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Pesticide Applicator Licenses and Recertification: We encourage anyone who applies pesticides on commercial crops to obtain a pesticide applicators license. While it is required only for certain circumstances or for use of certain types of pesticides, being able to document training in safe mixing, loading, and application procedures can be useful when dealing with the public. In order to find out how to obtain a pesticide applicators license or to find opportunities to earn recertification credits if you have a current license, check out the UMass Extension Pesticide Education website at <http://www.umass.edu/pested/index.htm>. There you will find information on:

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STRAWBERRY

Timing Winter Straw Removal in Strawberries

Jeff Kindhart and Tony Bratsch University of Illinois

A common sign that mulch should be removed is the presence of new growth. Many growers delay mulch removal in an attempt to delay flowering time and avoid frost damage. Unfortunately, this delay has little effect on flowering time and may result in reduced yields.

Let's look at the whole story ...

To be successful with strawberries in the Midwest it is critical to apply straw over strawberry plantings in the late fall. Straw protects plants from winter cold and desiccation and guards against excessive frost heaving which can damage the shallow, brittle roots of strawberries. Its other advantages are spring frost protection, weed suppression and soil moisture conservation. Straw also acts as a barrier between ripening berries and the soil, keeping fruit clean and dry during harvest. It has often been a question from growers as to ideal timing to apply and remove mulch. Recent research by Dr. Bob Skirvin and Research Specialist Alan Otterbacher at the University of Illinois has given growers solid guidelines for removal of winter straw.

The best way to gauge the timing of straw removal is by soil temperature monitoring. Because most strawberry roots are found in about an 8 inch zone,

taking soil temperature to a depth of about one half of the root zone (about 4 inches) is recommended. In a University of Illinois study, mulch removal timing was evaluated at 38, 43, 48 and 54 ° F, to determine when soils held steady at these temperatures for at least 3 days. In Champaign, these temperatures were correlated with roughly mid March, late March, mid April and late April removal timings, a range of about five weeks.

Results from this study indicated that the greatest yields were obtained where mulch was removed when the 4- to 5-inch soil temperature was 40 to 43 ° F. They also found that even between the earliest and latest dates of removal, early bloom was separated by only 11 days; and first harvest by only 3 days. Thus advantages of early mulch removal to promote early maturity were minimal. However, production was shown to increase by early removal. Late removal (a delay to 54 °F) actually decreased yields, mainly due to leaf etiolation (elongation under shade conditions) and reduction of leaf area due to sunburning. Crowns were also killed by a delay in straw removal.

Again, the ideal 4- to 5-inch soil temperature for straw removal is 40-43 ° F; in central Illinois, these temperatures were reached by the end of March. This allowed time for leaves to begin growth with little danger of sunburning, and produced the greatest yields. (*Source: Illinois Fruit & Vegetable News, Volume 5, Number 4, March 25, 1999*)

Biological Control of Root Weevils in Strawberries

Pam Fisher and Hannah Fraser, OMAFRA, Agriculture & Agri-Food Canada

Background

There are limited options for management of root weevils in berry crops. No successful monitoring program has been developed and there are few chemical options. Root weevils are causing damage at an increasing number of locations in Ontario and losses can be devastating in infested fields. A team of researchers across Canada is currently studying the situation in several provinces, in an attempt to develop IPM strategies for monitoring and control of this pest. Meanwhile, growers need immediate options. Beneficial nematodes are commercially available, although very expensive (ie \$400-\$600 per acre). Application conditions are very specific and control has been very sporadic in the past. A new strain of nematode has recently become available in Ontario,

which is more cold tolerant and perhaps better suited for our conditions.

Objective

To compare two types of beneficial nematodes for control of black vine and other root weevils in strawberries.

Methods

Two strains of beneficial nematode, *Nemasys L (Stienernema krausii)*, *Nemasys H (Heterorhabditis megidis)*, were applied to 10 m plots in a three year old strawberry field known to be infested with root weevils, predominantly black vine weevil. Plots were replicated 10 times and the untreated check plot was treated with water. Applications were made Sept 21, 2006 by hand at labeled rates, using a 5 L water per plot, followed by 15 L water per plot. Plots were assessed May 16 by sampling three cores per plot and examining soil for larvae and pupae. Differences in plant health were observed between plots, but

all plots showed noticeable levels of root weevil injury. Plant biomass was estimated by taking fresh weight of above ground plant material, biomass, clipped from 2 m area of the plot.

A second trial was set out in October 2007, using *Nemasys L*, at an infested site near Cambridge. Treatment was applied using a field sprayer followed by sprinkler irrigation. Plots will be assessed in 2008.

Results

Both strains of nematode provided some degree of control, although only the *Nemasys L* was statistically different from the control.

Root weevil control in strawberries: treatments applied October 2006, assessments May 2007

Other comments

Beneficial nematodes work best when applied to moist soil. Application in evening or in dull overcast conditions is preferred. High water volumes are required to move the product into the soil, and irrigation immediately following the application is recommended. Avoid application in the heat of the day or in bright sunlight. Application costs per acre can be reduced by banding the product over the rows. There are several suppliers of beneficial nematodes, see ontario.ca/crops for a list of suppliers (under resources and services click on sources of crop inputs, and then beneficial insect and mite suppliers). Order product at least a week in advance of application. The product has a limited shelf life and should be stored in a cool dry place.

Acknowledgements

CORD IV funding from the OBGA was used for student assistance and in the purchase of beneficial nematodes. (*Source: The Ontario Berry Grower, Volume # 1 January 2008*)

RASPBERRY

While You're Pruning Your Raspberries and Blackberries.....

