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Healthy Fruit
Prepared by the University of Massachusetts Fruit Program

Healthy Fruit, Issue 13, July 17, 2007

http://www.umass.edu/fruitadvisor/healthy_fruit/

The way I see it

It's about as quiet as it gets as we enter first harvest on peaches and the early pre-harvest period for apples. (Can you believe we are only a month away from the start of apple harvest?) The last cherries are being harvested this week (Regina, Sweetheart) and the very first early PF-1 peaches are probably going to be picked any day now. Cherry harvest appeared to be a bit ahead of schedule, therefore, I would watch peaches closely over the next couple weeks. With wet weather forecast and ripening fruit, peaches become more susceptible to brown rot. No doubt we have also entered a period when the summer diseases -- sooty blotch and fly speck and various rots -- are active. Dan Cooley has written a comprehensive summary of your summer disease management options and a little background on disease forecast/modeling which follows. Our E-Weather Apple Disease model suggest sooty blotch will become active (i.e., symptoms could appear on the fruit surface) on July 20 in Belchertown, so be prepared. Finally, if you missed it, the Dr. Ronald J. Prokopy Award (in recognition of outstanding support of Massachusetts Agriculture) was presented to Barbara Houle, Food Editor for the Worcester Telegram at the Annual Summer Meeting of the Massachusetts Fruit Growers' Association held last week at Bolton Orchard. Of course we also had most excellent hospitality -- including an orchard tour and Red Bones lunch -- by Steve Ware and Bob Davis of Bolton Orchards. The view on a delightful summer day from their orchard was spectacular. For a couple pictures of the event see the MFGA home page (http://www.massfruitgrowers.org). J. Clements

Healthy Fruit Disease Elements July 17, 2007

Summer diseases. For those of you too busy, too hot or just plain not interested in what goes into our advice on when to spray for summer diseases, just know that it's now time. Apply summer sprays, keep track of the time and rain, and reapply as necessary according to the table.

For the first summer spray, the most effective fungicide is a Topsin-M plus captan combination. If this can't be used, use either Flint, Sovran, Pristine or Indar to get eradication of any infections that may have started. Thereafter, captan alone at appropriate intervals is sufficient.

Fungicides for management of sooty blotch and flyspeck. Protection is gone when either the days of protection or amount of rain necessary for wash off, whichever comes first, have been met. (Based on tests by D. Rosenberger)

Treatment (rate/100 gal.)	Days protection	Rain to wash off
Topsin M 70WP or WSP (3 to 5 oz) + Captan 50 WP (l lb)	21	2
Flint 50 WDG (.67 to .8 oz)	21	2
Sovran 50 WG (1 to 1.6 oz)	21	2
Pristine (5 oz)	21	2
Indar 2 F (2.7 fl oz)	21	2
Captan 50 WP (2 lb)	14	2
Ziram 76 WP (1.5 lb)	14	2
Captan 50 WP (1 lb)	10	1.5
Ziram 76 WP (1 lb)	10	1.5

Up until last week, the risk of sooty blotch/flyspeck (SBFS) infection has been low. It takes some time for the inoculum to develop in the trees and bushes around orchards. Then once it is released and lands on apples, it takes some time to develop into visible “specks”.

I’m being deliberately vague about times because there’s some disagreement on how much time it takes to develop inoculum and symptoms. Basically, plant pathologists agree that the flyspeck fungus grows only when plant surfaces are wet. However, we haven’t settled on when to start counting the leaf wet hours, whether to count all leaf wet hours, and just how many leaf wet hours must be accumulated before fungicide treatments should start.

That’s largely because sooty blotch and flyspeck are stealth pathogens. In flyspeck, the “specks” are actually the first stage of the fungus trying to form ascospores for the next year. Before the specks form, the fungus still grows, and produces lots of another kind of spore, conidia, but we can’t see it doing that. It’s only after a considerable amount of fungal growth and spore production, including movement from reservoir hosts on orchard borders, that the fungus finally forms visible structures. The rest of the time, for practical purposes, it’s invisible.

