block.

- Generally one sample should not be expected to provide useful information for more than 5 acres.
- Sample different varieties separately. Samples should represent plants that are planted on the same soil type and are of the same age, variety and rootstock.
- Sample at the same time of day, consistently, preferably in the morning.
- Vines should represent that portion of a block that is maintained under the same cultural practices, i.e. fertilizer, irrigation, and vigor control practices.
- Do not sample vines on the border of the block or near dusty roads.

Sample timing:

- The recommended time for sampling in Maryland is during full-bloom.
- To follow up with problem discovered at bloom, a 70-100 day post bloom (mid-late-August) sample can be taken.

Tissue to sample:

For the bloom-sampling period, sample the petiole of the leaf petiole OPPOSITE the 1st blossom/cluster

Number of petioles:

About 75 petioles are need from varieties with large petioles and about 75-100 petioles are need from varieties with small petioles.

Handling petioles:

Gently wash petioles with water and gentle detergent to remove any residual pesticide that may influence results. Pat dry and place in OPEN paper bag (lunch, #6 size) to dry for a few days before closing bag and shipping to lab for analysis.

Where to send:

There are many labs that can analysis tissue samples. Call the laboratory to determine current pricing and submission information. Some laboratories, such as those at Cornell and Pennsylvania State Universities, require samples to be submitted in their kits. There is usually a sheet to fill out to give vineyard and sample background information. The following is a short list with names and addresses where to send:

A & L Eastern Agricultural Labs, Inc.
7621 Whitepine Rd.
Richmond, VA 23237
(804) 743-9401

Brookside Farm Laboratory
308 South Main St.
New Knoxville, OH 45871
(419) 753-2448

Agricultural Analytical Service Lab
The Pennsylvania State University
University Park, PA 16802

Agrico Chem Laboratory
P.O. Box 639
Washington Court House, OH 43160
(814) 863-6124 (614) 335-1562

Plant Analysis Laboratory/ICP
Fruit and Vegetable Science Dept.

Cornell University
Ithaca, NY 14853
(607) 255-1785

Plant Analysis Laboratory
Agronomic Division — NCDA
4300 Reedy Creek Dr.
Raleigh, NC 27607-6465
(919) 733-2655

Soil Testing Lab
145 Smyth Hall
Virginia Tech
Blacksburg, VA 24061
(703) 231-6893

(*Source: PennState Wine Grape Newsletter, June 30, 2003*)

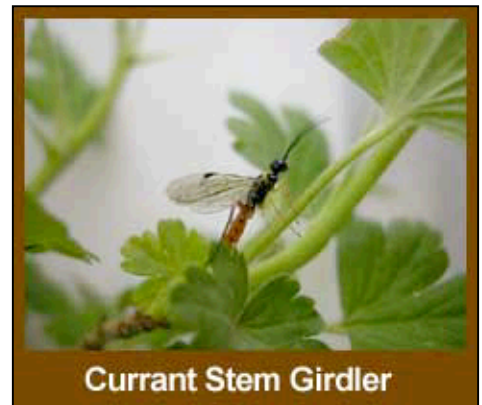
[**Editor's Note:** Samples may also be sent to the UMass Soil and Tissue Testing Lab, West Experiment Station/UMass, Amherst, MA 01003; (413) 545-2311]

Currants and Gooseberries

Secret Life of the Currant Stem Girdler; Another Opportunity to Use Sex Pheromones in Red Currants?

David James, Washington State University

Regular readers of Agrichemical and Environmental News will know of our successful research on mating disruption using a synthetic pheromone to control currant borers in the red currant fields of Prosser, Washington ("Pheromones Researched for Red Currant Pest Control: Softer Strategy May Replace Insecticides," Issue No. 171, July 2000; "Confusing (and Controlling) Currant Borers: Pheromones Show Success in Prosser Red Currant Fields," Issue No. 192, April 2002). This month, I report on yet another sex pheromone research story in red currants, which, if successful, might entirely remove the need to use insecticides to protect this high value crop!

