UNIVERSITY OF CONNECTICUT COOPERATIVE EXTENSION SYSTEM AND DEPARTMENT OF PLANT SCIENCE

CROP TALK

COMMERCIAL VEGETABLE AND FRUIT CROPS NEWSLETTER

VOLUME 1, NUMBER 1 — APRIL 2005

IN THIS ISSUE

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Mildew Tolerant Pumpkin Variety Evaluations in Pennsylvania

Reprinted from the Vegetable and Small Fruit Gazette; Vol. 9, No. 2
Timothy E. Elkner, Eric Oesterling & Lee Young, Penn State University

Pumpkins are a very important crop in the mid-Atlantic region. In Pennsylvania, pumpkin acreage is second only to sweet corn. PA ranked first in fresh market pumpkin production in 2002 with 7,376 acres harvested for 9% of the total U.S. acreage (non-processing). One of the major diseases limiting pumpkin yields is powdery mildew (PM). While there are fungicides available to control PM, it is still a problem for many growers. The purpose of this study was to evaluate PM tolerant and resistant pumpkin varieties under Pennsylvania growing conditions.

Seven varieties of small pumpkins (<5 lbs), 9 varieties of medium pumpkins (7-24 lbs) and 7 varieties of large pumpkins (25+ lbs) were grown in Lancaster and Westmoreland counties in 2004. The pumpkins were grown using raised beds with black plastic row covers and drip irrigation. Spacing of the plants was as follows: small – 2 ft (Lancaster) or 2.5 ft (Westmoreland) in row X 8 ft between rows; medium – 4 ft in row X 8 ft between rows; and large – 6 ft in row X 8 ft between rows (Westmoreland), 5 ft in row X 9 ft

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Welcome to *Crop Talk*

What is *Crop Talk?* *Crop Talk* is a newsletter from the University of Connecticut Cooperative Extension System and Department of Plant Science for commercial vegetable and fruit growers. Our goal with *Crop Talk* is to provide you with information on the latest developments in any and all aspects of vegetable and fruit farming, and to keep you abreast of upcoming educational events and opportunities

What *Crop Talk* is not! There will be no fancy hi-gloss pictures as there were in the *Yankee Grower*. We don't have a large team of specialists working on original articles. *Crop Talk* will not arrive monthly or bi-monthly as your subscription newsletters have in the past (we have no specific schedule). We don't even have a budget or a funding source!

How will we do it? We plan to rob, steal, plunder and otherwise abscond with articles from other Extension newsletters and web sites (full credit and references provided). We will reprint any articles that we feel could help you with your business and are in the public domain. Sometimes we'll even write them ourselves or rewrite articles that were not written well. We have help with desktop publishing and enough program money to photocopy and mail four or five issues in 2005…after that we'll need a plan… and are open to suggestions. *Crop Talk* could become a subscription newsletter or a free email newsletter, or we could try to solicit donations or find sponsors.

Be part of the solution! Most other Extension newsletters have gone to electronic delivery only (email) out of necessity. That is an option for *Crop Talk* in 2006. However, it is not a good option for everyone that could benefit from the information we hope to share. It may be a good option for you if you are set up to receive email at your home or farm. You can receive *Crop Talk* automatically and print it yourself. The more folks that send us their email addresses, the further our existing funding can be stretched, and the easier it is to send this to over 700 vegetable and fruit farmers. Don't wait for the end of the year. Do it now. ***Please send your name and email address to Kristen.Wilmer@uconn.edu and request to be added to the email list for Crop Talk.***

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Mildew Tolerant Pumpkin Evaluations

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between rows (Lancaster). Transplants were set June 21 in Westmoreland and June 24 in Lancaster, with the plants receiving a pre-plant drench of Admire. Recommended fertility, weed control and disease and insect control practices were used. There were two 10 plant replicates per variety at each location. Percent leaf surface and undersides infected with powdery mildew were rated on 10 plants per replicate on August 25 in Lancaster and September 3 in Westmoreland. Fruit were harvested and weighed on September 13 in Westmoreland and September 20 in Lancaster.

Overall, at both locations the large pumpkins had a greater percent PM leaf coverage than the medium and small pumpkins (Tables 1, 2). Pumpkin varieties listed as mildew tolerant had as much (or more) PM coverage on their leaf surfaces as those without tolerance in the small varieties at both locations (Tables 1, 2). Varieties with mildew tolerance and resistance had less mildew in the medium and large pumpkin groups at Westmoreland and in the medium group at Lancaster. Aladdin had the lowest mildew coverage on the lower leaf surfaces at Lancaster but the highest coverage on the upper leaf surfaces. There did not seem to be a relationship between mildew tolerance/resistance and yield in our trials.

MSX 6075 was more productive and had larger fruit at Westmoreland than Lancaster. Otherwise the data on size and yields for the small-fruited varieties were similar (Tables 1, 2). The smaller pumpkins tended to have a smooth texture and good handles in quality evaluations at the Lancaster site (Table 3). In the texture ratings a 1 is very smooth while a 5 has deep ribbing. In the handle ratings, 1 is poor (too small for fruit size, weak, etc.) while a 5 is large, dark green and strong. A good variety will have a rating of around 3 or better. Color on the medium and large pumpkins should be orange or dark orange. A yellow-orange fruit will not sell well when displayed with darker colored fruit.

Estimated yields were higher for both medium- and large-fruited varieties at the Westmoreland site. Estimated yield was calculated using yield/ft² in the experimental plots without allowing for spray/drive rows. We have no explanation for the higher yields at the western location. However, the top yielding variety was the same (RPX 1003), and Magic Lantern and Gold Bullion did well at both sites. Gold Bullion was somewhat variable in size. Magic Lantern is the current 'standard' for medium-fruited pumpkins in eastern PA because of its dark orange color and good handles. RPX-1003 had yellow-orange color and acceptable handles, while Gold Bullion and Magic Lantern had good color and better handles. The MSX selections and Magician had good color and handles.

Golden Condor and Autumn King were the most productive large-fruited varieties at both locations. These varieties were similar in size and appearance. Aladdin was the third most productive variety at Westmoreland, while it was fourth at Lancaster. Fruit quality on these top performers was similar, with all having good color and handles.

Additional data and photographs from all varieties grown at Lancaster can be viewed at: http://lancaster.extension.psu.edu. Select "Horticulture/Gardening" and then "Research Results" under County Links.

Table 1: Yield and powdery mildew infection ratings for 23 varieties of small, medium, and large pumpkins grown in Lancaster County, PA in 2004.