Kathy Demchak, Penn State University

Pruning is therapeutic – not only for a lot of us who enjoy pruning, but also for your plants. Pruning keeps plants healthy by encouraging new growth and opening up the plant canopy, and provides an opportunity to remove disease-infected or insect-infested canes. Here are some signs and symptoms of various diseases and insects to watch for while you prune your raspberries and blackberries. If you're done pruning by the time you read this, you may want to take another look before the plants leaf out to see if you missed any of these items.

Diseases

Crown gall: This systemic bacterial disease causes galls to form usually near the crown, though galls can also appear on the canes. Galls will be brown and cracked-looking at this time of the year. The largest galls can be the size of a golf ball, and several may be clustered together into a mass of galls in severe cases. If you find plants with galls, dig them out, and check the soil for galls that have broken off. You probably won't be able to completely eradicate the problem, but this will help. Thoroughly clean your pruners with alcohol before moving on to uninfected plants.

Anthrachnose: This fungal disease causes circular or oval pits on the canes. These lesions are more noticeable on canes that retain a reddish or greenish color, such as blackberries and black raspberries. Spores produced from these lesions will infect the young canes that will emerge soon. Prune out canes that are severely pitted, remove them from the planting, and

be sure to apply a good coating of lime sulfur at green tip.

Botrytis or gray mold: This fungus overwinters as sclerotia on the canes, which are tiny black, oval-shaped structures. Use cultural controls, i.e., anything that encourages drying of the foliage – and bloom sprays later on.

Cane blight: The epidermis of infected canes develops a silvery color by spring. Later on, buds may fail to break or lateral shoots may wilt (these can also be symptoms of winter injury). Remove infected canes.

Insects

Raspberry crown borers: You may be able to notice holes at the base of canes where larvae have bored in to enter the crown area. Especially with thornless blackberries and black raspberries (plants that send up new canes from the crown area), number of canes may decrease, and growth from infested crowns will be weak. Canes may break off making galleries in the crown visible. Because these borers take two years to mature, you may be able to find larvae in the crowns. A soil drench of Capture can be applied in fall or spring, as larvae overwinter in the soil.

Red-necked cane borer: Watch for a swelling on the cane. If you find one, carefully peel or scrape off the bark and look for tunnels that circle the stem. Remove any canes that have swellings. Adults are present anytime during the summer and are ¼-inch long beetles with a reddish section behind the head. Spray a labeled insecticide (Admire or Pyrellin) if necessary when adults are present.

(*Source: The Vegetable & Small Fruit Gazette, March 2008*)

Availability of the Revised NRAES Bramble Production Guide

Kathy Demchak, Penn State University

The following is adapted from NRAES information:

NRAES is preparing to publish *Raspberry and Blackberry Production Guide for the Northeast, Midwest, and Eastern Canada* (L. Bushway, M. Pritts, and D. Handley, eds). The book provides information on all aspects of raspberry and blackberry culture from site selection and preparation, trellising and pruning, to nutrient management, to harvesting and marketing. It will be the only comprehensive resource for novice and experienced growers as well as crop advisors and educators. It will be available in March 2008.

Special pre-printing prices are available for single copies (\$25 plus s+h) or bulk orders (\$22 plus s+h, 25 copy minimum). The list price is expected to be \$37. The book will be 156 pages and have 14 chapters, 134 color photos, 36 line drawings, 30 tables, 18 side bars, a glossary, and suggestions for further reading. The

deadline for pre-press orders is February 15, 2008. After this date, copies can be ordered directly from NRAES at the list price. The book will be available in March 2008.

For more information, including a two-page flier, sample pages, and a table of contents, go to www.nraes.org. You can place your order for books on the NRAES secure web site.

For more information, contact the NRAES staff at:

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BLUEBERRY

Simplified Blueberry IPM for Upland and Small Acreage Blueberry Growers

Dean Polk, Rutgers University Fruit R&E Center

More than a dozen arthropod pests and an equal number of diseases can attack highbush blueberries. Most wholesale commercial farms are located on porous soils with high organic matter, and shallow water tables.

Since the blueberry is a native fruit, it is common for commercial plantings to be surrounded by wild blueberry pests, and other alternate hosts for pest that attack cultivated plants and easily disperse into commercial fields. This kind of movement affects insect pressure and IPM practices for such pests as cranberry weevil, blueberry maggot, sharpnosed leafhoppers, and aphids as well as disease pressure from blueberry stunt disease, and blueberry scorch virus. Most growers on upland soils, with diverse crop plantings have a slightly different pest complex. This is partly due to the diversity of crops that are grown, the smaller and more isolated plantings, and different mixtures of plant species that may surround the farm. The most important key pests are those that can be found in most areas where blueberries are produced. Those pests that are most likely to be found on smaller, diverse farms are discussed below in rough order of seasonal appearance.

Mummyberry – This is one of the most common diseases that can occur in blueberry production. There are 2 phases of the disease, primary and secondary infections. Overwintering mummies near the soil surface produce miniature mushroom-like cups (apothecia) in the early spring in which ascospores are

formed. During infection periods, ascospores shoot up from the ground and land on expanding leaf tissue. As these leaves wilt from primary infection, conidia or secondary spores are formed. Infection periods and pollinators, which land on infected leaves, can carry the conidia to open blossoms thereby infecting the fruit. The infected fruit will ‘mummify’ and over time looks like a little gray pumpkin. Upon cutting the fruit open a white fungal mass can be seen developing in the fruit.

Scouting should start with ground examinations for mummies, especially in wet areas between the time green tissue first starts to show and 1/2” of growth. An average of one or more cups per bush usually indicates moderate to severe disease pressure. Primary shoot strikes should be scouted for prior to and during bloom. Looked for flagged, necrotic leaves. A dark brown to gray sporulation can often be seen on the leaf surface. The count can be based on 200 fruit clusters or approximately 2,000 fruit. Nothing for the season can be done at this point, but the information can be used as an indicator where disease pressure may be highest during the following season. This would be similar to monitoring mummified fruit on the ground during the dormant period.