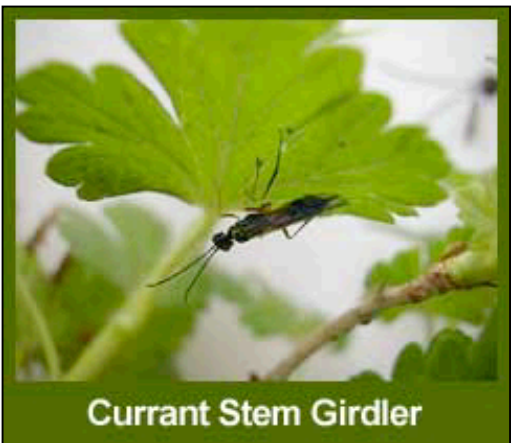
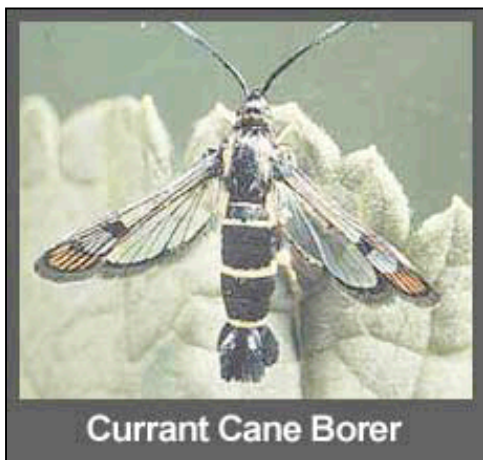


The Crop

Red currant production in Washington is centered in the Prosser area of Benton County where 78 acres are currently in commercial production. On this acreage, two growers produce about 300 tons of red currants annually. With an average value of around \$2,600/acre these currants are worth about \$203,000 each year. There are also some small acreages of currant production in western Washington. The Ribes industry (Ribes spp. include red currants, black currants, and gooseberries) in North America is small, but it has great potential for growth given the relatively high value of the crops, the low number of inputs required when compared to many other small fruits, and the considerable health benefits of the fruit (high vitamin C and potassium content). A Ribes renaissance appears to be underway with new acreage being brought into production in recent years in California, British Columbia, and parts of the eastern United States. The climate and soils of eastern Washington make it a prime region for future expansion of the currant industry.

The Pests

Two insect pests, the currant cane borer (CB) (*Synanthedon tipuliformis*) and currant stem girdler (CSG) (*Janus integer*) affect currant and gooseberry production and cause significant economic damage if left uncontrolled.



CB is a moth and CSG is a sawfly, but both have larvae that bore into canes, stunting plant growth and reducing fruit yield by up to 50%. In addition, CSG females injure new shoots during egg-laying by severing them 4-to-6 inches from the tips. Until recently, both pests were controlled by two to three applications of a broad-spectrum insecticide targeted at flying adults during May and June. Recent research by WSU has resulted in the development of an effective pheromone-based mating disruption strategy for CB, removing the need for insecticides to control this pest in Washington. However, insecticides are still required to control CSG. Accurate timing of insecticides for CSG is difficult to achieve because the pest is usually inconspicuous. Girdled shoots are often the first indication that adult sawflies have emerged.



