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Fruit ICM News

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Calendar

July 10: Ohio Fruit Growers Society Summer Tour, Hirsch Fruit Farm, Chillicothe, OH. More info later.

Review of Strategies for Controlling Apple Scab and Mildew in 2002

Source: Dave Rosenberger, Plant Pathology, Highland, Scaffolds Fruit Journal, Volume 11, No. 3

Fungicide strategies for controlling apple scab and powdery mildew remain mostly unchanged from those recommended for the 2001 season and published in *Scaffolds* last year (see citations at the end of this article). This article provides a brief summary and update of the recommendations published last year. A follow-up article next week will cover the latest information on fungicide resistance problems and strategies for minimizing selection pressures that contribute to fungicide resistance.

Key recommendations for early-season disease control on apples in 2002 include the following:

1. Start early! Plan to use contact fungicides (mancozeb, Polyram, captan) beginning at the green tip bud stage and again 7-10 days later. Appropriate spray intervals will vary, depending on temperature (i.e., tree growth rate), rainfall, and predicted infection periods. Copper applied at green tip to suppress fire blight inoculum provides scab control equivalent to that of a mancozeb spray. None of the protectant fungicides (including copper) have postinfection activity. Therefore, scab infections that occur at green

tip will not be controlled if the first spray is not applied until half-inch green.

Delaying the first spray beyond green tip is risky except when apple scab ascospore maturity is considerably delayed compared with "average" years or where orchards had virtually no scab the previous season. The latter can be determined only by carefully observing terminal leaves for scab symptoms during October. Growers should not assume that they have "clean" orchards just because they failed to notice scab from the tractor seat.

Sprays between green tip and tight cluster can prevent early scab infections that would otherwise generate secondary inoculum for infecting leaves and fruit between bloom and first cover. In most cases where significant fruit scab is present at harvest, the origins of the problem can be traced to poor scab control during the prebloom period.

Even the best fungicides will often fail when the following three conditions occur simultaneously:

- Trees are growing rapidly, thereby generating large quantities of susceptible tissue.
- Extended rains favor scab and interfere with spraying during the period between late bloom and second cover.
- Primary scab lesions are visible at petal fall, thereby providing huge quantities of inoculum.

The first condition occurs every year during the spring growth flush that begins near petal fall. The second condition is both unpredictable and uncontrollable. Therefore, the only fool-proof way to avoid a scab disaster is to prevent condition number 3. Careful prebloom scab control is the key to ensuring that no secondary inoculum is available during the interval between petal fall and second cover.

For powdery mildew, starting "early" means including a mildewcide in the spray program starting at the tight cluster bud stage, or at the very latest, by the pink bud stage. When the SI fungicides were first introduced, they sometimes provided adequate mildew control when applied only in the petal fall and first cover sprays. In most orchards, the SI fungicides are less effective against mildew now than they were 10-12 years ago, so mildew control must be initiated earlier before inoculum from primary mildew infections can spread to new foliage. Remember that powdery mildew can spread in the absence of rainfall or leaf wetting. Therefore, new foliage should be protected with fungicides even when no scab infection periods are predicted.

We can expect high levels of overwintering mildew in 2002 because the mild winter will have allowed most mildew-infected buds to survive. For 2002, delaying mildewcide applications until petal fall will be somewhat like closing the barn doors after the horses have run away.

2. Strobilurin or SI+contact fungicide sprays should be introduced at tight cluster or pink. Sovran and Flint are strobilurin fungicides; Nova, Rubigan, and Procure are SI fungicides. A strobilurin or SI fungicide should be used at tight cluster and/or pink to ensure adequate mildew control and to ensure complete control of apple scab during this critical period. The strobilurin and SI fungicides have postinfection and anti-sporulant capabilities that are lacking in contact fungicides. The time between tight cluster and petal fall usually encompasses the peak of scab ascospore discharge, the period of most rapid leaf expansion, and the period when any primary infections that became established shortly after bud-break will begin to produce conidia. Dollars paid out for fungicides between tight cluster and petal fall often pay dividends by reducing the need for fungicides to control secondary scab and mildew during summer.