Cranberry Weevil – There are 1-2 generations per year in most of New Jersey and the Mid-Atlantic area. Adults are 1/16” long and brown, with a few white markings on the wing. The snout is about 1/3 as long as the body. Overwintering weevils disperse into fields from wooded areas, hedgerows, weedy areas, or debris early in the spring.

The cranberry weevil is active on warm, sunny days. Females puncture a hole in the developing bud or flower, laying an egg inside. Both expanding buds and bloom may be heavily damaged. The larva develops in the flower and the adults emerge in the summer. Most activity occurs near field edges bordered by woodlands. Therefore monitoring should be concentrated on fields that border wooded areas. If weevils or weevil injury is found on field edges, sampling should continue into the interior of the field to define the area of weevil activity. Monitoring should start at bud swell, and continue through bloom, particularly on warm, sunny days. If monitoring on a cloudy day, concentrate on weevil injury. If the day is warm and sunny, look for both injury and adult weevils. Bud injury or presence of adults prior to bloom is particularly important to catch, since insecticides cannot be applied during bloom.

Cranberry weevil populations and injury can be recorded by examining 10 entire bushes and reporting the number of weevils per bush. Since this is a lengthy process, an alternate method is to use a 3 ft square beating tray beneath each bush, and beat half of each bush, catching all insects that drop. This should be done on 20 bushes, since only half of each bush can be monitored with this procedure. Blossoms and blossom clusters should be monitored for a number of pests at once. Use a 10 bush sample, and inspect 20 blossom clusters per bush. Examine 5 clusters on each of 4 shoots per bush.

Sampling is done from the mid to upper areas of each bush. Data collected from each site is a composite from the data collected from all 200 clusters (about 2,000 estimated fruit), but is divided by 10 bushes for an average per 20 clusters.

Most varieties range from 10+ berries per cluster, so a simple percentage of infestation may be calculated when needed. The percent of injured blossom clusters is reported. A blossom cluster is rated as injured if at least one blossom of the cluster has a weevil puncture. Treatment thresholds are set at 5 weevils per bush or 20% of blossom clusters (at least 1 injury or puncture per 5 clusters) with reported injury.

Leafrollers – While various species of leafrollers can occur at different times of the season, the first larvae or ‘worms’ are often seen during bloom, so they are dealt with here.

Redbanded Leafroller (RNLR) – RBLR pupae overwinter in leaf litter and trash. Adults emerge during the early spring before flowering, and deposit egg masses on bark and leaf surfaces. Adults have a wingspan of about 1/2”, and have silver, gray and orange markings with prominent cinnamon colored band across each wing. Larvae are green with a green head and thoracic shield. Like other leafrollers, RBLR larvae produce a shelter made of spun together leaf

pieces. During the early part of the season, these may be found on the tips of growing shoots, around developing blossoms or fruit clusters.

First generation larvae feed on leaves and surfaces of young berries. There are 3 generations per year. The first flight can start in early April, with the second flight starting in mid June and peaking by the end of June to early July. The third flight usually peaks by early to mid August. Egg laying period occurs roughly at the same times as peak trap catches.

Obliquebanded Leafroller – Half grown larvae overwinter under bark scales, around the crown, and in other protected places. During the spring, larvae feed on developing buds, leaves, and berry clusters. Larvae are easily recognized. They are up to 3/4” long and robust, with a green body, and a dark brown to black head capsule, legs and a prothoracic shield (just behind the head capsule). Larvae feed for several weeks before pupating at the feeding site. The first adults usually start to emerge by mid to late May, but may appear by late April. OBLR adults are larger than RBLR adults, and are tan with a darker band of tan to brown on the front wing. Eggs are laid on the foliage, and hatch after 1 to 2 weeks, depending on the temperature. Summer larvae are usually found from late June through July. Larvae feed on foliage and fruit.

Second flight adults start to appear in late July to mid August, with larvae feeding briefly before finding overwintering sites. Larval habits and damage are similar to other leafrollers.

Fruittree Leafroller (FTLR) – This leafroller may be common during some seasons. The adult is rusty brown with gray and silver markings. Larvae are similar in appearance to OBLR larvae. However, the prothoracic shield is slight lighter in color and the larvae less robust.

Green Fruitworm (GFW) – There are several species which may appear in blueberries. The humped green fruit worm is the most common. Adults are large with a wingspan of 1.5”. Larvae have a dorsal hump on the posterior end, are a medium shade green with a pair of lateral white stripes and many small spots extending the length of the body, which may be up to 1.5” long. Larvae may be found feeding in the growing shoots, or on the fruit itself, but do not tie leaves together with silk the way leafrollers do.

During pre-bloom to bloom, as well as other times when larvae are active, flower and fruit clusters can be monitored as previously described. Adults should be monitored with pheromone traps. During bloom and shortly thereafter, a treatment threshold of 1 larva per 100 clusters (or .2 per 20 clusters) may be used. Since damage is similar among most leafrollers, the treatment level is an aggregate for all the worms present. The only exception is Gypsy Moth, which is not a leafroller, and may be blowing in from surrounding trees if populations are high. Gypsy moth larvae should always be treated prior to attaining the third INSTAR LARVAKL STAGE, NO LARGER THAN 1/2 TO 3/4”.

Past experience has shown that even 1 Gypsy moth larva per bush, especially the very young larvae, represents a high population.

Anthracnose – Usually considered a post harvest or even late season rot, the real problem occurs much earlier in the season. The fungus overwinters on twigs, especially bud scales. Most infections occur during bloom and on young fruit. Therefore, good fungicide programs are important during this period. The infection cycle is highly dependent on variety.