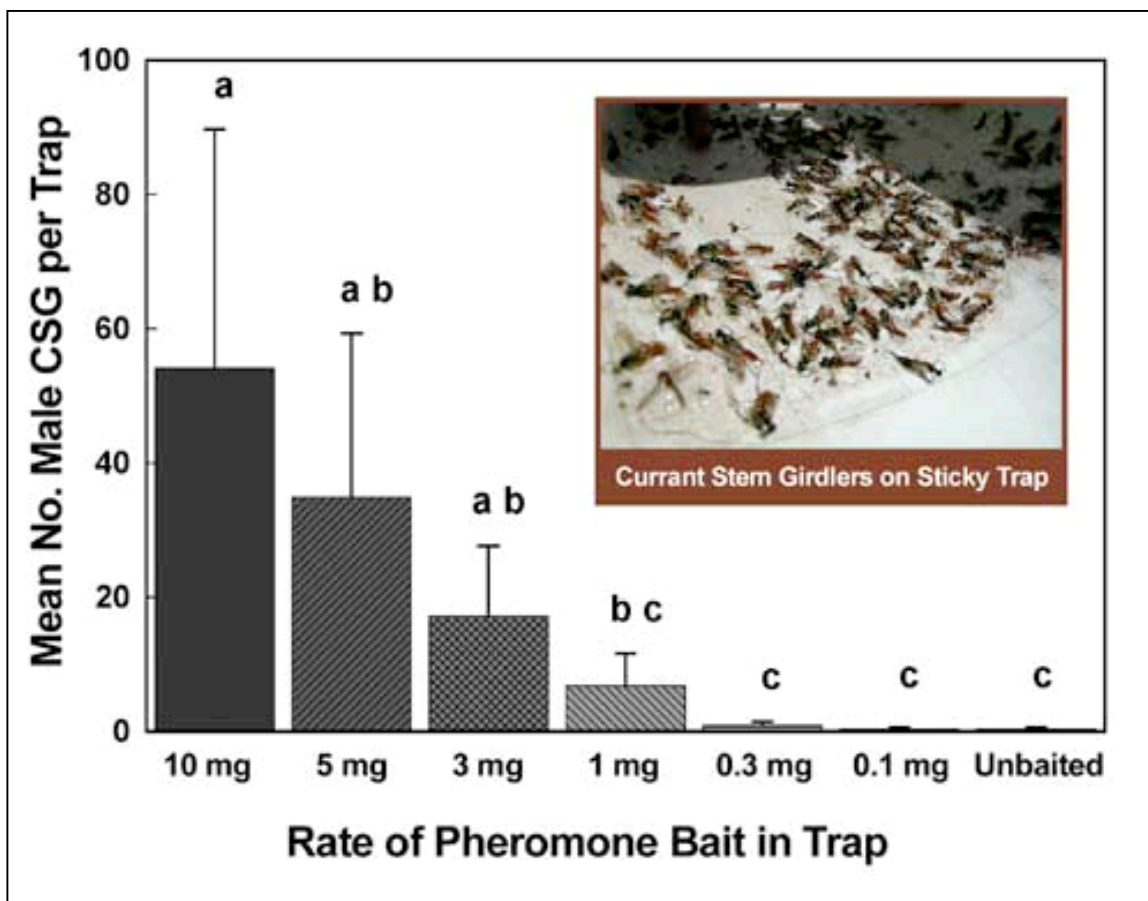
The Pheromone

While moths like CB are well known for their use of pheromones in mating, very few sawflies have been studied for pheromones. In fact only one sawfly species in the family to which CSG belongs has been shown to use a sex pheromone.

A chance observation in 2000 piqued my interest. I saw CSG males apparently attracted to a cage containing CSG females. The following winter I split open some red currant canes, collected a number of CSG pupae and sent them off to my colleagues in Illinois (Allard Cosse, Robert Bartelt and Richard Petrovski, USDA, Peoria) who are specialists in sawfly pheromones. They reared out male and female CSG and analyzed volatile emissions as well as whole-body extracts. They showed that female CSG produce a novel compound that excites or stimulates the antennae of male CSG, indicating that this material might be a sex pheromone used by females to attract males for mating. The Illinois team then developed a synthesis for the compound, allowing preparation of a synthetic version. The only way to be sure whether this compound was indeed a sex pheromone was to conduct field tests to see if we could attract male CSG to the synthetic material in the field.

The Field Test

In April 2002, I conducted a field test with the possible CSG pheromone and obtained good results indicating that the compound does function as a sex pheromone. Sticky traps baited with the compound at rates of 1, 3, 5 and 10 mg captured increasing numbers of male CSG (Figure 1). Greatest numbers of CSG were captured in 10 mg traps with up to 60 individuals captured daily. No CSG were caught in unbaited traps.



Mean number of male currant stem girdlers captured 13-20 May 2002 in sticky traps baited with different rates of pheromone. Bars with different letters are significantly different ($P = 0.0026$)

The Possibilities

These results are very promising, suggesting that we may be able to utilize the sex pheromone of CSG in managing this pest of red currants. Further field tests are planned to confirm this year’s results and to identify optimal rates and formulation of the pheromone.

It seems likely that at the very least we now have a pheromone to assist in monitoring the emergence and abundance of CSG, which will greatly enhance the precision of targeting insecticide applications. There may also be possibilities for controlling CSG using the pheromone in mass-trapping or mating disruption. The possibility of growing red currants with reduced or no pesticide inputs would provide yet another boost to this growing industry. (Source: *Agrichemical and Environmental News, January 2003, Issue No. 201*)

ACKNOWLEDGMENTS

I wish to thank Dennis Pleasant and Ken Lewis for allowing me to use their red currant fields to conduct pheromone experiments. I also thank Robert Bartelt, Allard Cosse, Richard Petrovski and Bruce Zilkowski of USDA, Illinois for their identification and synthesis of CSG pheromone, and to the Washington State Commission on Pesticide Registration for partial funding of the research.