Researchers at North Carolina State decided that the best way to start to get a handle on a better way to manage SBFS was to see if they could predict the first appearance of symptoms using weather information. From 1987 to 1994, they collected weather data and noted when the first SBFS symptoms appeared on apples. Based on this, they determined that it took 273 hrs. of leaf wetness for the first SBFS symptoms to show on apples, counting only wetting that was 4 hours or longer, accumulated from the first rain to occur 10 days after petal fall (LWHA, 4 hr. min, 10 days). There wasn’t a real biological explanation about why this worked. But they theorized that the fungi were probably growing invisibly on fruit up to the point that 273 LWHA accumulated, at which point they formed visible symptoms. Based on this, they recommended that growers put on Benlate or Topsin M at about 220 hours, a little before symptoms were predicted to appear. Benlate and Topsin M were the most effective materials available, and assumed to have eradicant activity against SBFS fungi, much as they did against scab. After this initial application, they recommended regular fungicide applications at roughly 2 week intervals through the rest of the season. This saved a spray or two from a little after petal fall until the 220 hours wetness had accumulated.

Later work in Kentucky simplified the model, and counted all wetting periods, not just the ones that were longer than four hours. This research used paper bags to protect fruit from SBFS, and compared the bags to fungicide. They concluded that it took from 185 to 251 hours of wetting, with no minimum on the wetting, before SBFS symptoms appeared. If fruit were bagged, or sprayed with Topsin M, at 175 wet hours starting at 10 days after petal fall, they stayed free of SBFS. There was no reason to think that bags would eradicate existing infections on the apples, so it appeared that the Topsin M was most likely working as a protectant fungicide, without eradicating invisible infections. Ultimately, this Hartman/Sutton model has become the most widely used forecast tool. It has worked throughout the upper Midwest and in the Mid-Atlantic, and it is used by Spectrum Technologies (the weather monitor used by Jon Clements at the UMass Cold Spring Orchard in Belchertown).

Cornell used a somewhat different approach for several years. As we did at UMass, they concluded that the last scab sprays should offer some protection against SBFS. Dave Rosenberger's trials indicated that the amount of protection that was provided by different fungicides ranged from 10 to 21 days, or from 1 to 2 inches of rain (see the table above). So, the last fungicide application targeting scab would generally be applied during the first week to 10 days after petal fall, and would usually protect for up to 3 weeks. After that, 100 wet hours were allowed to elapse before a Topsin M application was applied. From then on, the table was used to tell when to apply the next spray. This approach has worked well.

While these programs have generally been effective, they are not based on a clear understanding of the pathogens and their biology, but on tests of varying spray intervals and the appearance of SBFS symptoms in response. The growth of the SBFS fungi is frustratingly mysterious. It isn't at all clear exactly when the flyspeck and sooty blotch fungi land on apple fruit, or how long they grow before symptoms can be seen. Some tests indicate that they can grow, then stop growing, then start again, depending on whether the fruit are wet and whether a fungicide is present.

The Kentucky work is particularly interesting, because putting a bag around fruit at 175 hours of wetting stops SBFS. If all the bag is doing is keeping inoculum from getting to fruit, then this suggests that SBFS doesn't move into orchards until 175 wet hours measured from 10 days after petal fall. But how long after that does it take for the fungus to grow and produce symptoms? Ten wet hours? One hundred wet hours? We aren't all that sure. And while the fruit bags stop infections, a captan spray at the same time doesn't. But a Topsin M spray does.

Rosenberger's work in New York consistently points towards a period of 270 wet hours, a grace period, during which the fungus is probably on the fruit, but is not developing. Apparently, if an appropriate fungicide is applied before the end of this period, and coverage is maintained, the fungus is either killed or can't grow. In at least one test, however, it is clear that the fungus is not always killed, and a break in coverage will allow it to develop into symptoms. But because we can't watch the fungus develop, we really don't know what's happening during this time.