‘Bluecrop’ drops bud scales late, and is very susceptible to infection, and therefore needs a longer period of fungicide use. Post bloom sprays on other varieties have little value as long as the field is well managed and disease pressure is low. The most easily recognized symptom for scouting is infected fruit. Field counts maybe made using the 20 cluster x 10 bushes sample method (approx. 2,000 fruit – see cranberry weevil above), and record the percent fruit showing anthracnose symptoms. If infected fruit are seen during the early ripening phase, then additional fungicides applications should be made, and presence noted for an improved disease control program the following year. Fruit infections first show up as sunken areas, then progress into masses of salmon colored spores.

Fields may also be monitored prebloom and postharvest. During the dormant period a field can be assessed for its approximate risk to anthracnose and judgments made for potential use of fungicides in that field. Depending on the number of fields being monitored, collect from 10 to 100 shoots, about 18” long, per field. Mist them with water and enclose in a plastic bag. Maintain at room temperature for 2-3 weeks then remove and look for orange sporulation. Count the branch as positive if there is at least one sporulating lesion, and record the number of branches that have one or more sporulating lesions. Heavy disease pressure is indicated if at least 20% of the shots are positive. During harvest, collect at least one pint per field per picking. Incubate at room temperature in plastic clamshell containers for 7 days. Count berries with anthracnose symptoms and calculate the % infected fruit. Infected berries will have sunken areas with concentric rings of orange sporulation. The incubation method is more accurate, but both are used only as an indication of disease pressure for the following year, as well as an assessment of the current season’s spray program,

Plum Curculio – Curculio are active once per season, but twice per season in the southeast. They overwinter as adults mostly in nearby woods. Adults become active in the spring when temperatures reach 50-60°F for several days or 75°F for 2 or more days. The spring flight is the most critical, when adults disperse into fields to feed on buds and developing fruit, mate, and lay eggs. Individual eggs are laid in holes eaten in the

fruit. The female then makes a crescent shaped cut beneath the egg, which kills the tissue in that area and protects the egg. The grub spends the entire larval period in one berry, and then drops to the ground to pupate. Larval development is usually complete by mid July. Therefore, while any variety maybe injured, only early maturing varieties are subject to having grubs in harvested fruit. Most injury on later varieties simply causes fruit to prematurely drop. Injury is usually found along field edges, or in fields that border wooded areas. Weedy and brushy hedgerow areas also serve as alternate host sites for this pest. Sampling should be biased toward border fields of early maturing varieties such as ‘Weymouth’, ‘Earliblue’, and ‘Bluetta’.

Cranberry Fruitworm (CBFW) – CBFW overwinters as a larva near the soil surface, pupates in the late winter to early spring, and usually starts to emerge by early May. During some years emergence may be as early as April, but generally coincides with the end of bloom and fruit set. Adults are small moths with gray-brown wings. Young adults have 2 white spots on each wing. Eggs are flat and white, and are laid in the calyx end cup of developing berries. Developing larvae usually move through 3 to 6 berries, leaving webbing and frass as they go. The frass hangs on, and is the distinguishing characteristic of its damage. Larval development is usually finished by the end of May to mid June, at which time they drop to the ground to spin a cocoon and pupate. There is one generation per year.

Monitoring is done with pheromone traps and by monitoring fruit clusters for the presence of larvae or infested fruit.

Blueberry Maggot (BBM) – BBM overwinters in a puparium in the soil, and the adults emerge by early to mid June.

Adults continue to emerge throughout the remainder of the season. After 7 to 10 days eggs are deposited on green or ripening fruit just under the skin. Maggot larvae hatch in 2 to 7 days, and develop inside the fruit for about 3 weeks.

Infested berries are soft and often have a depressed area at the point where the egg was laid. Infested fruit may drop, where the mature larva emerges and pupates in the ground. The adult is about the size of a small housefly, with a small white to yellow mark on the back of the thorax and thin yellow to white bands across the back of the abdomen. The most distinctive characteristic is the inverted “W” or “M” pattern on each wing. Depending on the market there is low to “0” tolerance for maggot larvae in fruit. Therefore, most controls are directed towards the adult flies.

Monitor with baited yellow sticky boards hung in an inverted “V” in the top 6” of the bush canopy along field edges. Monitor at least once per week, preferably 2 times per week, and change the traps every 2 weeks.

General Monitoring with Pheromone Traps – Pheromone traps are used for leafrollers and cranberry fruitworm adults. Traps should be hung 6” to 8” above the bush canopy on

poles that are bent at a 90° angle to serve as hangers. If trapping for several different insects, the traps should be at least 30' apart within a row. RBLR pheromone should be placed prior to bloom, while OBLR can wait until fruit set. Pheromone caps for CBFW should be replaced at petal fall.

While attractant caps for RBLR and OBLR should be changed every 6 weeks, only a single placement is required for CBFW, since there is only one generation per year.

Sources for Scouting Supplies – Distributors, Dealers, and Manufacturers -

- Phero Tech, Inc. 7272 Progress Way, Delta, BC Canada V4G 1E9 800-665-0076, www.pherotech.com
- Scentry Biologicals, Inc., 610 Central Ave, Billings, MT 59102, 800-735-5323, www.scentry.com
- Suterra, LLC., 213 Southwest Columbia St., Bend, OR 97702 866-326-6737, www.suterra.com
- Trece, Inc., 7560 Highway 28 West, P.O. Box 129, Adair, OK 74330, 866-785-1313, www.trece.com