Apple growers with low-inoculum orchards and good management skills may be able to save on

fungicide costs by using only contact fungicides until petal fall. However, scab programs built exclusively on contact fungicides are likely to fail in orchards with high inoculum levels and in years when weather conditions favor severe scab and limit preventive spray timing. Furthermore, none of the contact fungicides control powdery mildew. If no mildewcide is applied before petal fall, mildew control may be compromised and selection pressure for fungicide resistance will be increased.

3. Consider an alternating program of strobilurin and SI+contact fungicide sprays. There is no single "correct" scheme for configuring strobilurin and SI+contact fungicide sprays during the period between tight cluster and second cover. However, an alternating program (e.g., stroby, then SI+contact, then stroby, then SI+contact) may be slightly more effective than blocking programs wherein two or three applications of one chemistry are followed by several sprays of the alternative chemistry. This is especially true where the strobilurins are applied alone and rust diseases are prevalent. As suggested last year, a "fill-in" spray of mancozeb or captan alone may be needed to bridge the period between strobilurin or SI+contact sprays applied at pink and petal fall.

4. Should the strobilurin fungicides be applied in combination with contact fungicides? No one has a definitive answer for this question. An obvious reason for using strobilurin+contact combinations is to gain better control of rust diseases than that provided by strobilurin fungicides used alone. If one assumes that contact fungicides will redistribute better than strobilurin fungicides, then tank mixes might perform better than a strobilurin fungicide applied alone in situations where spray coverage was incomplete or rapid terminal growth might leave new leaves unprotected. However, we currently have no data to prove that contact fungicides have better redistribution capabilities than strobilurin fungicides. Tank-mix combinations of strobilurin+contact fungicides have been proposed as a resistance management strategy for apple scab, but that assumption is now questionable, based on recent work by Dr. Wolfram Koeller. (The details of fungicide resistance management will be discussed in next week's article.)

If growers opt to use strobilurin fungicides in combination with a contact fungicide, it is imperative that the rate of strobilurin in the mixture be maintained at the same level as for sprays where the strobilurin is applied alone. Tank-mix combinations involving a contact fungicide plus a full rate (minimum label rate) of a strobilurin fungicide can be expensive, but they may provide enough risk-reduction to warrant consideration during the critical period between pink and first cover.

5. Regardless of tree-row volume calculations, never apply Flint at less than 1 oz/A or Sovran at less than 2 oz/A. These minimum rates for small trees have been adjusted upward since last year due to changes on product labels and concerns about fungicide resistance. The only exception is that if trees are sprayed to drip with a hand-held wand, then rates of 0.67 oz of Flint/100 gallons or 1.33 oz of Sovran/100 gallons are sufficient. When directed sprays are applied with a hand wand, then the actual rate per acre might drop below the minimum rates recommended for airblast applications.

6. On mildew-sensitive cultivars, mildewcides will be needed until shoot growth slows or terminates. After four or five applications of strobilurin and SI fungicides, sulfur may useful for suppressing mildew infections during June and early July.

The bottom line: Focus on preventing early infections of scab and mildew. Over the past 20 years, many of us have proposed IPM strategies for controlling scab and mildew that involved omitting early fungicide applications or stretching spray intervals during bloom. Based upon what we are learning about fungicide resistance, many of those strategies now appear unwise and unsustainable. We are increasingly aware that fungicides with post-infection activity are valuable tools that will be quickly compromised if they are overused or misused. Next week's article on fungicide resistance will help to explain the basis for our renewed emphasis on controlling primary infections of scab and mildew and

will include more information on effects of strobilurin rates and spray timing.

Citations: Rosenberger, D.A. 2001. Fungicide strategies for control of apple scab and mildew in 2001. *Scaffolds Fruit Journal* 10(2):1-3. On-line at:
http://www.nysaes.cornell.edu/ent/scaffolds/2001/3.26_disease.html

Rosenberger, D.A. 2001. Fungicide strategies for control of apple scab and mildew in 2001 - Part II. *Scaffolds Fruit Journal* 10(3):1-3. On-line at:
www.nysaes.cornell.edu/ent/scaffolds/2001/4.2_disease.html

Early Season Considerations for Managing Diseases of Stone Fruit

Source: Bill Turechek, Plant Pathology, Geneva, Scaffolds Fruit Journal, Volume 11, No. 3

Several diseases of stone fruit require attention early in the season. This article will provide a brief overview and management options for those diseases of peaches, nectarines, cherries, and plums.