A few studies have indicated that benzimidazoles (Topsin M) do kill, that is, eradicate SBFS fungi, while captan will not. For example, Rosenberger treated apples in the field with a benzimidazole plus Captan on several dates during summer. He harvested fruit from these trees several days after treatments were applied and incubated them, along with fruit from unsprayed control trees, in moist conditions to encourage SBFS development. Sixty-six percent of unsprayed fruit harvested on 23 July developed symptoms within two weeks, compared to only 20 percent of treated fruit that received the first spray on 19 July. Following a second benzimidazole-captan spray on 2 Aug, only five percent of fruit harvested on 6 Aug developed flyspeck after incubation. The presence of flyspeck on the control fruit indicated that the SBFS fungi were present on the fruit by 19 July and that the benzimidazole-captan fungicide sprays had eradicated them.

It is not clear exactly what the strobilurines Flint and Sovran, or the strobie/boscalid combination Pristine, or the sterol inhibitor Indar do in terms of eradication vs protection, though they have generally been very effective against SBFS.

North Carolina research did show that with the standard protectant funigicides, dilute applications are more effective than concentrate applications against SBFS. For example, with Captan 50W, 1X (dilute) applications, 53% of fruit had SB and 70% had FS. That compared with 5X applications where 97% of fruit had SB, and 90% had FS. This may be a simple coverage issue, but again, we don't know.

Add to all of this the discoveries out of North Carolina and Iowa that there aren't just two fungi causing SBFS, but many different species, and that several may occur on the same apple. It's unlikely that all of these fungi behave the same. We can only hope that forecast models can accommodate whatever growth differences there may be between the several fungal species.

So far, they appear to do that. For the time being, without a clear understanding of the biology of the SBFS pathogens, we stick with what has worked in terms of management, and what allows us to save a spray or three in June and July. And the bottom line is that this year, there have now been enough wet weather to recommend that summer sprays begin. D. Cooley

Cornell Fruit Field Day

Wednesday, July 25, from 8:00 a.m. to 5:00 p.m is the 2007 Fruit Field Day and Equipment Show at the New York State Agricultural Experiment Station in Geneva, NY. This is one of several events that commemorate the 125th anniversary of the Experiment Station, which opened its doors on March 1, 1882.

Fruit growers, consultants, and industry personnel are invited to tour field plots and laboratories and learn about the latest research and extension efforts being carried out by researchers on the Geneva, Highland and Ithaca campuses. The focus will be on all commodities key to New York's $300 million fruit industry: apples, grapes, raspberries, strawberries, peaches, pears and cherries.

During lunch, equipment dealers will showcase the latest techniques to improve sprayer deposition and reducing drift. Representatives from various companies will advise growers on the latest technologies.

The event will be held on the Experiment Station's Fruit and Vegetable Research Farm South, 1097 County Road No. 4, 1 mile west of Pre-emption Rd. in Geneva, NY. Attendees will be able to select from tours of apples, stone fruits, small fruits, and grapes, as well as a tour of the Experiment Station's labs and greenhouses. Admission is free and lunch is provided courtesy of industry sponsors. For additional information, contact Nancy Long at 315-787-2288 or NPL1@cornell.edu . Pre-registration is requested and you may register on line at: http://www.nysaes.cornell.edu/hort/fieldday/index.html

Leaf analysis time

It's time to collect leaves for leaf analysis. Direction are attached. All orchard blocks should be sampled at least every 3-4 years and nutrients applied based on soil and leaf tissue tests. Be sure to request the tissue test *with* nitrogen.

Note: Healthy Fruit is now on a once every two weeks publication schedule. The next HF will be published July 31.