- Great Lakes IPM, 10220 Church Rd. NE, Vestaburg, MI 48891, 800-235-0285, www.greatlakesipm.com
- IPM Tech. Inc., 4134 N. Vancouver Ave, #105, Portland, OR 97217, 888-476-8727, www.imptech.com
- Gempler's, P.O. Box 270, Mt Horeb, WI 53572, 800-382-8473, www.gemplers.com
- AgBio, Inc., 9915 Raleigh St., Westminster, Co 80031, 877-268-2020, www.agbio-inc.com
- ISCA Technologies, Inc., P.O. Box 5266, Riverside California 92517, 951-686-5008, www.iscatech.com

Further Reading:

- Cornell Pest Management Guidelines for Berry Crops, <http://ipmguidelines.org/BerryCrops/>
- The Mid-Atlantic Berry Guide, www.pubs.cas.psu.edu/FreePubs/pdfs/agrs97.pdf
- The Blueberry Bulletin, www.njaes.rutgers.edu/pubs/blueberrybulletin
- Michigan State Blueberry Information, <http://web1.msue.msu.edu/fruit/blueberry.htm>
(*Source: New York Berry News, News, Vol. 7, No. 2, Feb. 2008*)

GRAPE

Assessing Bud Injury

Tim Weigle, Cornell University

With temperatures hitting below zero numerous times this season there has been some concern expressed as to how badly the buds have been injured. One comment I have heard is that the best defense is a good offense and more buds will be left up to combat winter injury and to guard against another spring frost. I will leave the discussion of how you need to look at the whole picture and be prepared to thin during the growing season and the effects of over cropping on the vines carbohydrate storage to Terry Bates and Hans Walter-Peterson. I would like to direct your attention to some of the pest management problems that can be caused by leaving up more buds than you need.

Number 1 - While not specifically a pest management issue, it is an issue of common sense. Most everyone has complained about the job an unsupervised migrant crew does, leaving up too many buds, not leaving up the best buds, etc., leaving you with a mess that requires additional input of man hours in future years to get back to a training system you recognize. Why would you do on purpose what you have tried to avoid over the years?

Number 2 - Along the same lines as minimal pruning, or hedging (but hopefully not as drastic) will be the number of smaller shoots that come out in the spring quickly filling in the canopy. Take the problem with getting coverage in the interior of the canopy (the

fruiting zone) during late season sprays for grape berry moth and move it up earlier in the season due to a quicker closing in of a denser canopy.

Number 3 - One of my favorites, the law of limiting factors. As you push a vine toward maximum yield you will eventually run into a factor required for getting that crop ripe, while maintaining a healthy vine, that will become limiting. Powdery mildew is an excellent example of this. When the vines are hanging a moderate to high yield per acre, some powdery mildew on the foliage is not considered to be worth treating, the vine can ripen the crop while building carbohydrate reserves. However, with an excessive crop, management of late season powdery mildew becomes much more important and will require much more time and effort devoted to it than a vineyard with an appropriate sized crop.

The Take Home Message is: do a little detective work to see what you have in the vineyard to get the information necessary to make a good decision. Take the time to check each vineyard block, each variety within a block, and check areas separately if you know they have a tendency to be cold spots.

A guide to checking bud for cold injury can be found at: <http://www.nysaes.cornell.edu/hort/faculty/pool/budcoldinjury/Assessingbudcoldinjury.html>

If the pictures are a bit small for you try clicking on the picture, it should enlarge the pictures for you. As always, I welcome any questions on vineyard pest management. Just send an e-mail

timweigl@netsync.net, call me at (716) 672- 6830 or drop by the office at 412 E. Main St in Fredonia NY. (*Source: Lake Erie Regional Grape Program Update, March 5, 2003*)

CURRENTS AND GOOSEBERRIES

New Possibilities for Black Currants

Elizabeth Keller, Staff Writer, Communication Services, NYSAES Cornell University

When Curt Rhodes of RH Rhodes and Sons, Inc. in Penn Yan, NY first contacted the New York State Food Venture Center (FVC) in 2004 for assistance with value-added black currant products, FVC director Olga Padilla-Zakour realized she had a unique opportunity. Black currants are making a comeback in New York after Congress banned them in 1911 as a contributing factor to the spread of white pine blister rust. In 1966, the availability of disease-resistant varieties made Congress relax its position and made lifting the ban a state issue. New York, once the number one producer of currants in the US, lifted the ban in 2003 through the efforts of Hudson Valley grower Gregg Quinn.



Working with the Rhodes family, Padilla-Zakour had an opportunity to encourage the reintroduction of black currants by creating formulations for value-added recipes that make the crop more profitable and offer alternative marketing options. There were two serious challenges to overcome in processing the fruit. While Black currants have four times more vitamin C than oranges and twice the antioxidants of blueberries, they are high in acid and pectin, so formulations for jams, jellies, and dressings have to be altered and existing methods adapted to produce a quality product. These challenges were overcome and Rhodes has several new products to market and a co-packer to make them. The

products were debuted at the 125th Anniversary Open House at the (Geneva Experiment) Station where they made a big hit.

The black currant craze is gaining momentum. Rhodes is selling his crop to wineries that use it primarily for blending.

Through Padilla-Zakour, Rhodes also gained a link to Bellwether Hard Cider. Bill Barton, of Bellwether, wanted to blend black currant juice with his hard cider, but commercially available juice concentrate did not produce the desired results.

Padilla-Zakour told put him in contact with Rhodes and the FVC produced a test batch of 100 gallons of fresh black currant juice for blending under the sponsorship of the NY Farm Viability Institute. “The difference in quality between concentrate and fresh pressed juice manufactured using optimal conditions is what makes the final black currants products so distinctive, full of flavor and color”, said Padilla-Zakour. The fresh juice worked like a charm, and Bellwether’s newest product, ‘Black Magic’ is one of their top sellers, going for \$3 a bottle more than regular hard cider.

