Ohio Fruit ICM News

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Calendar - Newly added in ***Bold***

June 11-17, International Fruit Tree Association Summer Orchard Tour to Mexico www.ifta.org.

June 15, Gooseberry Field Day, KSU Research Farm, Mills Lane, Frankfort, KY. For more information contact Kirk Pomper at 502-597-5942

June 16, Illinois State Horticultural Society Summer Field Day, Boggio's Little Mountain Orchards, Granville, Ill. For more information phone Don Naylor, (309) 828-8929.

June 21, 2006, Twilight Fruit Tree Field Meeting, 6:30 p.m.~9:00 p.m. Heartland Orchard, 13029 Laurel Hill Road, Thornville, Ohio. Featured fruits of the evening will be apples, peaches, pears, and grapes. Speakers for the evening include: Dr. Celeste Welty, OSU Entomology, Dr. Diane Miller, OSU Horticulture, Mark Schmittgen, Grower. For more information contact Howard Siegrist, OSU Extension-Licking County, Phone: (740)670-5315

June 21-22, OVPGA Tour. For more information contact Tom Sachs at 614-246-8290 or email at tsachs@ofbf.org

June 28, OFGS Summer Tour at White House Fruit Farm in Canfield, Ohio. For more information on the tour, contact Tom Sachs or Kathy Lutz at (614) 246-8292 or via email at klutz@ofbf.org.

Aug. 1 UK Horticultural Research Farm Twilight Tou*r*, Horticultural Research Farm, Lexington, KY. Contact John Strang 859-257-5685; e-mail: jstrang@uky.edu

August 22-23, North American Strawberry Growers Association Summer Tour, Portland Maine. For more information, http://www.nasga.org/

Aug. 30-Sept.1 North American Fruit, Explorers (NAFEX) and SFF Annual Meeting, Holiday Inn North, Lexington, KY. Contact John Strang 859-257-5685; e-mail: jstrang@uky.edu

September 19-21, Farm Science Review, Molly Caren Agricultural Center, London. http://fsr.osu.edu/

September 21, Grape and Pawpaw Field Day KSU Research Farm, Mills Lane, Frankfort, KY. For more information contact Kirk Pomper at 502-597-5942

December 5-7, Great Lakes Fruit, Vegetable and Farm Market EXPO. DeVos Place, Grand Rapids, Mich., www.glexpo.com..

January 7-9, 2007, Wisconsin Fresh Fruit and Vegetable Conference, Olympia Resort and Conference Center, Oconomowoc, www.wisconsinfreshproduce.org

Jan. 8-9, 2007, Kentucky Fruit and Vegetable Conference and Trade Show, Holiday Inn North, Lexington, KY. Contact John Strang 859-257-5685; e-mail jstrang@uky.edu

February 9-12, 2007, North American Strawberry Growers Association Strawberry Symposium. Ventura, California. For more information, http://www.nasga.org/

Comments from the Editor

I thought if I complained about being dry we would get some rain. While others were getting 4 inches or more late last week we received less than ¾". This is an abbreviated version of the newsletter, but Dr. Ellis thought the pathology information was timely.

Apple Scab and Fungicide Resistance

by Wolfram Koeller and Diana Parker, Plant Pathology, Geneva (source: SCAFFOLDS Fruit Journal, Geneva, NY Volume 15, No. 10)

What started out as an "easy" scab season in our Station orchards here in Geneva turned around to be a serious problem. Following a heavy 3-day infection period at tight cluster, 90% of clusters had scab lesions at petal fall, and the performance of fungicides in our orchard trials confirmed previous experiences.

Starting the scab program at half-inch green rather than at green tip and responding to the infection at tight cluster with a post-infection spray provided no or poor control of cluster leaf scab. Dithane at its low mixture rate, but also when mixed with Captan, failed to control cluster leaf scab. As expected for an orchard with resistance to the SI fungicides, Nova, even in combination with Dithane, performed poorly.

The performance of the strobilurin Flint was also poor, showing one more time that the strobilurins Flint and Sovran are starting to lose their post-infection edge. Both Scala and Vangard provided adequate post-infection activity, but we will have to wait until harvest to find out whether and how this post-infection advantage can be carried over to good control of fruit scab at harvest.