Variety	% PM: Upper Leaf (8/25)	% PM: Lower Leaf (8/25)	# Fruit per Plant	Average Weight of Fruit (lbs)	Estimated yield (tons/A)	Source
Small						
Apprentice	0	26.0	7.8	1.1	12	HM*
Bumpkin	0	3.0	8.8	0.7	8	Meyer
Gold Dust	0	0.5	8.6	0.6	7	Rupp
Harvest Princess (PMT)**	0	7.5	7.0	2.1	20	Meyer
Iron Man (PMT)	0.3	6.3	3.3	4.0	18	HM
MSX 6075 (Pure Gold) (PMT)	0	4.0	2.5	4.1	14	Meyer
Munchkin	0	8.8	8.0	0.5	5	HM
Medium						
Gold Bullion (PMT)	0	7.8	2.0	17.9	24	Rupp
Gold Gem	1.3	43.8	1.5	19.8	20	Rupp
Magic Lantern (PMT)	1.0	11.3	1.9	18.7	24	HM
Magician (PMR)	1.0	3.0	2.1	13.7	20	HM
MSX 6009 (Scarecrow) (PMT)	1.0	11.8	2.1	17.7	25	Meyer
MSX 6074	0.3	26.0	2.2	11.8	18	Meyer
MSX 6078	0.3	17.3	2.0	11.9	16	Meyer
RPX 1003	1.8	26.0	1.8	21.7	27	Rupp
RPX 1006	0.8	43.5	1.4	17.8	17	Rupp
Large						
Aladdin (PMT)	3.8	23.8	1.8	24.5	21	HM
Autumn King	2.8	46.0	1.9	24.3	22	Rupp
Gold Medal	1.0	29.8	1.5	23.4	17	Rupp
Golden Condor (PMT)	1.3	40.3	2.0	23.6	23	Meyer
Harvest King	3.3	43.3	1.3	23.2	15	Meyer
MSX 6077	2.3	37.8	1.7	26.3	22	Meyer
RPX 1002	1.8	26.3	1.5	24.2	18	Rupp

* HM=Harris-Moran

**PMT=powdery mildew tolerant; PMR=powdery mildew resistant

Table 2: Yield and powdery mildew infection ratings for 23 varieties of small, medium, and large pumpkins grown in Westmoreland County, PA in 2004.

Variety	% PM: Upper Leaf (9/03)	% PM: Lower Leaf (9/03)	# Fruit per Plant	Average Weight of Fruit (lbs)	Estimated yield (tons/A)	Source
Small						
Apprentice	5.1	42.0	7.2	1.1	8	HM*
Bumpkin	1.8	5.8	8.1	0.8	7	Meyer
Gold Dust	0	2.9	6.6	0.7	5	Rupp
Harvest Princess (PMT)**	2.6	29.6	8.5	2.0	19	Meyer
Iron Man (PMT)	1.5	16.2	4.5	4.4	22	HM
MSX 6075 (Pure Gold) (PMT)	5.9	23.2	4.9	5.2	28	Meyer
Munchkin	0.8	7.5	7.0	0.6	4	HM
Medium						
Gold Bullion (PMT)	1.6	9.2	3.4	18.0	42	Rupp
Gold Gem	14.0	44.7	2.2	22.5	34	Rupp
Magic Lantern (PMT)	0	7.0	2.8	18.4	35	HM
Magician (PMR)	0.3	1.4	2.9	13.9	28	HM
MSX 6009 (Scarecrow) (PMT)	1.9	11.9	2.4	17.1	28	Meyer
MSX 6074	0.9	14.7	2.85	20.8	39	Meyer
MSX 6078	7.9	21.8	3.4	15.8	33	Meyer
RPX 1003	6.7	47.3	2.5	27.0	46	Rupp
RPX 1006	10.5	29.3	2.7	17.8	20	Rupp
Large						
Aladdin (PMT)	2.0	14.0	3.1	26.5	38	HM
Autumn King	10.9	49.0	3.6	26.2	43	Rupp
Gold Medal	11.9	43.3	2.6	30.8	36	Rupp
Golden Condor (PMT)	3.6	35.0	3.4	29.2	45	Meyer
Harvest King	12.6	52.3	3.4	25.2	36	Meyer
MSX 6077	9.5	30.6	2.6	29.7	35	Meyer
RPX 1002	15.5	47.8	2.5	25.3	29	Rupp

*HM=Harris-Moran

** PMT=powdery mildew tolerant, PMR=powdery mildew resistant

Table 3: Evaluation of color, shape, texture, and handle quantity for 23 pumpkin varieties grown in Lancaster County, PA in 2004 (texture and handle quantity are measured on a scale of 1-5 with 5 being the most desirable).

Variety	Color	Shape	Texture	Handle
Small				
Apprentice	Orange	Round	1.0	4.0
Bumpkin	Yellow-Orange	Flattened Oval	1.5	4.0
Gold Dust	Yellow-Orange	Flattened Oval	2.0	3.3
Harvest Princess (PMT)*	Orange	Flattened Oval	2.3	2.8
Iron Man (PMT)	Dark Orange	Round	1.5	3.5
MSX 6075 (Pure Gold) (PMT)	Dark Orange	Round	1.8	4.0
Munchkin	Yellow-Orange	Flattened Oval	3.3	2.8
Medium				
Gold Bullion (PMT)	Orange	Variable	2.5	3.5
Gold Gem	Orange	Upright Oval	3.8	2.8
Magic Lantern (PMT)	Dark Orange	Upright Round	3.0	3.5
Magician (PMR)	Orange	Upright Round	3.0	3.5
MSX 6009 (Scarecrow) (PMT)	Dark Orange	Upright Round	2.5	3.0
MSX 6074	Orange	Upright	2.3	3.3
MSX 6078	Dark Orange	Variable	2.8	3.3
RPX 1003	Yellow-Orange	Upright Oval	2.3	2.8
RPX 1006	Orange	Upright Round	3.0	4.0
Large				
Aladdin (PMT)	Orange	Upright	2.3	3.5
Autumn King	Orange	Upright Oval	2.8	3.0
Gold Medal	Dark Orange	Upright Oval	2.5	4.0
Golden Condor (PMT)	Orange	Upright Oval	2.8	3.8
Harvest King	Dark Orange	Upright Oval	3.3	4.0
MSX 6077	Dark Orange	Upright Round	3.5	2.8
RPX 1002	Dark Orange	Upright Oval	3.0	3.5

* PMT=powdery mildew tolerant, PMR=powdery mildew resistant

How to Control Apple Scab: Relearning What Your Father Knew

Reprinted from Southern Tier Produce News; March 2005

David A. Rosenberger, Professor of Plant Pathology, Cornell University

For the past 40 years, apple growers have benefited from development of new fungicides that allowed consistent control of apple scab along with increased flexibility in spray timing. When ferbam was introduced in the early 1950s, apple growers marveled at its effectiveness compared to sulfur. The introduction of captan, maneb, and mancozeb fungicides later in the 1950s provided more options for controlling apple scab and other apple diseases.