General Information

Sudangrass and Sorghum-Sudangrass Hybrids as Summer Cover Crops for Rotational Plantings

William Bamka and Michelle Infante-Casella, Rutgers Cooperative Extension

The use of sudangrass and sorghum-sudangrass hybrids as a summer annual cover crop and green manure in crop rotations increases soil organic matter when grown and incorporated. Sudangrass and sorghum-sudangrass hybrids are annual warm season grasses that are heat and drought tolerant. Sudangrass and sorghum-sudangrass hybrids can grow from 6-8 feet tall and produce large amounts of dry matter. Both crops winterkill with the first hard frost. Sudangrass and sorghum-sudangrass hybrids offer several benefits as a cover crop. They can be used to store residual soil nitrogen, suppress weeds, improve soil quality, and may suppress some nematodes.

Residual Nitrogen Storage:

Sudangrass and sorghum-sudangrass have an extensive fibrous root system and the ability to produce high levels of dry matter. These plants also have the capability to take up and store soil nitrogen. Dry matter stores the nitrogen, preventing some leaching and allows nitrogen to be available to subsequent crops as the residue decomposes.

Weed Suppression:

When seeded at higher rates, sudangrass and sorghum-sudangrass are strong competitors that serve as a smother crop. They are reported to have a suppressive effect on some weed species such as **pigweed, purslane** and **foxtail**.

Nematode Suppression:

Research on nematode suppression by sudangrass and sorghum-sudangrass is not conclusive at this time. Some studies have shown that when sudangrass residue is incorporated in the soil, nematicidal compounds are released that reduce populations of **root knot nematodes**. Other studies have shown no effect, while others have shown increases of **root lesion and sting nematodes**.

Improvement of Soil Compaction:

Mowing the crop can increase the extensive root system. When repeatedly mowed, the root system also penetrates deeper. This helps to loosen compacted soils. Mowing can be done 2-6 times during the season depending on rainfall and management.

Organic Matter Addition:

Because of the capability to produce large amounts of dry matter, large quantities of organic matter can be added to the soil. This is especially true when the crop grows rapidly and can be mowed repeatedly during the growing season.

Establishment

A soil test will indicate any soil fertility problems that prevent adequate establishment of sudangrass and sorghum-sudangrass. The optimum soil pH for growth is 6.0-7.0. Apply 40-60 lb. per acre nitrogen at planting to ensure plant establishment and stimulate plant development. The crop should be planted after the threat of frost in spring and before July 15 to allow for maximum growth. Planting with less than six weeks until frost will result in unsatisfactory dry matter production. Warm soil temperatures (60°F) are required for germination. Planting with a seed drill into a well-prepared seedbed will result in a better stand and requires less seed than broadcasting followed by light tillage. Although row spacing does not affect yield, narrow rows are better for cover cropping. An adequate plant stand is important to ensure good dry matter production and weed suppression. Seeding rates are generally between 15 to 40 lbs. per acre. Seed costs per acre can range from \$15 to \$20 depending on rates. Seed costs are comparable to spring oats that can cost \$14 to \$18 per acre, but not as low as annual ryegrass that is \$4 to \$11 per acre for seed. Plant sudangrass and sorghum-sudangrass hybrids 1 inch deep in medium to heavy soils and 1.5 inches deep in sandy soils.

Management

In order to obtain the maximum benefit from a sudangrass or sorghum-sudangrass cover crop the crop must be managed properly. In some soils, especially sandy soils, topdressing with nitrogen after mowing will improve growth. Mowing is necessary to encourage tillering, increase vegetative growth, prevent seed head formation, and to provide for maximum dry matter production. Without mowing the crop can become unmanageable and hard seed may be set that will produce volunteer weeds in subsequent crops. When the crop is approximately 18-36 inches tall it should be clipped too closely (less than 8 inches) or plants may weaken or die. Frequency of mowing will depend on seasonal environmental conditions and fertility. At the end of the growing season the crop should be mowed again, just prior to a killing frost. Green crop residue from young plants decomposes quickly. However, residues from older, larger plants decompose slowly due to their high carbon to nitrogen ratio. If the crop is being grown for nematode suppression, past studies suggest it should be finely chopped and incorporated into the soil when still green and before a killing frost. It is also

recommended to run a cultipacker across the field to firm the soil. The nematode suppression is reported to be a result of the release of nematicidal compounds during decomposition. It should be noted that the ability of sudangrass to suppress nematodes has been reported to be specific to the nematode type.