Peaches and Nectarines

One of the most potentially serious diseases of peaches and nectarines is peach leaf curl, caused by the fungus *Taphrina deformans*. The disease affects leaves, causing them to curl and blister and leaving them quite deformed. If left uncontrolled, these initial infections can produce additional spores that go on to infect new leaves and eventually the fruit. Severely infected leaves eventually shrivel and fall to the ground. Infected fruit either drop prematurely or remain on the tree and develop blisters or wart-like deformities on their surfaces.

The pathogen overwinters as spores in protected bark crevices and around buds. Initial infections occur in the early spring just as the buds begin to swell. The pathogen infects young undeveloped tissue, so infections are typically more severe when cool conditions prevent rapid development of the foliage. Severe infections occur during wetting periods with temperatures between 50-70°F. Once the leaves are fully expanded they are resistant to infection.

This disease is easily controlled with one well-timed fungicide application. Applications are most effective when applied either in the autumn when 90% of the leaves have fallen or in spring just before bud swell. Ferbam, Bravo, and Ziram are labeled for control of peach leaf curl. However, copper hydroxide or copper sulfate are also labeled and may be the preferred pesticide, especially where bacterial spot is a problem.

Bacterial spot is a disease that affects virtually all stone fruits, but is particularly damaging to peach, nectarines, and apricots. The disease is caused by the bacterium *Xanthomonas arboricola* (previously known as *Xanthomonas campestris* pv. *pruni*). Except for Long Island, the disease does not typically cause significant losses in New York. The disease was particularly severe in western New York two years ago so the potential clearly exists for a severe outbreak. The winter may not have been cold enough to substantially knock back overwintering populations of the bacteria, so if we have a warm and wet spring we need to be mindful of this disease.

Bacterial spot affects the fruit, foliage, and young woody growth (twigs). Severe foliar infections result in leaf drop, which may significantly reduce tree vigor and winter hardiness. Bacteria from leaf infections move to the current year's twig growth, leading to canker formation and providing an overwintering site for the bacteria. On fruit, the bacteria cause unsightly, dark-brown lesions or blemishes. Lesions often become sunken and the skin of the fruit cracks, causing deep pits that leave the fruit unmarketable. The disease favors warm and wet weather and may particularly be a problem in orchards with a history of disease. Primary fruit and leaf infection occur as a result of frequent wetting events from full bloom to 4 weeks after shuck split. Wind-driven rain or debris can damage leaves and developing fruit, creating small wounds that the bacteria can enter, and significantly affect the occurrence and severity of fruit and leaf infection. Disease does not develop under hot and dry conditions.

The most effective way to manage bacterial spot is to avoid planting varieties that are highly susceptible to this disease. Yet, this not always practical when processors ask for certain varieties such as 'Babygold 5' that are particularly susceptible to bacterial spot. However, chemical control is typically necessary to manage disease. If bacterial spot has not been a problem in your orchard, a dormant application of copper is recommended as a preventive spray. This application can be timed to coincide with your peach leaf curl spray. If bacterial spot is a problem later in the season, apply oxytetracycline on a 7-10-day schedule from shuck split until 3 week before harvest.

Phytophthora root, crown, and collar rot is a problematic disease that is best managed in the pre-planting phase through proper site selection, providing supplemental drainage, and selecting resistant rootstock. Peach and cherry rootstocks are much more susceptible to this disease than apple rootstocks. However, even the best laid plans are compromised by unexpected events. If the disease has been a problem, or exceptionally wet weather favors disease development, apply Ridomil Gold (at the appropriate rate according to trunk size) to the soil beneath the tree canopy in enough water to ensure good coverage. Young and newly planted trees are at the greatest risk because they can be girdled more quickly than older trees.