Thanks to contacts like these, and through products formulated by Padilla-Zakour, Rhodes’ entire 2008 crop is already spoken for. (*Source: New York Berry News, Vol. 7, No. 2, Feb. 2008*)

General

Providing Summer-Long Berries for ‘Localvores’

Charlie O’Dell, Virginia. Tech

We have noted an increasing demand and eagerness to pick berries of all kinds and colors at our farm in recent years. A major dictionary publishing company declared their new word for year 2007 to be ‘Localvores or Localvores’: People who avidly support local production and marketing of food near their community by their purchases of it. This trend is widely evidenced by an increase in sales at local farmers markets, U-Pick enterprises and retail on-farm markets.

It seems to us that more and more Americans are now getting the message being presented by our government, medical and nutritional researchers and horticulturists: Berries of all types are good for your health! The more varied the colors the better, to increase the range and types of antioxidants plus dietary fiber and potassium. An ancient philosopher wrote “you are what you eat”. Now, nutritional scientists have proven it so! Also, our public schools are going towards more healthy meals with less fat, more fruits and vegetables for our children, great news for our berry,

tree fruit and vegetable growers! An example of berries being more visible to the public while they are shopping: Look at cereal boxes in supermarkets. Many have very attractive color photos of raspberries, blueberries, blackberries or strawberries on the box fronts showing them atop a cereal bowl as serving suggestions. We note that a cup of raspberries on cereal, such as from our freezer from which we eat all year long, contains only 52 calories while adding 7 grams of dietary fiber plus 151 mg of potassium! Figures are very similar for one cup of blackberries, one cup of blueberries or one cup of strawberries, greatly increasing the nutritional power of a mere bowl of breakfast cereal. Consumers are getting this message!

Here at our U-Pick farm featuring blueberries, blackberries, late summer primocane raspberries (red and yellow) and seedless grapes (red, white and blue fruit colored varieties), plus retail sales of fresh green asparagus, we now offer seasonlong production of 6 colors of berries and vegetables. Our season begins about mid-April to mid-June with asparagus, then into U-Pick blueberries from mid-June to early August; blackberries begin in early August and pick until mid-September; seedless table grapes pick through the month of September, primocane raspberries begin in early August and pick continuously until early October. *Note:* Due to increasing customer demand for more blueberries, we have recently completed new plantings of blueberries that will pick from mid-June until early October, ripening continuously in succession through the summer, by selecting an array of early, mid-and late season ripening varieties now available to growers.

Another trend we note is the high percentage of lean, fit and trim, health-conscious folks who come to pick. They are eager to sign onto our berry pickers' list-serve to notify them when our various berries are in season and for instant updates on picking schedules. This direct communication with our customer base has totally replaced our use of expensive newspaper ads and all other forms of media advertising, saving us several thousand dollars each year in advertising costs! Our 'Localvores' tell us they consider our U-Pick berries to be a great service to our community, which makes us feel honored to be able to provide this service and encourages us to continually strive to improve our production for them.

We growers need to make plans to increase our variety of offerings to meet this rising consumer demand for all types and colors of fresh berries! For example, in this region, I sincerely believe there should be at least one season-long, multiple berry crops grower near every town and city. Look at my home state of Virginia, for example: There are over 1,100 towns and cities listed in our official state highways map, some small, some large, but only a pitifully small number of strawberry,

blueberry, blackberry and raspberry farms exist in this state. To me this makes no sense in this rapidly urbanizing region of increasingly health-conscious (read berry conscious) citizens! Traditional farming enterprises are time-honored here, but I believe it is high time for more farmers to consider these new crop opportunities driven by consumer interest in healthy eating!

Note: Berries farming, to offer consumers season-long varieties and types of berries harvested in succession from spring into early fall, is a full-time job, not a part-time or "supplemental" enterprise. Please plan to give focused, full-time management and operational effort to this business. Where can traditional or non-berry growing farm families find the needed information to learn the nuts and bolts details of berry crops production/marketing they must have to transition into successful berry enterprises? I believe that our berry growers' associations such as we have assembled at this convention must take a major responsibility to catalyze change by recruiting more farm families to learn about and enter this business of berries production!

An excellent example of such efforts by berry growers associations is the educational conference such as this that specializes in providing information on berry crops. Such conferences bring together interested farmers as well as experienced berry farmers, industry suppliers and research/extension berry workers presenting and exchanging ideas and information including latest research results to benefit our berries industry. Such meetings are "complete buffets" for the mind and soul of berry growers and those wanting to learn how to grow berries successfully. Making such educational buffets readily available and widely publicized to county and area Extension Agents and their administrators serve as valuable agent in-service training to provide them resources to work with their clientele awakened to berries growing/marketing potentials.

To stay in the educational, informational and social loop of berry crops growers, a vital step that more growers and supporting industries must take is to join and support berry grower's organizations dedicated to improving the berry crops industry of growing and marketing these tasty, nutritious crops. For example, if your interest is in growing and marketing raspberries and blackberries, you should consider joining The North American Raspberry and Blackberry Growers Association (NARBGA). Contact www.rasperryblackberry.com or email nabga@mindspring.com.

For strawberry growing interest, you should consider joining the nationwide strawberry growers association, The North American Strawberry Growers Association (NASGA). Contact info@NASGA.org. In the Southeast region, an example of a fine regional strawberry growers meeting is the SE Strawberry Expo, held annually sponsored by the NC Strawberry Association, the North Carolina Department of Agriculture, NCSU Cooperative

Extension Service and other cooperating Land-Grant universities in the states of South Carolina, Georgia and Virginia. Contact ncstrawberry@mindspring.com.

If your interest is in blueberry farming, you should consider joining the national US Highbush Blueberry Council (USHBC), contact www.blueberry.org. In the southeast region, an excellent growers' meeting is held annually by the NC Blueberry Council in cooperation with NCSU Extension blueberry specialist, Bill Cline.