Possible Concerns

Prussic acid poisoning can be a concern when feeding sudangrass and sudangrass-sorghum hybrids to livestock. Hybrids can produce hydrocyanic acid (HCN) which is converted in the rumen to prussic acid. Prussic acid is readily absorbed in the blood stream and interferes with respiration. The danger of poisoning is highest in the early growth stages and following a light frost. Therefore, it is recommended not to pasture livestock until the crop is 18 to 24 inches tall, rotating pastures to prevent grazing of young regrowth, and removing livestock if new shoots develop after a partial kill by frost. Hay should be made when the grass is in the boot stage. Poisoning of horses fed sudangrass and sorghumsudangrass hybrids has been reported. The exact cause of the poisoning is not known. Horses should not be allowed to graze sudangrass or sorghum-sudangrass hybrids, and they should never be fed the hay. Scout sudangrass and sorghum-sudangrass fields for **aphids**. Sugars in the plant can attract aphids. Aphids can transmit plant diseases and should be controlled if they are a potential problem for nearby crops. (*Source: Rutgers Plant & Pest Advisory Organic Farming Edition, Vol. 4, No. 2, MAY 8, 2003*)

SkyBit™E-Weather Service for NJ Growers

Winfred P. Cowgill, Jr. and Martha Maletta, , Rutgers Cooperative Extension

Many of you have heard us at Rutgers refer to the SkyBit™ weather service. We utilize it in our Rutgers IPM weather-based programs and on many of our research farms to assist in making spraying decisions. We have found it to be an invaluable service that we use on a daily basis in planning our agricultural activities. SkyBit™ E-Weather is particularly valuable in predicting wind speed and the time wind events will occur. This is extremely important to us at the Rutgers Snyder Farm in Hunterdon County, NJ, where we have constant westerly winds and many times have a very small window of time to make a research treatment or maintenance application. We also find it to be accurate with temperature predictions. Other data provided includes a 0-48 hour forecast, a 1-7 day forecast and the past 7 day's summary. Data includes temperature, precipitation, wind speed, cloud cover, drying time, spraying forecast, soil temperature and more. The best part is that this service is delivered to either your fax machine or E-Mail box every morning. Frost alerts are also generated when they occur.

What is E-Weather?

E-Weather is an electronic weather service from SkyBit™ that delivers (with subscription) site-specific weather information via fax or e-mail on a daily basis. EWeather Service offers a variety of products in an easy-to-read tabular or graphical form. The E-Weather Service subscription is divided into Tiers, depending on the complexity of the product. Tier 1 includes the basic weather data forecast and observations and frost alert. Tier 2 includes weather-dependent data specialty products for decision making in commodities, such as an IPM Disease, IPM Insect modules and TOMCAST Tomato Disease forecasting. For example, the Apple Disease Product uses individual pest models to simulate and predict several parameters for a potential disease threat. These include Accumulated Wetness (AW) and Temperature (TW) of the potential threat. Also provided is a "pest window" (PW), which represents conditions associated with a particular disease development, including **Apple Scab, Fireblight** or **Sooty Blotch**.

What do you need to do to get started?

Go to the website at <http://www.skybit.com> and get the subscription information forms. First, fill out the "EWeather Service Application Form." This form provides SkyBit with subscription and billing information. The second form is the "E-Weather Service Site Identification Form." On this form enter state, county, location, geographic address, elevation, time zone, start and end dates for each site. The third form to fill out is the "E-Weather Service Product Delivery and Price Form." You may also call SkyBit at Tel: 800-454-2266 or Email: eweather@skybit.com

Costs

In my opinion, the price is very reasonable and cost effective. The cost of products varies with the selection of the number of sites and products you wish to add, but the basic is \$50.00/month for as many months as needed, i.e. you don't need to subscribe for a full year. The basic service includes your choice of one Tier 1 product, and frost alert. Additional Tier 1 products are \$5 each and Tier two products are \$10 each per month. For more details on pricing see the SkyBit website. (*Source: Rutgers Plant & Pest Advisory Organic Farming Edition, Vol. 4, No. 2, MAY 8, 2003*)

[**Editor's Note:** SkyBit also has forecasting programs available for grapes,]

Overview of High Tunnels

Chris Mullins, Virginia State University

What is a High Tunnel?