Then dodine, sold as Cyprex in the early 1960s, provided apple growers with the first fungicide that had both post-infection and anti-sporulant activities. As a result, dodine proved very effective for slowing or arresting development of secondary scab in orchards where early-season control failures would otherwise have resulted in significant crop loss. The 1970s brought the introductions of benomyl (Benlate) and integrated pest management (IPM). By the time the DMI fungicides (Rubigan, Nova, Procure) were introduced in the late 1980s, IPM was an accepted part of fruit-grower jargon and everyone was looking for methods to reduce pesticide use.

The DMI fungicides were tailor-made for IPM programs because they provided a scab-control safety net that enabled growers to take risks that would have been inconceivable 20 years earlier. By tank mixing DMI fungicides with a protectant fungicide (captan, mancozeb, or Polyram), apple growers were able to capitalize on the benefits of both fungicide chemistries. The protectants in the mix provided excellent residual activity against scab on both leaves and fruit. The DMI fungicides provided up to 96 hours of post-infection activity, excellent pre-symptom activity when applied after the 96-hour post-infection window, and anti-sporulant activity that suppressed production of secondary inoculum on leaves with visible lesions.

With DMI fungicides, scab sprays at green tip became optional, 10-day spray intervals were the norm, and alternate row spraying on a 10-day interval was common during the pre-bloom period. Timing of scab sprays could be adjusted by a few days so as to coincide with insecticide sprays that had to be applied at pink or petal fall. Even when pre-bloom fungicide programs were less than 100% effective, back-to-back applications of a DMI fungicide at petal fall and first cover would correct the problem.

Holes in the safety net!

Research in NY has shown that apple scab with resistance to DMI fungicides is now common in many orchards. Unfortunately, DMI resistance often becomes evident only in the wake of disastrous control failures. As a result of control failures, orchards with DMI-resistant scab often have exceptionally high levels of overwintering inoculum. The situation is further complicated by the fact that scab in most orchards is also resistant to Topsin M and is sometimes resistant to dodine as well.

Suddenly, most apple growers with less than 50 years of experience are entering unfamiliar territory: how does one manage apple scab in high-inoculum orchards when no fungicides are available to arrest scab development after leaves become infected? For the first time since the introduction of dodine, apple growers must consider the possibility that just a slight error in pre-bloom scab control can result in season-long scab problems and a high incidence of scabby fruit. Pre-bloom scab control becomes analogous to a high-wire act with no safety net!

Attitude Adjustments:

The scab control guidelines that follow might sound familiar to fathers and grandfathers of current-day apple growers. For younger apple growers, a quick attitude adjustment is essential for minimizing potential losses to apple scab. Following are a list of common misconceptions about dealing with DMI-resistant apple scab:

Misconception #1: *DMI resistance is of no concern to me because the DMIs are still working in my orchards.* Wrong! Even if the DMIs have always worked well in your orchards, you never know when they may stop working. Why wait for an expensive control failure before shifting to more conservative strategies? Furthermore, by adopting more conservative spray strategies immediately, you may be able to conserve the post-infection activity of DMI fungicides for another decade in your orchards, thereby preserving the only remaining tool that can be used to arrest development of secondary scab in those unusual years when your conservative program is less than perfect.

Misconception #2: *We'll ask Cooperative Extension or our fungicide supplier to run a quick test and tell us which fungicides are still working in our orchards.* Wrong! There are currently no quick tests for resistance to dodine or to DMI fungicides. Wolfram Koller at Cornell and Vincent Philion in Quebec are working to develop reliable tests, but it may be several years before a testing methodology is perfected. Even after a test becomes available, testing for fungicide resistance will probably cost several hundred dollars per sample and will require collection of scabby leaves or active apple scab lesions from an unsprayed sample tree. Availability of qualified service providers for this kind of work could also limit the usefulness of fungicide resistance testing.

Misconception #3: *We can substitute Flint or Sovran for DMIs when DMI resistance appears.* Wrong! Sovran and Flint are great fungicides when they are used as protectants. However, they are less effective than the DMI fungicides because they have less post-infection activity (only 48 to 72 hours instead of the 96 hours for DMIs) and they have no pre-symptom activity to slow development of incubating scab lesions. As a result, Sovran and Flint have almost always been a disappointment when they have been used to stop epidemics in orchards where primary scab is already well established.

Misconception #4: *The green tip spray can't be that important because most ascospores aren't released until after tight cluster.* Wrong! It is true that relatively few ascospores are usually released at green tip. However, infections initiated between green tip and tight cluster pose greater risks to the apple crop than primary infections that are initiated after tight cluster. The early infections begin producing conidia just when fruit and

terminal leaves reach their period of peak susceptibility around petal fall, and the huge numbers of conidia produced by a single lesion can overwhelm protectant fungicides in a wet season.

Misconception #5: *I can still rely on dodine in a pinch.* Perhaps! In New York, however, lab tests showed high levels of dodine resistance in many orchards where growers had assumed that dodine should still be effective. Most growers have relatively poor memories for what was actually sprayed in their orchards in the 1960s, and dodine resistance can persist a long time after it becomes established in the orchard.

Misconception #6: *Switching to protectant fungicides should be an easy transition.* Perhaps! Maintaining scab control with protectant fungicides like mancozeb and captan is relatively easy in low-inoculum orchards. High inoculum and wet pre-bloom weather are a deadly combination, however, and the difficulties of controlling scab under those conditions should not be underestimated. In large operations where equipment and pesticide applicators were already stretched to the limit when applying DMI fungicides, it may be necessary to buy another sprayer and hire another applicator so as to ensure that all trees can be sprayed on a weekly basis during the pre-bloom intervals.

Essentials for pre-bloom scab control in the era of fungicide resistance:

1) ***In high inoculum orchards, consider applying urea before bud break to reduce ascospore production.*** Applying 40 lb/A of urea to the orchard floor in late winter or early spring can reduce ascospore production by more than 75%. In a high-inoculum orchard, that could spell the difference between effective scab control and a control failure, especially if wet weather between green tip and petal fall favors scab development and hinders fungicide application.

2) ***Start protectant fungicide sprays at green tip.*** It is absolutely essential to have the first fungicide applied BEFORE the first apple scab infection period. That means that prunings in the orchard must be chopped or removed well in advance of green tip, and sprayers should be up and running by silver tip.

3) ***Use full rates of protectant fungicides.*** Remember that 1 lb of mancozeb fungicide or 1 lb of Captan 50W per 100 gal of dilute spray (3 lb/A for medium-sized trees) is actually a half-rate of fungicide that was initially recommended as a complement for Benlate, Topsin M, or DMI fungicides. Using mancozeb fungicides at 3 lb/A on a 7-day spray interval can result in a control failure in a high-inoculum orchard.