We have continued our sensitivity testing of the apple scab fungus during the 2005 season, and the not so "pretty" picture we found a year earlier has been confirmed. Resistance to the SIs Nova, Procure and Rubigan is by now quite common rather than a rare occasion here and there. Resistance to Syllit is unpredictable. We found that, once an orchard had developed resistance to dodine, this resistance was stable for more than 30 years, even after orchards had been replanted. We have not yet discovered an orchard totally immune to the strobilurins Flint and Sovran. But, sensitivity shifts toward resistance are obvious. These sensitivity shifts have eroded the post-infection power of the strobilurins. They remain very effective in a protective mode.

The APs Scala and Vangard remain a "hard nut to crack". We found that in SI-resistant orchards their potency was diminished before they ever were used. We also found that their post-infection advantage in the early scab season provided little advantage in the control of fruit scab at harvest.

Where do we go from here? With financial aid provided by the Northeast IPM Center, we will be able to test the resistance level of scab lesions found on leaves of commercial orchards "for free". How many orchards can we test? About 25, on a "first come, first served" basis. We also will not accept samples after 15 July.

How to submit leaves with scab lesions to be tested? Easy. Contact Diana Parker, Cornell University, Department of Plant Pathology, 630 West North Street, Barton Laboratory, New York State Agricultural Experiment Station, Geneva, NY 14456. (Telephone 315-787-2400; dmp2@nysaes.cornell.edu). The procedure for collecting and shipping the leaves can be found on our Geneva web site (http://www.nysaes.cornell.edu/pp/extension/tfabp/index.html) or from your regional Cornell Cooperative Extension agents. Each shipment of leaves must be accompanied by the name, the address and the telephone/e-mail number of the submitter, and a summary of the orchard's fungicide history. Please contact Diana Parker prior to a shipment (Telephone 315-787-2400; dmp2@cornell.edu).

Causes of Early Summer Leaf Spots, Part I Dave Rosenberger, Plant Pathology, Highland (Source: SCAFFOLDS Fruit Journal, Geneva, NY Volume 15, No. 11)

Leaf spots on fruit trees are caused by a wide variety of pathogens and abiotic factors.

Most growers can identify typical leaf lesions caused by apple scab, cedar apple rust, powdery mildew, and cherry leaf spot. However, when leaves develop small, nondescript brown leaf spots or small shot holes, even experienced plant pathologists often have difficulty identifying the causes.

Fortunately, the nondescript leaf spot diseases in the Northeastern United States rarely cause economic losses, even when their appearance temporarily disfigures the tree canopy. The fungi causing apple leaf spot diseases either do not have secondary cycles on leaves or they are easily controlled with fungicides and appear only when fungicide protection is disrupted by extended spring rain events. Abiotic leaf spots that develop shortly after petal fall are often attributable to agrichemical mixtures that have caused localized phytotoxicity.

Following are some of the most common causes of early season leaf spots and clues for determining their causes. The electronic version of this article, available at http://www.nysaes.cornell.edu/ent/scaffolds/2006/, includes color photographs that may be helpful in diagnosis. This article focuses on leaf spots that may appear in May, June, and July. Leaf spots with other causes and symptoms sometimes appear during August and September, but they will not be discussed here.

Frog-eye leaf spot, caused by Botryosphaeria obtusa, is the stereotypical leaf spot disease on apples. Frog-eye leaf spots are round, dark brown spots, 2-5 mm in diameter, with an almost black border and a tan center. Individual leaves may have a single spot or as many as 30 to 50 spots. Frog-eye can usually be differentiated from other kinds of leaf spots by its non-random distribution and its association with nearby inoculum sources. In sprayed orchards, frog-eye leaf spots are usually concentrated in the vicinity of mummified fruitlets that were retained after fruit thinning. Fruitlet mummies can be colonized by B. obtusa and then provide inoculum for infecting the leaves the following season. Spores are dispersed by splashing rain between tight cluster and about second cover. Frog-eye is most common on apple cultivars such as Cortland, Northern Spy, and Honeycrisp, that retain many fruitlets after chemical thinning. However, all cultivars may retain thinned fruit in years when weather conditions fail to promote rapid abscission of thinned fruitlets.