A High Tunnel is a simplified growing system that enhances crop growth, yield and quality. Similar to heated greenhouses, high tunnels are used to extend the growing season in the spring and fall and are useful with a variety of crops; however, they lack all of the electrical components and automation of a conventional greenhouse. Basic components of a high tunnel are a metal Quonset shaped frame, single layer of polyethylene cover and an irrigation system. Crops are grown in the ground, yet are protected from temperature fluctuations and light frost. Other benefits are reduction in moisture fluctuation, wind protection, soil warming, reduced chemical usage and the ability to use biological pest control.

High tunnels are relatively inexpensive allowing for protected vegetable production with a limited capital investment. The system is most appealing to direct marketers, who can take advantage of having out-of-season produce which can be sold at a premium price.



What crops can be grown in a high tunnel?

Many crops such as tomatoes, cucumber, peppers, strawberries, broccoli, brambles, and cut flowers do very well in a high tunnel. Specific crops, which might be grown, will largely depend on marketing opportunities available to individual growers. Much work has been done at Pennsylvania State University with high tunnel structures and the different crops that are best suited to these structures. When used along with other plasticulture components such as drip irrigation and plastic mulch, a high tunnel can produce high quality crops 3-4 weeks early in the spring and extend the growing season in the fall by 3-4 weeks.

How is a high tunnel constructed?

High tunnel frame packages can be purchased from many different suppliers, so always follow the construction instructions that come with your frame. Generally, the frame for a high tunnel is composed of various 1-2" galvanized metal pieces and hardware. The first step is to drive the 3' ground posts into the ground, leaving 1' above ground. These posts should be placed 4' on center. With the posts level side-to-side and the corners square, the next step is to construct the bows. Metal bows usually come in 2-3 pieces and give the structure its shape. Bows can be constructed on the ground, then lifted into position and fitted into the ground posts. Placement of the horizontal metal tubing called purlins is the next step. Purlins span the length of the structure and are bolted to the bows. Normally, there are three purlins for each structure, one at the ridge and one on each side of the ridge. The purlins along with the corner bracing give the structure stability. Along the ground on the sides of the structure are the baseboards. These are usually 2" x 8" treated lumber that touch the ground and are bolted to the ground posts. The frame will be complete after hipboard (1" x 4" lumber) along with poly lock is attached to the bows approximately 5-6' off the ground. This will serve as the point of attachment for the plastic covering.

The end walls are the next step in construction. Generally, these are framed from 2" x 4" treated lumber and can be built either fixed with a passage door or semi-fixed with a large hinged door. The large door that spans the width of the tunnel will allow for movement of equipment in and out. Next, the 6-mil greenhouse grade plastic can be attached to the hipboard, along the end bows and to the end walls. This is best done early morning or late afternoon when there is less chance for wind. The last construction step is to attach the plastic at the baseboard to a length of 1" metal tubing with PVC clips. This will allow the plastic to be rolled up to the hipboard. Ventilation in the tunnels is accomplished by rolling up these sidewalls.



What is the cost of a high tunnel?

Approximate Costs for 21' x 48' High Tunnel

Structure:	Cost:	
Metal Frame		\$1,400.00
Poly cover and lock		\$ 460.00
End wall lumber		\$ 265.00
Irrigation		\$ 125.00
	Subtotal:	\$2,250.00
Labor:		
Construction labor 60hrs @ 8/hr.		\$ 480.00
	Total:	\$2,730

For more information: Chris Mullins, Virginia State University, PO Box 9081, Petersburg, VA 23803 (804) 524-5834 / cmullins@vsu.edu

Note: Penn State has recently released the new "2003 High Tunnel Production Manual" which covers everything from history, construction, to environmental management, all phases of production, pest management, economics, and references. It is 152 page plus three appendices. The manual is for sale at \$25.00 and for bulk orders of 20 or more copies the price is \$20. Orders can be sent to Dr. Bill Lamont at the address below:

Dr. Bill Lamont, Department of Horticulture, 206 Tyson Bldg., The Pennsylvania State University, University Park, PA 16802
Please make checks payable to: The Pennsylvania State University.