Another disease that deserves your attention early in the season is X-disease, a problem mostly confined to the Hudson Valley. This disease is caused by a mycoplasma and infects many varieties of stone fruits. Chokecherry (*Prunus virginiannae*) is a natural host/reservoir for the pathogen. The disease is spread from infected chokecherry, wild sweet cherry seedlings, and cultivated sweet cherry by leafhoppers. The only effective control measure for this disease is the eradication of chokecherry and infected cherry trees within a 500 ft radius of all peach, nectarine, and cherry orchards. Eradication can be accomplished with chemical brush killers -- but be extremely careful not to Ohio Fruit ICM News use them within your orchard. If brush killers were used in the previous season, scout those areas in the early spring for regrowth.

Cherries

Bacterial canker is one of the most serious diseases of sweet cherry. The disease is caused by the bacteria *Pseudomonas syringae* pv. *syringae* and *Pseudomonas syringae* pv. *morsprunorum*. The bacteria overwinter in bark tissue at canker margins, in apparently healthy buds or systemically in the vascular system. In the spring, particularly when conditions are cool and wet, bacteria multiply and emerge from their overwintering sites and are disseminated throughout the orchard by wind and rain. Natural plant openings (i.e., stomata, nectaries, and lenticels) or wounds provide entry sites for bacteria. The bacteria typically enter tree limbs and the trunk through pruning wounds and sites of freeze injury in autumn and early winter.

Upon infection, the bacteria multiply profusely and induce disease symptoms and replenish resident

populations. They may reach axillary buds by systemic spread from infected leaves through the petiole throughout the season. Cankers subsequently appear at the base of infected buds. Canker expansion slows during winter but resumes again in early spring. Blossom infection occasionally occurs in some orchards. Infected blossoms are not always killed and may lead to fruit infection.

Bacterial canker is difficult to control. Removal of wild *Prunus* species in hedgerows adjacent to sweet cherry orchards may help to reduce inoculum. Growers should prune cankered limbs well below visible cankers, **avoid pruning in early spring** and fall when bacteria are most active, and sterilize pruning tools before pruning healthy trees. Cankers also provide entry sites for Leucostoma canker (a.k.a. Valsa, Peach, or fungal canker). The area around the base of young trees should be kept free of weeds and trash. This helps keep the trunk and crown dry and potentially reduces the build-up of the bacteria.

As is true for many bacterial diseases, there is a limited chemical arsenal available to battle bacterial canker of cherry. Fixed-copper compounds are recommended for disease control. Current label recommendations call for one autumn application "before heavy rains begin" and another at late dormant. A third application is also labeled for use shortly after harvest in orchards where disease is severe, but is discouraged in most situations due to the phytotoxic effects of copper. Some growers have experimented with using half, quarter, and even lower rates during the season (usually after harvest) to try to get better control of the disease. Although these low-rate applications may not have resulted in phytotoxicity, keep in mind that the pathogen does grow well in the heat of the summer so the timing of these applications is questionable.

If you are planning on designing or planting a new orchard this season, plant on sites that do not have sandy soils, poorly drained, waterlogged soils, or sites that may suffer extended periods of drought. In newly planted orchards, train trees to wide crotch angles to prevent the formation of wounds in the crotches; injury to the bark provides perhaps the best avenue for infection. It is not surprising then that winter-injured wood is particularly susceptible to bacterial invasion. To minimize winter injury in new and young (2 to 7-year old) orchards, painting tree trunks with a bright white latex paint to reflect the winter sun and minimize temperature fluctuations at the bark surface should be done sometime after harvest. Any inexpensive white latex paint will do.

Plums and Prunes Black knot is a destructive disease on susceptible varieties of plums and prunes (and in recent years on cherry). The disease is caused by the fungus *Apiosporina morbosa* and attacks only the woody tissues of the tree. Black knot develops slowly. Initial infections typically occur on new shoot growth during periods of rainfall that exceed six hours when temperatures range from 55-75°F. Susceptible twigs may become infected shortly after bud break when shoots are elongating rapidly. The first symptoms are usually evident by autumn as an olive-green swelling of the young woody tissue. Black knot develops rapidly the following summer to form the characteristic dark and warty knot. Knots vary in length from as small as 1 inch to nearly a foot and may or may not completely encircle the branch. The vascular tissue becomes restricted in infected branches, ultimately leading to the death of the branch.