4) ***Use shorter spray intervals.*** Where DMI fungicides are no longer working, forget about 10-day spray intervals. Plan on a 5 to 7 day spray interval instead. Fungicide protection might need to be renewed after 5 days following heavy rains or to ensure protection ahead of slow-moving weather fronts that might impede spraying for several days. If mancozeb fungicides or Captan 50W are applied at 2 lb/100 gal (6 lb/A for medium-sized trees), then residual activity should hold up through 1.5 to 2 inches of rain (other captan formulations would be equally effective when applied at similar rates of active ingredient). If mancozeb fungicides or Captan 50W are applied at only 1 lb/100 gal., then fungicide protection will often be exhausted after only an inch of rainfall.

5) ***Spray in the rain if necessary to protect new foliage during infection periods that last more than 2 or 3 days.*** If fungicide protection is removed by heavy rains at the beginning of a wetting period, and rains are predicted to continue for several more days, then protectant fungicides should be re-applied during the rain to protect against ascospores that will mature as the wetting period continues. Sulfur, captan and mancozeb fungicides that are applied in the rain will provide 3-4 days of protection against scab infection. Sovran, Flint, Vangard, Scala, Topsin M, and DMI fungicides should never be applied in the rain, however, because all of these fungicides must dry on the leaf to be fully effective.

6) ***Be wary of alternate row spraying on an extended interval.*** Alternate row spraying often leaves a shadow of unprotected foliage on the back sides of tree trunks. Missing a few leaves here and there was not very important when DMI fungicides applied 7-10 days later from the opposite sides of the trees could arrest scab development on the few leaves that may have become infected. Where DMIs are no longer working, it is imperative that all leaves be protected every 7 days. If in doubt about spray coverage, use water-sensitive paper to evaluate coverage on the back sides of trees. Attempting to judge spray coverage based on visual analysis of the spray plume can be misleading because the spray mist that refracts the most light carries a relatively small proportion of the fungicide load.

7) ***Where DMI resistance is suspected, do not use any DMI sprays before petal fall.*** Application of DMI+protectant sprays to a fully DMI-resistant scab population may actually stimulate scab growth and result in less scab control than would occur if a low rate of protectant fungicide were used alone. However, even where scab is resistant to DMI fungicides, the DMIs may still be needed to control powdery mildew and rust diseases. Delaying DMI sprays until petal fall will minimize risks of stimulating scab problems because most ascospore release will be completed by petal fall, and there should be no secondary scab inoculum if appropriate pre-bloom sprays were applied.

Suggestions for a conservative scab control program:

1) ***Use a copper spray or mancozeb at silver tip to green tip.*** In high inoculum orchards, this could be the most critical scab spray for the entire season! Copper is recommended for orchards with a history of fire blight. Otherwise, mancozeb fungicides will provide the most cost-effective protection. Neither copper nor mancozeb will provide any post-infection activity. Note, however, that protectant fungicides (copper, mancozeb, captan, sulfur) will usually be effective as long as they are applied before a Mills period is completed. For example, approximately 40 hours of wetting are required for light Mills infection period at 37°F, so a protectant fungicide could be applied up to 40 hours after the start of a wetting period if the mean temperature for the wetting period was 37°F.

2) ***Consider mancozeb-captan combinations from half-inch green through tight cluster.*** In high inoculum orchards, a combination of 3 lb/A of a mancozeb fungicide plus 3 lb/A of captan 50W (or the equivalent amount of another captan formulation) may be the best option. Using 6 lb/A of mancozeb

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How to Control Apple Scab *(Continued from page 5)*

alone or 6 lb/A of Captan 50W alone are acceptable alternatives, but both alternatives have disadvantages. Using the higher rate of mancozeb during pre-bloom triggers a label restriction against any mancozeb use after bloom, and mancozeb may be needed after bloom as a substitute for captan if insecticide+oil sprays are planned for early summer. The higher rate of captan alone is effective, but captan usually is more expensive than mancozeb.

3) *Use Scala or Vangard to work around pre-bloom oil sprays or when 48-hr post-infection activity is essential.* Both of these fungicides work best in cool weather. They have the advantage of providing 48 hours of post-infection activity, but as protectants they are no more effective than the less expensive mancozeb fungicides.

4) *Consider Flint or Sovran at tight cluster and pink or at pink and bloom, but keep the spray interval at 7 days.* These fungicides often give slightly better control of scab than can be achieved with mancozeb or captan sprays. Sovran and Flint can be applied alone; tank mixing with captan or mancozeb has not improved control in field trials. If oil sprays are applied at tight cluster, then Sovran or Flint can be used as a substitute for Captan or mancozeb+Captan when the oil is applied. Using Sovran and Flint at pink and bloom provides two benefits: they will provide protection against early powdery mildew infections, and they will suppress sporulation of any primary scab lesions that may have become established at green tip, thereby slowing secondary spread of scab during the period around bloom and petal fall and fruitlets and early terminal leaves are at peak susceptibility. Note, however, that Sovran and Flint will not completely arrest development of primary scab lesions in the way that DMI fungicides did, so using Sovran or Flint at pink and bloom is not an acceptable substitute for a green tip spray. In an "easy" scab year, when protectant scab fungicides were in place ahead of all pre-bloom infection periods, it may be more cost-effective to continue with a mancozeb+captan program until petal fall rather than using Flint or Sovran during bloom.

5) *Use DMI-captan or DMI-mancozeb sprays at petal fall and first cover.* The DMI fungicides still provide the best available mildew control, and using them at petal fall and first cover optimizes their usefulness against mildew and against cedar apple rust infections on terminal leaves.

Managing Secondary Scab:

What course of action is recommended if primary scab lesions start appearing on leaves? This is a difficult question because of all the variables that must be considered. For example, a little bit of scab showing up on late terminal leaves in the latter half of June poses less of a threat than a little bit of scab showing up at petal fall, because by late June fruit will be more resistant to infection than they are at petal fall. Similarly, a little bit of scab on Empire, Honeycrisp, or Red Delicious is of less concern that a similar scenario for scab susceptible cultivars such as McIntosh, Ginger Gold, or Silken. Finding scab on leaves just ahead of a predicted heat wave is less threatening than finding scab just before a week of cool wet weather. Finally, the fungicide resistance status of the orchard must be considered when deciding what to do. Following are a few general principles:

1) *Depend on captan; pray for hot, dry weather.* If the fungicide resistance status of the orchard is uncertain, then the best defense against fruit scab will be to apply the full label rate of captan on a 7 to 14 day interval (depending on weather) until terminal buds are set or until hot weather intervenes to slow scab development. Several days with maximum temperatures above 85° F will reduce viability of scab conidia produced in new lesions. Hot weather also seems to increase the effectiveness of captan. During cool wet summers, protection with captan will need to be maintained throughout summer and to within two weeks of harvest. Lower rates of captan and 14-day spray intervals should suffice during July and August, but coverage will need to be renewed at shorter intervals if rain removes fungicide residues.