Contact www.ncblueberrycouncil.org. Also, this convention features excellent blueberry educational information and speakers, as do blueberry educational meetings in many states such as Georgia, Florida, New Jersey, Kentucky, Michigan, Oregon, and others. Check with your state land-grant university for berries information and berries educational meetings for your area. (*Source: New York Berry News, Vol. 7, No. 2, Feb. 2008*)

Thinking of Using Drip Irrigation this Season?

Bill Lamont, PSU, Horticulture

I have long believed that water would be a commodity traded in the future just like oil is now! All we have to do is look around the country and we can see the beginnings of water rights being bought and sold, water being diverted to populated areas, and the lack of water for crop production in areas hit by the recent droughts. We have to remember that in the production of vegetables all we are doing is packaging water in another form and selling it to the consuming public. We are indeed fortunate that vegetables are a major component of a healthy diet and if we look carefully we can see a shift toward preventative medicine based largely on the premise if we eat the right food, exercise, and drink good quality water we can prevent a lot of the current medical problems that we see around us. Drip irrigation can help us supply high quality vegetables to the marketplace while conserving our precious water resources. Drip irrigation is a method of applying small amounts of water, often on a daily basis, to the plant's root zone.

No matter the size of the system, a drip irrigation system has four major components and two options.

Major Components

- * Delivery system: emitters or line source drip tubing
- * Filters: sand, disk, or screen
- * Pressure regulators: spring or valve
- * Valves: hand-operated, hydraulic, or electrical

Options

- * Controller: simple electric clock or computer
- * Fertigation system: electric pumps, hydraulic pumps, venturi systems, etc.

How you put these components together, and which options you choose, will depend on the size of the system, the water source, the crop, and the degree of sophistication you desire.

Advantages and Disadvantages

Although many advantages favor installation of a drip system, there are some limitations as well.

Advantages

1. Smaller water sources can be used, as drip irrigation may require less than half of the water needed for sprinkler irrigation.
2. Lower pressures mean reduced energy for pumping.
3. High levels of water management are achieved because plants can be supplied with precise amounts of water.
4. Diseases may be lessened because foliage remains dry.
5. Labor and operating costs are generally less, and extensive automation is possible.
6. Water applications are precisely targeted. No applications are made between rows or other non-productive areas.
7. Field operations can continue during irrigation because the areas between rows remain dry, resulting in better weed control and lower production costs.
8. Fertilizers can be applied efficiently to roots through the drip system.
9. Watering can is accomplished on varied terrains and in varied soil conditions.
10. Soil erosion and nutrient leaching can be reduced.

Disadvantages or problems

1. Initial investment costs may be more on a per acre basis than other irrigation options.
2. Management requirements are high. A critical delay in operation decisions may cause irreversible damage to crops.
3. Frost protection that can be achieved by sprinkler systems is not possible with drip systems.
4. Rodent, insect, or human damage to drip tubes may cause leaks.
5. Filtration of water for drip irrigation is necessary to prevent clogging of the small openings in the drip line.
6. Water distribution in the soil is restricted.

Specific Adaptations to Vegetables

Because vegetables are usually planted in rows, drip tape/tubing with prepunched emitter holes, called a line source emitter, is used to wet a continuous strip along the row. Also since most vegetables are considered annuals, a thin-walled disposable tubing (4 or 8 mil thick) generally is used for only one season. Less emphasis is usually placed on buried mainlines and sub-mainlines to allow the system to be dismantled and moved from season to season. Costs may be high, so a goal should be to develop an inexpensive yet functional system that allows maximum production with minimal costs. You may purchase an entire system from an irrigation dealer or adapt your own components. Assistance in design from an irrigation dealer or professional can be very helpful in avoiding problems later on.

Water Sources

The water supply may come from wells, ponds, lakes, municipal lines, or pits. Well water sources generally are fairly clean and require only a screen filter to remove particles. However, precipitates or other contaminants in the water should be determined by a water quality test prior to considering a drip system. Municipal sources generally provide documentation of water quality tests, making it easier to spot potential problems. Surface water such as streams, ponds, pits or rivers will contain bacteria, algae or other aquatic life, and sand filters are an absolute necessity. Sand filters are generally more expensive.

Major Components of a Drip System

1. Delivery system

- * Mainline distribution to field
- * Sub-mainline (header line)
- * Connectors/Feeder tubes
- * Drip tape/tube

2. Filters

3. Pressure regulators

4. Valves or gauges

Delivery System

* Mainline distribution to field: Buried underground polyethylene plastic pipe or PVC pipe or above-ground aluminum pipe can be used to deliver water from its source (pump, filtering system, etc.) to sub-mainline (header line).

* Sub-mainline (header): It is common to use vinyl "lay flat" hose or polyethylene pipe as the sub-mainline (header line). The vinyl "lay flat" hose is durable, long-lasting, and lays flat when not in use so equipment can be driven over it. The lay flat hose and connectors/feeder tubes are retrieved after each growing season and stored until the following year.

* Connectors/Feeder tubes: Water flows to the drip tubing through small plastic tubes attached to plastic connectors that connect the sub-mainline (header line) and each drip tube. This allows some flexibility season to season when the sub-mainline is laid out and the drip tubes are not in exactly the same place.

* Drip tube: The design of most drip tubing consists of an inner and outer chamber that allows for even water distribution over a wide range of conditions. Most tubing is polyethylene black plastic, 4 to 8 mil thick, with holes at intervals of 8 to 24 inches. In general, the sandier the soil, the closer the spacing needed. 12-inch spacing is common. The tubing is shipped flattened on a roll and is often called drip tape. Most drip tapes emit water at about 25 gallons per 100 feet per hour when operated at 10 psi pressure. Standard rolls of tape (7,200 feet) contain enough tubing tape for 1 acre of crop on 6-foot row centers.