Managing the disease requires removal of wild plum, prune, and cherry seedlings along fence rows, woodlots, and the orchard perimeter. Wild hosts infected with black knot are easy to spot if scouting is done before bud break. Binoculars may be needed to scan high twigs and branches of black cherry trees (*Prunus serotina*), as these trees can grow to more than 50 ft. Black knots should be pruned from infected trees within the orchard during the dormant season. Pruning cuts should be made at least 6 inches below the margin of the knot and infected twigs and branches should be removed from the orchard and buried or burned. Fungicides should be applied from white bud through shuck split; however, chemical treatment is most likely to be effective only if pruning and sanitation has been practiced. The most effective fungicide for black knot control is Bravo. Bravo's use is permitted under

FIFRA Section 2(ee) and has been approved by the NY DEC (users must have a copy of the DEC approval at time of application, available at: http://www.nysaes.cornell.edu/pp/extension/tfabp/pestnews.shtml). Bravo is not labeled on plums after shuck split.

Summary

- Dormant application of copper for peach leaf curl, bacterial spot of peach, and bacterial canker of cherry.
- Soil drench with Ridomil Gold in problem areas for Phytophthora crown, root, and collar rot.
- Prune out black knots, remove from orchard and destroy by burning or burying.
- Destroy wild plum, prune, cherry, and chokecherry in a 500 ft radius of orchard for black knot and/or X-disease control.

Pest Phenology

Coming Events	Degree Day Accum. Base 50F
Pear psylla adults active	0 - 49
Pear psylla 1st oviposition	1 - 72
Redbanded leaf roller 1st catch	5 - 251
Green fruitworm 1st catch	9 - 101
Spotted tentiform leafminer 1st catch	17 - 251
Tarnished plant bug active	34 - 299

Thanks to *Scaffolds Fruit Journal* (Art Agnello)

Degree Day Accumulations for Ohio Sites April 3, 2002

Location	Degree Day Accumulations Base 50F
Akron-Canton	23
Cincinnati	62
Cleveland	14
Columbus	55
Dayton	35
Kingsville Grape Branch	10
Mansfield	14
Piketon	73
Toledo	6

Wooster	27
Youngstown	22

Preliminary Monthly Climatological Data for Selected Ohio Locations March 2002

Weather Station Location	Monthly Precip	Normal Monthly Precip	Year to Date Precip	Normal Year to Date Precip	Avg High Temp	Normal High Temp	Avg Low Temp	Normal Low Temp	Mean Temp	Normal Mean Temp
Akron-Canton	3.88	3.15	7.98	7.92	47.3	47.5	28.2	27.9	37.7	37.7
Cincinnati	4.60	3.90	8.74	9.57	51.5	53.9	32.2	33.8	41.9	43.8
Cleveland	4.13	2.94	8.77	7.71	46.3	46.1	28.5	28.9	37.4	37.5
Columbus	3.45	2.89	7.04	7.62	50.5	51.6	32.1	32.2	41.3	41.9
Dayton	3.89	3.29	6.72	8.18	48.2	49.3	30.5	31.2	39.3	40.2
Fremont	2.24	2.69	6.33	6.14	46.7	45.3	25.5	27.0	36.1	36.2
Kingsville	3.32	2.39	8.24	6.18	45.8	43.6	26.9	27.0	36.3	35.3
Mansfield	3.81	3.36	7.67	8.16	45.6	46.6	27.5	26.8	36.6	36.7
Norwalk	4.40	2.77	9.32	6.40	44.8	45.4	29.2	26.9	37.0	36.1
Piketon	5.70	4.2	8.85	10.6	54.3	52.8	31.3	31.2	42.8	42.0
Toledo	3.07	2.62	7.41	6.43	45.5	46.5	27.6	27.9	36.5	37.2
Wooster	4.70	2.92	9.49	6.84	49.2	47.7	28.8	27.7	39.0	37.6
Youngstown	3.17	3.05	7.81	7.42	47.4	46.3	27.8	27.1	37.6	36.7

Temperatures in degrees F, Precipitation in inches

Table Created by Ted W. Gastier, OSU Extension from National Weather Service, OARDC & Local Data

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