2) *Sovran and Flint can help* because they reduce sporulation in lesions that are visible when sprays are applied. However, many growers have found that Sovran and Flint used alone are not satisfactory for stopping well-established scab epidemics. Therefore, I recommend that Sovran and Flint should always be used in combinations with the full rate of captan if they are applied in orchards with visible scab lesions. Using Sovran and Flint in combination with captan where scab lesions are already present will also limit selection pressure for resistance to Sovran and Flint.

3) *Syllit could be an option in orchards where it is still effective.* Syllit is very effective for shutting down scab epidemics in the absence of dodine resistance. However, using Syllit alone in orchards where there is dodine resistance could result in complete crop loss. Therefore, even where Syllit resistance is not suspected, Syllit should be used in combination with at least 3 lb/A of mancozeb or Captan 50W (or equivalent). For effective pre-symptom and anti-sporulant activity, Syllit 400F must be used at a minimum rate of 12 fl oz/100 gal (or 36 fl oz/A for medium-sized trees).

4) *Beware of late-summer under-leaf scab and the potential for late-season fruit infections.* Sovran, Flint, and Captan can protect new leaves and foliage during summer, but they usually will not completely eradicate scab from existing lesions. Some of these old lesions can become active again in late summer or fall. Conidia from older scab lesions can infect the undersides of leaves in late summer. If the harvest season is exceptionally wet, then inoculum from these late-summer under-leaf infections can contribute to fruit infections that appear as pinpoint scab or storage scab. If scab is evident on the undersides of leaves in early September, then an additional fungicide spray may be needed to protect fruit against pinpoint scab.

All of the options noted above for controlling secondary scab will prove extremely expensive as compared to adding one or two sprays of protectant fungicide during the pre-bloom period. Thus, in this era of fungicide resistance and failing fungicides, the importance of controlling primary scab cannot be overemphasized.

Acknowledgements:
The concepts and guidelines presented in this document were derived from discussions and collaborative work with Dr. Wolfram Koeller and Dr. Bill Turechek, both from the Department of Plant Pathology at the N.Y. State Agricultural Experiment Station in Geneva.

Could "Green" Approaches for Scab Control Improve Profitability?

Reprinted from Southern Tier Produce News; March 2005

David A. Rosenberger, Professor of Plant Pathology, Cornell University

The title for this presentation may have raised expectations that will prove impossible to meet. What one envisions as a "green" approach to scab control is probably dependent on prior experiences with apple scab, on the company that one keeps, and to some extent, on one's religion. This presentation will focus on the science of scab control as it relates to measures that can complement or substitute for traditional fungicide programs. I will not attempt to weigh various options based on their acceptability to groups with widely divergent philosophical perspectives.

As with any business, profitability in apple production requires that income from selling the product must exceed the costs involved in producing, packing, and marketing. "Green" approaches to scab control that inflate production costs may still be profitable if the "green" crop can be marketed to someone who is willing to pay a premium for food that is produced in a certain way. Because I cannot assess your markets, I cannot predict which practices will prove profitable for any given farm operation. The best that I can provide is some estimation of how difficult and expensive it may be to incorporate new practices into existing production systems.

For purposes of this discussion, "green" approaches for scab control are subdivided into four categories. Those categories are listed below, starting with those I deem least useful and ending with those that have broader applicability:

1) Scab control with new "biorational" fungicides and nutrient sprays
2) Scab control via scab-resistant cultivars
3) Scab control with copper and sulfur compounds
4) Scab control via inoculum reduction

Scab control with new "biorational" fungicides and nutrient sprays

This approach to scab control requires the least discussion: "biorational," "green" or "soft" fungicides introduced to date are uniformly ineffective for controlling apple scab. I have personally evaluated Serenade, Oxidate and Messenger and found them less effective than sulfur. Other scientists have evaluated some of the other oils and natural products with similar results. These "green" products may be profitable for the manufacturers, but none of those tested to date will improve profitability for apple growers!

Scab control via scab-resistant cultivars

Scab-resistant cultivars provide the ultimate solution for low-cost scab control, but they will prove profitable only if they can be marketed. Producers of scab-resistant apples will face several significant problems. First, organic production from the desert areas of Washington State is creating a very low floor for pricing of organic apples. Producers in non-desert regions will have higher costs for organic production because of greater pressure from diseases and insects. Second, many scab-resistant apple cultivars lack the taste and quality characteristics that consumers have come to expect in their apples, so finding an acceptable scab-resistant cultivar for your niche-market consumers may prove difficult. Finally, scab-resistant cultivars may still require fungicide protection during the summer to prevent sooty blotch, flyspeck and summer fruit rots. If the objective of growing scab-resistant cultivars is to supply an organic market, then all aspects of pest control must be carefully considered before making a large investment in new cultivars.

Scab control with copper and sulfur compounds.

Methods for scab control with copper and sulfur compounds were perfected more than 50 years ago, and those methods still work very well for anyone willing to expend the effort required. Copper applied at green tip will provide the same level of scab protection as one would expect from a mancozeb fungicide. Copper sprays do not have any post-infection or eradicant activity, however. Copper sprays applied after green tip will often result in severe fruit russetting and/or blackening of fruit lenticels.

The best directions that I have found for controlling apple scab with sulfur compounds was published by Dr. Art Burrell in the 1945 Proceedings of the N.Y. Horticultural Society. Dr. Burrell suggested that growers should maintain a supply of three different products for scab control. Wettable sulfur was to be mixed with water and applied as a spray ahead of predicted infection periods. If the grower had a duster, then a finely ground sulfur was to be applied as a dust when foliage was wet after or between rains. Dusters could cover an orchard more quickly than a sprayer, and the dust tended to stick to wet trees better than sulfur applied as a spray. Finally, liquid lime-sulfur was needed to cover trees that could not be protected before the end of a Mill's infection period.

Liquid lime-sulfur provides 60 to 70 hours of post-infection activity, counting from the beginning of a wetting period. It also acts as an anti-sporulant when applied to trees where primary scab lesions are just beginning to appear. However, lime-sulfur has a number of undesirable qualities that must be considered. First, it is caustic and must be handled with caution by applicators. Second, it can cause severe leaf burn if applied to wet foliage. Third, even when applied to dry foliage, each application causes a slight reduction in both leaf size and fruit size. Fourth, application of lime-sulfur any time between bloom and second cover can result in appreciable fruit thinning. The thinning capabilities of lime-sulfur are not necessarily bad in situations where reduction of crop load is desirable. However, applications of lime-sulfur might be undesirable if crop load is already light.

Sulfur fungicides can differ significantly in their efficacy. Among wettable sulfur formulations, the Microthiol Special formulation has proven particularly effective, probably because that formulation includes a bentonite clay carrier that may help to improve resistance to wash-off during rains.