References

1. Butler, B. R., Extending the Production Season for Vegetables and Small Fruit. Univ. of Maryland Coop. Ext. Fact Sheet 760.
2. Wells, O.S., 1998. Rowcovers and High Tunnels-Growth enhancing Technology. Proc. of the Soc. of Hort. Sci. and Plasticulture.Sem. Series.
3. Wells, O. S., 1996. Row Cover and High Tunnel Growing Systems in the United States. Hort Technology. 6 (3): 172-176.

(Source: Virginia Vegetable, Small Fruit and Specialty Crops Newsletter, May-June 2003; Volume 2, Issue 3)

Pesticide Updates

More fruit crops added to imidacloprid (Admire and Provado) labels

Lorraine Los, University of Connecticut

The new Admire 2F and Provado 1.6F labels from Bayer CropScience have a number of new crops added. These new labels (as well as most other pesticide labels) are available on www.cdms.net. We were especially interested in the addition of strawberries to the Admire 2F label due to the concerns about white grubs. Dr. Rich Cowles from the Connecticut Agricultural Experiment Station was instrumental in getting a Section 18 label for Admire in strawberries in the past and was involved in discussions with Bayer CropScience and CT DEP regarding these new labels. The timing of the new Admire label is ideal because renovation is the time to control white grubs (see below).

Admire 2F for strawberries - The Admire 2F product is for SOIL applications only. For whitefly or aphids, apply specified dosage by one of the following methods. 1) Just prior to transplanting or during transplanting or 2) In drip irrigation after plants are established or on perennial crops in early spring prior to bud opening. Allow 14 days to harvest. For the white-grub complex (Asiatic garden beetle, European chafer, Japanese beetle, Oriental beetle), apply a single application post-harvest to coincide with renovation of strawberry fields. Admire 2F must be incorporated into the soil with at least 0.25 inches of irrigation or rainfall within two hours of application. Admire 2F may not be applied both in the spring and post-harvest during renovation. See new label for rates and more directions.

Admire 2F for other small fruits - Bushberries (currant, elderberry, gooseberry, huckleberry, juneberry, lingonberry and salal) are also on the new Admire 2F label. Blueberries are NOT included. Again, it's for soil applications for Oriental beetle and Japanese beetle larvae.

Provado 1.6F for strawberries- The Provado 1.6F product is for FOLIAR applications only, for control of aphids, whitefly and spittle bugs. Do not apply prior to or during bloom when bees are actively foraging. For resistance management purposes, a Provado foliar application following a soil application of Admire in the same crop is not recommended. See new label for more directions.

Provado 1.6F for other small fruits - Bushberries (excluding blueberries) are also on the Provado label. Pests controlled include aphids, leafhoppers, thrips and Japanese beetle adults.

Provado 1.6F for stone fruit - A number of stone fruit crops are now on the Provado 1.6F label. Pests include aphids, green june beetle, Japanese beetle, potato leafhopper, rose chafer, San Jose scale, tarnished plant bug, and white apple leafhopper. There are different pre-harvest intervals and restrictions depending on the type of stone fruit. See label for these details. (*Source: CT Fruit Pest Message, June 26, 2003*)

Meetings

NH Vegetable/Berry Twilight Farm Meeting

July 8, 2003, all day at Moulton Farm, hosted by John Moulton in Meredith NH. Contact Cheryl Estabrooke

NH Vegetable/Berry Twilight Farm Meeting

July 30, 2003, all day at Roots & Fruits in Dalton NH. Hosted by David Craxton. Contact George Hamilton at 603-673-2510 or Amy Oulette at 603-527-5475.

One berry, two berry, pick me a blueberry

Plan on attending the Berry Jubilee on Sat. Aug. 2 at Local Hero farm The Benson Place in Heath. Celebrate the wild blueberry harvest in a spectacular location and enjoy tasty blueberry treats, blueberry picking, farm tours and more. For more information contact the Benson Place at 413-337-5340. (*Source: CISA June 2003 Newsletter, <http://www.buylocalfood.com>*)

NOFA Summer Conference

August 8, 9, and 10, 2003. Make plans to come to this dynamic and informative weekend conference on Organic Farming and Gardening. To view a list of all the workshops and download registration information, go to: www.nofaiac.org or call 978-355-2853.

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