Filters

Filters are essential to the operation of a drip system and may be viewed as the most important component of a drip system. For wells or municipal water a screen filter or disc filter can be used. Screen filters (150–200 mesh screen) are available in sizes from 3/4 inch (used only for 1/2 acre) to 6-inch (used with several acres). Some filters have a valve to open and flush the filter. Disc filters operate with a series of discs stacked vertically to separate out small particles. Although more expensive to purchase, they are reliable and easy to clean.

For any open or surface water sources, sand filters are an absolute necessity. They are installed as pairs of sand-filled canisters and can be back-flushed to accomplish cleaning. Canisters from 14 inches (enough for 2 acres) to 48 inches in diameter are used, depending on the size of the system. I have used a lot of stainless steel canisters over the years to clean the water from ponds.

The need to clean or flush filters can be determined by the loss of pressure through the filter. You can install pressure gauges on either side of the filter to indicate the need to flush when pressure loss exceeds 5 to 7 psi. With only one pressure gauge behind the filter, watch for reduced operating pressure in normal operation. When stream or river water is used, a sand separator is usually needed to remove suspended sand from the water before it enters the sand filter.

Pressure Regulators

Most drip tubing is designed to operate at 8 to 15 psi pressure, with 10 psi being standard operating pressure. A spring-type (used on smaller systems) or diaphragm-type pressure regulator can be purchased to hold pressure steady. These are inexpensive and reliable. Both adjustable and pre-set types are available.

Valves or Gauges

Watering several fields or sections of fields from one water source can be accomplished by a zone system using valves to open and close various lines. A backflow/anti-siphon

valve is a necessity on a well or municipal source where fertilizers or chemicals are to be injected into the line. Hand-operated gate or ball valves or electric solenoid valves can be used to automate the system using a time clock, water need sensor (discussed later), or automatic controller box (“computer” controller).

Optional Additions

Fertigation or chemigation: Soluble fertilizers can be added to the drip irrigation water to provide uniform crop fertilization. A simple “hazon” venturi injector siphons soluble fertilizer from a bucket or jug into the line at a pre-set ratio (usually 1:16 or 1 gallon for every 16 gallons of water flowing through the line). The hazon injection system, however, is only suitable for 1/2 acre plantings or less. Other venturi units are available in sizes up to 2 inches in diameter. More expensive injectors with greater capacity and accuracy, use electric or hydraulic “pumps” to inject fertilizer solutions from a stock tank into the line. A hydraulic device, called a Dosatron, can be set at various dilution rates and operates with water flowing directly through the device, which is placed in the mainline. Use only high quality, soluble fertilizers that completely dissolve. All fertilizer injections should be made as close to the field as possible and ahead of a secondary screen filter in the line so that any contaminants are filtered out.

Fertigation is most commonly used to supply nitrogen since it is highly soluble and moves easily through soils to roots. Phosphate and potash are best applied prior to planting and not injected through the irrigation system. Other chemigation applications may include pest control measures, but check label restrictions on use in chemigation applications. If any fertilizer or chemicals are applied through the system a check valve to ensure no contamination of the water source is a necessity. For regulations on water use, well and valve requirements, and water permits contact the Pennsylvania Department of Agriculture.

Drip systems operate most effectively when used in conjunction with plastic mulches. Mulches reduce evaporation of water from soils and improve economy

of drip water application. Vegetable operators typically use 4-foot-wide rolls of black or white-on-black polyethylene plastic mulch on 5-foot row centers with drip tape buried 1 to 3 inches deep below the plastic and either 3 to 5 inches to the side of the row or in the center, depending upon whether a single- or double-row crop is being grown. Use care in laying tubing straight so it will not be damaged when transplanting. Plastic laying machines can lay drip tape and plastic mulch in one operation.

Maintenance

The drip system filter should be checked daily and cleaned if necessary. A clogged screen filter can be cleaned with a stiff bristle brush or by soaking in water. Sand filters need to be back-flushed. Check lines for excessive leaking. A large wet area in the field indicates a leaking drip tube. You can install a connector to the leaking tube or bypass the leak with a short piece of feeder tube.

Excessive mineral precipitates on drip lines can be dissolved with acids, usually phosphoric acid. Tapes buried under plastic mulches are much less apt to become clogged from precipitates.

Bacteria, algae and “slime” in lines can be removed by injections of chlorine or commercial bacterial control agents applied through the fertigation system. Use a 2 ppm chlorine daily “rinse” at the end of the irrigation cycle or a 30 ppm “shock treatment” if slime becomes a problem in the system. Consult with a drip system representative for dilution rates for commercial cleaning products.

Periodic flushing of the mainline, sub-mainline and drip tape is an excellent maintenance practice. Adapters are available for the ends of each drip tape to automatically flush lines at the end of each

irrigation cycle, or they can be manually opened to allow a few gallons of water to flush from the end. This will prevent any build-up of particles or slime at the end of the drip line. (Source: *The Vegetable & Small Fruit Gazette*, March 2008)

Upcoming Meetings:

March 18, 2008. **Cornell Soils Workshop: Soil Health & Dynamic Nitrogen Modeling.** Conference Room 102, Mann Library, Cornell Campus, Ithaca, NY. For more information contact Larissa Smith, lls14@cornell.edu or Bob Schindelbeck at rrs3@cornell.edu or see http://nysipm.cornell.edu/press_rel/soil_health_dynamic.pdf.

March 25, 2008. **Berry Pest Management Workshop,** Jordan Hall NYAES, Geneva NY (or via satellite broadcast at additional locations). 8:30am to 4:30pm. Cost \$25 includes lunch and proceedings. For more information contact Laura McDermott at 518-746-2562 or lmg4@cornell.edu.

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