Regardless of the sulfur formulation that is used, sulfur sprays must be renewed frequently during rainy seasons. Protection provided by sulfur sprays is probably gone after one-half to three-quarters of an inch of rainfall. Those attempting to use sulfur as their primary scab fungicide should be prepared to re-cover orchards every three to five days between green tip and the third cover spray.

Scab control via inoculum reduction. This "green" approach offers the greatest potential for improving profitability. Inoculum reduction is absolutely essential for organic orchards or for orchards where DMI fungicides (Rubigan, Nova, Procure) are no

(Continued on page 8)

"Green" Approaches to Scab Control

(Continued from page 7)

longer effective due to fungicide resistance. Inoculum reduction will not provide adequate scab control when used alone, but it can reduce losses that might otherwise be incurred with sulfur programs or even with protectant fungicide applied in high-inoculum orchards.

The objective of inoculum reduction is to eliminate some of the ascospores that overwinter in fallen leaves. Reducing the number of ascospores makes it easier to prevent leaf infections with fungicides applied in spring, and it decreases the likelihood that scab infections will be initiated at green tip or half-inch green when only a small proportion of ascospores are ready to discharge. By avoiding early-season infections, the risk of developing fruit scab is significantly reduced.

Three effective approaches for inoculum reduction have been documented in the scientific literature. None of these approaches will eliminate 100% of the ascospores, but any one of them can reduce inoculum production by at least 50 to 80%.

1) Urea sprays (40 lb urea/A) applied to fallen leaves in autumn or spring
2) Shredding leaf litter with a flail mower
3) Application of dolomitic lime (2.5 ton/A) over fallen leaves in autumn

Urea works by stimulating microbial breakdown of overwintering leaves. It may also inhibit ascospore formation in the surviving leaf litter. Urea should be applied at 40 lb/A to fallen leaves using a sprayer that provides coverage of the entire orchard floor. Spraying trees with urea before leaf drop in autumn is less effective than spraying leaves on the ground, because leaves that remain on the tree for 7 days after the urea application will translocate the nitrogen into the twigs, thereby making it unavailable to assist in decay of the fallen leaves. Surprisingly, even when ground sprays of urea are applied as late as green tip, they have been shown to reduce ascospore release by 40-86%.

Shredding leaf litter with a flail mower can reduce inoculum in several ways. First, it provides more "edges" in the leaf litter for invasion by the microflora that cause the leaves to decay. Second, if flail mowing is done in spring, the chopping action will result in the reorientation of most leaf pieces on the orchard floor, and many ascospores will discharge into the soil rather than into the air. In New Hampshire, leaf shredding was least effective when it was done in December, presumably because shredding at that time did not allow for leaf decomposition before winter and also failed to cause disorientation of ascospore release (the pseudothecia in overwintering leaves have not yet formed in December and therefore cannot become disoriented). Effective leaf shredding can be accomplished only with a flail mower that is set so low that it nearly scalps the sod in the row middles. Effectiveness is also dependent on having a very level orchard floor and on being able to shred most of the leaves beneath the tree canopy. If the flail mower cannot be offset to reach beneath trees, then it may be necessary to blow leaves from beneath trees into the sodded row middle or to remove leaf litter from beneath trees using a brush rake ahead of the flail mower.

Dolomitic lime has been less widely tested as an inoculum reduction technique, but it was very effective when tested in Oregon, where it was applied at 2.5 ton/A after leaf drop in autumn. Lime presumably works by raising the pH of fallen leaves to a level where they are more subject to breakdown by bacteria and yeasts. The effectiveness of lime applied in the spring has not been tested, but spring applications would probably be less effective than lime applied in late autumn.

Will any of these "green" approaches improve profitability? Inoculum reduction, when applied to high inoculum orchards, may improve profitability by reducing the potential for severe scab infection the following year. This is especially true if pre-bloom weather turns out to be extremely conducive for scab development. The profitability of other alternative approaches for scab control is doubtful because protectant fungicide such as captan and mancozeb are extremely cost-effective when used properly!

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Asian Soybean Rust Found in U.S. in Late 2004 and Early 2005

Reprinted from Plant and Pest Advisory Vegetable Crops Edition; Vol.11, Issue 1. Adapted for use in Connecticut.

Andy Wyenandt, Ph.D., Rutgers Cooperative Research and Extension

Asian soybean rust (SBR), a potentially destructive pathogen of soybean and vegetable bean crops in the United States, was first reported in Louisiana in November 2004. Since that time soybean rust has been found in nine states and traveled as far north as Tennessee late last year. Importantly, ***soybean rust was found in southern Florida on February 23, 2005 on Kudzu.*** Asian soybean rust has impacted soybean crops in other parts of the world in recent years. First identified in Japan in the early 1900's, the disease has spread across China and Asia and in the mid-1990's appeared in Africa followed by South America in 2001. All commercial soybeans are, and many vegetable bean crops appear to be, susceptible to soybean rust. Soybean rust may also infect weeds, such as Kudzu and Crown Vetch, as well as forage crops such as White and Crimson Clover.

An extensive effort has been made to track the progress of soybean rust in the United States. Growers who plant soybean crops in their rotations, as well as produce crops such as dry, green, snap, butter, lima, broad and fava beans, need to track and follow the potential progress of soybean rust in the United States. Soybean rust can be controlled with preventative fungicide applications. Currently, compounds that have labels for Soybean rust control in Connecticut include azoxystrobin (Quadris, Group 11) and chlorothalonil (Bravo, Echo, Group M5). For more information on soybean rust and how you can track its progress in the United States, please visit the following website: http://www.ces.ncsu.edu/depts/pp/soybeanrust/index.php.

Predicting and Diagnosing Winter Injury in Berry Crops

Reprinted from Hort Matters; Vol. 3, Issue 6
Pam Fischer, Ontario Ministry of Agriculture and Food

Predicting winter injury is difficult because it is complicated by many factors. Diagnosing winter injury, however, is important because crop management practices should be adjusted when significant winter injury occurs.

Winter injury is more correctly called low temperature injury, or cold injury. Factors that affect this type of damage include how cold it was, how long the cold spell lasted, and the environmental conditions before the cold occurred. Healthy plants in a fully dormant state can tolerate colder temperatures than plants that have not yet entered dormancy, or plants that are coming out of dormancy. Sharp drops in temperature before plants are fully dormant are especially harmful to strawberries. We suspect that many of our common raspberry varieties suffer more from fluctuating temperatures in January-March than from absolute cold.

Other important factors that affect cold temperature injury may include the variety, snow cover and field topography:

- Expect cultivars developed in Florida, California, or the Pacific Northwest to show more injury than varieties developed in the Northeast.
- Snow is a great insulator and is important for protecting roots and strawberry crowns from severe cold.
- Cold air flows like water across a field. Look for winter injury in low or protected areas where cold air would settle.