Bag #:

Plant Tissue Analysis Questionnaire

Please READ the instructions on the reverse side of this questionnaire.
TAPE QUESTIONNAIRE TO PAPER SAMPLE BAG.
See instructions for PAYMENT on Reverse Side.

(1)_____ (2)_____
Name of Sender Name of Farm/Orchard/Vineyard

(3)_____ (4)_____
Street Address City & State

(5)_____ (6)_____
Zip Code Telephone #

(7)_____ (8)_____ (9)_____
Crop Variety Rootstock (if applicable)

(10)_____ (11)_____ (12)_____
Date Sampled Sample Collected by Soil Type (if known)

(13) Customer Sample ID (block, field name, location, etc.):_____

(13) Stage of growth: (1) Early (2) Mid (3) Mature

(14) Soil Moisture Level: (1) Very Dry (2) Dry (3) Moist (4) Wet

(15) Anticipated Yield: (1) Light (2) Moderate (3) High

(15) Plant Vigor: (1) Weak (2) Moderate (3) Vigorous

(17) Pruning: (1) None (2) Light (3) Moderate (4) Heavy

(18) Plant Age: _____ (19) Plant Spacing: _____

(20) Fertilizer applied last year: _____

(21) Fertilizer applied this year: _____

(22) Purpose of sample: Normal Nutrient Check Problem

(23) Comments: _____

HOW AND WHEN TO SAMPLE: Samples should be taken from the specific plant part, at a specific location on the plant, at a specific stage of growth for which research data has been evaluated. In other words, to assess the nutritional status of your plant tissue one must have data from comparable plants of known nutritional status. Generally the most recently developed mature leaves are sampled, and timing is often critical. See the list below for guidelines for typical crops. Contact the lab for specific procedures for other plant types.

Apples (Pears):	sample fully expanded leaves from mid-shoot of current growth during late July or August
Strawberries:	sample from the first fully expanded new leaves after renovation.
Blueberries:	sample healthy leaves during July or August
Raspberries:	sample healthy leaves on non-fruiting canes in early to mid-August
Grapes:	sample **petioles** from most recently matured leaves on shoots at beginning of verasion in mid-August
Cranberries	sample top 2 inches of at least 50 randomly chosen new upright tips (leaves and twigs, mixed flowering and vegetative) between mid-August and mid-September

PROCEDURE:

1. When there is a plant growth problem, always attempt to sample the problem areas and then take a second sample from the same variety showing satisfactory growth. Send these two samples in separate containers with separate payments.
2. When no plant growth problem exists, but there is interest in assessing the nutritional status, your results will be compared with those in the scientific literature or from previously sampled crops.
3. Remove leaves (or selected plant part) from a representative area. For example, remove leaves from 10-20 plants scattered through the area to be sampled (rather than 10-20 plants from one end of the planting).
4. Make certain management practices have been uniform within the sampling area. If soil characteristics vary significantly over the area, sampling should be refined to reflect these differences.
5. Take 10-50 leaves (or selected plant part), depending on crop, rinse thoroughly with tap water to remove any chemicals, foliar applied fertilizer, and soil particles. Place them on clean paper to air-dry.
6. Once air-dried, carefully place tissue (avoiding contamination with foreign material) in a paper bag (using the one provided if you have a UMass Tissue Kit). Please PRINT (do not write)
7. Answer all questions on the reverse side of this sheet, and enclose questionnaire in an envelope along with your sample to the Soil and Plant Tissue Testing Lab.

PAYMENT PROCEDURE	**FEES:**	**Tissue Analysis without Nitrogen**	**$14.00**
		Tissue Analysis including Nitrogen	**$20.00**

Enclose CHECK made PAYABLE to **University of Massachusetts** along with completed questionnaire. Please DO NOT send cash. If more than one sample is being submitted, please indicate which sample contains payment for the group.

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(Cut at dotted line and save bottom for your records)

Bag #: _____ Your Sample ID: _____ Date Sent: ___/___/_____.