Table 1. Critical temperatures and symptoms of cold injury for berry crops

	Temperatures of concern	What to look for	Symptoms of winter injury
Strawberries	14 to 10°F (unmulched crown temperatures)	Slice crowns lengthwise and look for browning in the normally creamy white crown tissue. In plants with mild injury, browning develops at the base of this area. More seriously injured plants will have browning just below the tip of the crown. The vascular tissue around the edge of the crown is less susceptible to damage, and if it is not destroyed, plants can recover to varying degrees.	Symptoms of sub-lethal winter injury include: - weakened plants - late leaf emergence - narrow or deformed leaves - early runner production - fewer blossoms - lower yield
Raspberries **Blackberries**	-20°F (hardy reds) -9°F (purples) -4°F (black raspberries) 0°F (erect blackberries) 9 to 12°F (trailing blackberries)	The raspberry plant parts most sensitive to cold are, in order: - the pith in the basal part of the buds (most sensitive) - the pith of the cane - the vascular tissue at the base of the buds, - the immature flower tissue (flower primordia) These parts will appear brown or dried up. Tissue at the base of the buds is more sensitive than the buds themselves.	Symptoms may include: - bud death - production of short, weak lateral shoots - shoots that develop normally at first, but then die under the stress of warm weather or cropping The injury shows up at the tips of the canes and extends down the cane in proportion to severity.
Highbush Blueberries	-20°F	Slice flower buds with sharp knife or blade. Look for browning in the center of the bud (flower primordia). Buds at the tip of a shoot are more sensitive than buds at the base.	Cold temperatures damage stems and buds. Usually all the flowers in a bud are killed, but some damaged buds may produce 1-2 blooms, instead of 8-12. Very cold temperatures may also damage the cambium at the base of plant stems. Shoots on these stems will leaf out, then die back.
Currants and Gooseberries	-31°F		Currants and gooseberries are very hardy compared to other berry crops. They bloom early, so spring frosts are a bigger problem than winter cold.

Have You Tried Perimeter Trap Cropping Yet?

Research sponsored by NE SARE

Jude Boucher & Rob Durgy, University of Connecticut;
Ruth Hazzard & Andy Cavanagh, University of Massachusetts

Cucumber beetles can cause direct damage to seedlings between the cotyledon and third true leaf stage. That is also the stage when the plants are most susceptible to infection by the bacterial wilt pathogen, which is spread by the beetles. Perimeter trap cropping (PTC) has provided better protection from beetle and wilt damage than multiple, full-field insecticide applications on many Connecticut and Massachusetts farms. Perimeter trap cropping also spares natural enemies on the unsprayed main crop.

Directions: The trap crop (i.e. Blue Hubbard or other *Cucurbita maxima* squash) should be planted all the way around the main cucurbit crop you are trying to protect. Insecticide applications should be timed to protect the seedling trap crop plants as soon as beetles arrive from overwintering sites. Think of the trap crop as a "poisoned fence!" One to three weekly insecticide applications on the trap crop may be necessary. If not controlled, cucumber beetles disperse throughout the field over time. Using an effective insecticide (e.g. Sevin, Asana or Admire) to kill the colonizing beetle population while they are still on the trap crop is essential when using PTC for cucumber beetles, or higher levels of bacterial wilt could occur. Organic growers may need to reapply pyrethrin or other insecticides every three or four days during the seedling stage and/or supplement with clay applications (Surround) to the main crop. That is because botanicals tend to have a very short residual period of effectiveness and are less efficacious than conventional products.

Trap crop fruit can be marketed as food or ornamentals, or the plants can be pulled out at bloom to prevent competition between the main and trap crops. Competition is not a factor when PTC is used to protect large fields or short-season crops (cucumbers or summer squash), and it is minimal when used on full-season crops (butternut or acorn squash or melons). Much to their surprise, most growers have found that they can easily sell the Blue Hubbard squash. The sale of the Blue Hubbard alone has added an extra $500-$1,000/acre of cucurbits crops for some PTC growers. Almost every grower who has tried PTC has found it simpler to use and more profitable than full field sprays, and they get better control! Why not try PTC on your farm in 2005?

Helpful Hints

- ***Perimeter trap cropping works for garden-sized plantings or larger fields*** (1/8 to 40 acres).
- ***Perimeter trap cropping and crop rotation should be used together*** to prevent some cucumber beetles from overwintering within the field, and to help prevent an increase in the pest population over time.
- ***Plant the trap crop (i.e. Blue Hubbard) so that it completely encircles the main crop*** without any large gaps in the perimeter. In bare-ground plantings, all of the trap crop seeding can be done by machine (both across the tops of the rows and along the outer rows).
- ***Plant the trap crop on good ground***, so that it remains healthy throughout the pre-bloom period. In plasticulture systems, planting the trap crop on the outer edge (3 to 6") of the plastic/bed works best to provide large, healthy, trap crop plants. Do not plant the trap crop in the drainage ditch or on compacted roadways. You'll also need 2-4 trap crop plants at both ends of each bed.
- ***Plant the trap crop at the same time as (or before) the main crop***. Seeds or transplants work equally well, as long as the trap crop plants are at least as big as the main crop plants between emergence and bloom.
- ***Plant the trap crop at the same in-row and between-row spacing as the main crop***, with 1 to 3 trap crop rows along the length of the planting and 2 to 6 seeds or plants at the ends of each row. Multiple trap crop rows may be needed if extreme pest pressure is expected, or along tree lines where the heaviest pest pressure usually occurs as beetles colonize the fields from overwintering sites in the woods.
- ***Spray the perimeter plants as soon as the first beetle appears and begins to feed on the trap crop***. Do not wait for the beetles to colonize the main crop or for a threshold level to be exceeded on the trap crop. Carbaryl (Sevin) and synthetic pyrethroids (e.g. Asana) work well, as does a preventative soil drench of imidacloprid (Admire) at planting.
- In large plantings, **perimeter sprays easily can be applied by circling the field once** with a boom sprayer or mist blower. In smaller plantings, the trap crop usually can be sprayed with a backpack sprayer faster than the whole planting can be sprayed with a large sprayer.
- ***Monitor the field weekly until bloom*** or harvest and be prepared to make 1 or 2 additional perimeter sprays or, if necessary, full-field applications. Repeat perimeter applications are necessary if rain washes the insecticide from the plants prematurely or if more live beetles are found on the trap crop prior to bloom. Full-field sprays should be applied when pest pressure is excessive on a particular farm, causing a breach in the perimeter and substantial main crop infestation (>½ beetle/plant for cucumbers or melons, >2 beetles/plant for squash).
- ***If the trap crop planting is incomplete or has large gaps*** (>15 ft) for any reason, treat the field as if it were a conventional planting (i.e. ***spray the whole field as often as needed***). For example, you do not have an effective perimeter if you fail to plant along one side of the field or if wet conditions prevent the emergence of most of the trap crop plants. Gaps (<15 ft) from harvest or spray alleys will not adversely affect the ability of the trap crop to stop the beetle.

After you try PTC, let us know what you think. We'd love to hear from you.

Want to know more about PTC? See 'Moving Towards Ecologically Based Pest Management' in the December issue of the Journal of Extension (http://www.JOE.org) or UConn's IPM Web Site (http://www.hort.uconn.edu/ipm).

Increasing Strawberry Productivity with Early Spring Row Cover

Reprinted from New York Berry News; Vol. 3, No. 2

Lori Bushway, Senior Berry Crop Extension Associate, Cornell University

Many different cultural practices have been recommended to Northeastern strawberry growers over the years, but none has proven to be consistently beneficial to all growers. The exception to that may be the use of early spring row covers. Research at Cornell and elsewhere has repeatedly found spring row covers to positively impact plant development, carbohydrate reserves, and productivity in strawberry fields.

Straw mulch is applied over the strawberry planting in late fall to protect plants from winter injury. However, plants left under winter straw mulch into April show greater than 50% decline in starch content, a loss of root biomass, and subsequently lower yields. Creating a more favorable plant microclimate in late March and April by removing straw mulch and covering plants with synthetic row covers improves photosynthetic rates of leaves, enhances starch accumulation, accelerates plant development (including earlier fruiting) and increases total fruit yield. As a general rule, March is an appropriate time to remove protective winter straw mulch and apply row cover. The row covers should be removed soon after flowers are observed. Without wind or bee activity, pollination will be reduced and fruit will be deformed. If cold temperatures (<30F) occur when covers are still in place and flower trusses have emerged, water can be applied directly over the row covers for frost protection. The economics of row cover use is favorable if the material is reused for several springs.

Details on spring microclimate studies can be found in the following article: Lori J. Bushway and Marvin P. Pritts. 2002. Enhancing Early Spring Microclimate to Increase Carbon Resources and Productivity in June-bearing Strawberry. *Journal of the American Society for Horticultural Science.* 127(3): 415-422. See http://www.ashs.org/journal.

Tomatoes: Bacterial Canker

Reprinted from abstract of presentation given at the Vegetable and Farm Market Expo on December 7, 2004 in Grand Rapids, Michigan

Mary Hausbeck, Professor of Plant Pathology, Michigan State University

Bacterial canker was diagnosed in several fields of processing tomatoes in Michigan in 2004. Bacterial canker is caused by the bacterium, *Clavibacter michiganensis* subsp. *michiganensis*, and causes plant stunting, wilting and fruit spotting. This year, symptoms on fruit appeared early and became severe in some fields. Although yield losses vary among years, bacterial canker has the potential to be devastating. Young plants are more susceptible than older plants. Bacterial canker can be introduced into a clean field via transplants, machinery and wooden stakes or other equipment that has been previously used in an infected field.

Once a greenhouse or field is contaminated with bacterial canker, steps must be taken to assure that future crops remain disease free. If a greenhouse is contaminated, remove all plant material from the greenhouse (including weeds and dead plant tissue on the floor), wash and disinfect floor surfaces, hoses, equipment, etc. with a 10% solution of bleach or a commercial disinfectant (GreenShield is an example). Wooden structures such as benches or trays should be soaked in a disinfectant such as bleach (10%) or GreenShield for a minimum of an hour and preferably overnight. A simple washing of wooden surfaces is inadequate because of the cracks and crevices that may allow the bacteria to escape a surface wash. Bacteria that overwinter on a wooden surface may be carried to the plants in water droplets next season during the splashing of overhead irrigation.

A contaminated field should be rotated out of tomatoes for at least three years. At one time it was believed that a rotation of at least five years was necessary. However, it is now known that the level of bacteria in a contaminated field drops dramatically after the first year of rotation. Any equipment used in the problem field should be washed and disinfected prior to entering a clean field. Equipment and workers should begin work in the cleanest field and finish with the contaminated field. Copper sprays every five to seven days may help reduce the spread of bacterial canker. However, if the environment is favorable for bacterial canker (75 - 90°F with rain) coppers may be limited because the bacteria has a decided advantage in a wet environment. Avoid working in a diseased field when it is wet to avoid spreading the disease. Bacteria may enter the plant through natural openings, or wounds created by wind, pesticide spraying or insects. A film of water on the leaf surface allows the bacteria to remain viable and move. If workers are moving within a wet field and creating new wounds on the plants, new infections are likely. If plants have been staked, all stakes should be treated as discussed previously for wooden trays and benches.

New England Fruit Pest Management Guides for 2005

The New England Small Fruit Pest Management Guide has been updated for 2005 and should be available in both electronic and printed versions by mid-May. The New England Apple Pest Management Guide will not be reprinted in 2005. An update is being prepared to highlight significant changes since the guide was printed in 2003. This update will be mailed to those on our apple mailing list. If you do not receive a copy, please contact Lorraine Los at (860) 486-6449 or Lorraine.Los@uconn.edu. The 2003-2004 edition of the New England Apple Pest Management Guide is still available at the Communications and Information Technology Office, 1376 Storrs Rd., Unit 4035, University of Connecticut, Storrs, CT. Call (860) 486-3336 to order, or purchase the guide online at http://www.resourcecenter.uconn.edu.

Extension Floriculture Program Given Grant

The University of Massachusetts Extension Floriculture Program in cooperation with University of Connecticut Extension Greenhouse Program has been awarded $83,000 from the Northeast Sustainable Agriculture Research and Education (SARE) program to implement a "Sustainable Greenhouse Health Maintenance Program" for farmers in southern New England (MA, CT, RI). This three year program beginning in April will include hands-on training, diagnostics, pest management and cultural recommendations, an early alert system, sustainable greenhouse workshops, farms tours or twilight meetings, and baseline and post-project evaluation surveys.

Tina Smith and Paul Lopes (University of Massachusetts) and Leanne Pundt (University of Connecticut) will work with growers to prevent problems in greenhouses, identify pests, nutritional and cultural problems, and to use sustainable greenhouse practices. Information gathered throughout the growing season will be disseminated to growers throughout southern New England (MA, CT, RI) via the internet, email and fax as an early alert system.

As part of this grant we will distribute "New England Greenhouse Update," timely information collected from growers in MA, CT and RI which will be posted on a website. To receive the update via email, see registration information to the right.

To receive the New England Greenhouse Update via email, please send in this registration form or email the information to tsmith@umext.umass.edu.

Name _____

Company _____

Email Address _____

Mail this form to NE Greenhouse Update, UMass Extension, Rm 203 French Hall, University of Massachusetts, Amherst, MA 01003. For more information, contact Tina Smith at (413) 545-5306, tsmith@umext.umass.edu; Paul Lopes at (508) 295-2212 ext. 24, lopes@umext.umass.edu; or Leanne Pundt at (860) 626-6240, leanne.pundt@uconn.edu.

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