Frog-eye leaf spot may cause premature drop of severely affected leaves, but most damage from frog-eye is cosmetic. The same fungus that causes frog-eye leaf spot also causes black rot fruit decay, but there is no evidence that leaf spots contribute to fruit infection. Instead, the inoculum for fruit infection comes from the same fruit mummies that provide the inoculum for leaf infection. Thus, frog-eye on leaves can be viewed as an indicator for conditions that may have favored infection of fruit, but the leaves themselves do not contribute directly to the development of black rot on fruit. Black rot infections in fruit may remain quiescent until fruit ripen because green fruit contain inhibitors that prevent fungal growth.

Most fungicides control frog-eye leaf spot, but the SI fungicides (Rubigan, Nova, Procure) and the 3 lb/A rates of mancozeb or Polyram are less effective than captan, Flint, and Sovran. Severity of leaf spotting around fruitlet mummies may be affected by the fungicide program that was used the previous season because fungicides used after thinning may prevent the fruitlets from becoming infected as they dry out during summer. However, the relationship between spray programs, colonization of retained fruitlets by B. obtusa, and inoculum levels within trees has not been documented for most of the fungicides currently available.

Rust-induced leaf spots develop when cedar apple rust and hawthorn rust infections are killed either by subsequent application of SI fungicides or by host incompatibility reactions. SI fungicides applied within 96 hr of the start of wetting periods will eliminate rust infections before they can cause visible damage to leaves. However, if SI fungicides are applied more than 4 days after infection, leaf cells invaded by the rust fungi will die even though the rust fungus is eradicated. These killed leaf cells result in small 1-2-mm diameter leaf spots that are tan or brown, sometimes with a tiny orange rust fleck in the center of the leaf spot. Similar lesions can appear on McIntosh, Empire, Liberty, and other rust-resistant cultivars if trees are subjected to high levels of rust inoculum in the absence of fungicide protection. On the rust-resistant cultivars, fungal development is arrested by the genetic resistance of the host rather than by fungicide activity, but the resulting leaf spots are similar.

Leaf cells killed by the initial phases of rust infections provide an entry point for other less-pathogenic leaf spot pathogens such as Botryosphaeria, Alternaria, or Phomopsis species. These fungi invade cells killed or damaged by failed rust infections and then move into adjacent healthy tissue, thereby enlarging the leaf spots until the individual lesions look like frog-eye leaf spots. Rust-induced leaf spots can be distinguished from frog-eye leaf spots because the former are uniformly distributed throughout tree canopies, whereas the latter are clustered near inoculum sources. Sometimes the original orange-yellow rust lesion remains visible in the center of rust induced leaf spots, whereas frog-eye leaf spots never have such bright orange centers.

Other leaf spots resulting from fungus-fungicide interactions can develop when SI fungicides, strobilurin fungicides (Sovran, Flint, Pristine), or Topsin M are applied to leaves that contain incubating apple scab or mildew lesions. Scab spots that are arrested during the early part of the incubation period (roughly 5 to 8 days after infection) can produce "ghost lesions." Ghost lesions are indistinct pale spots 2-3 mm in diameter that develop where the scab fungus disrupted normal cell functions before the fungus was inactivated by the fungicide. The same fungicides applied just before scab lesions become visible can result in rusty, red-brown lesions that exhibit the usual size and shape of normal scab spots.

Post-infection application of the SIs and strobilurins can also cause "burned out" mildew lesions on leaves. Mildew lesions arrested by fungicides can appear on the upper leaf surface as large chlorotic lesions with indistinct margins, or on the lower leaf surface as more sharply-defined red blotches. Portions of the leaf compromised by mildew may be more susceptible to subsequent invasion by secondary pathogens that may cause necrotic spots or larger irregular areas of leaf necrosis.

Alternaria leaf spot appears as brown spots similar in size to frog-eye leaf spots. Alternaria species can be isolated from leaf spots in many orchards, especially in late summer, but Alternaria leaf spot does not cause economic damage in the northeast. In most cases, Alternaria is a secondary invader of damaged leaf tissue. In North Carolina and Virginia, however, a severe form of leaf spotting known as Alternaria blotch spreads rapidly during summer and causes premature defoliation of affected trees. Delicious is particularly susceptible. The strain of Alternaria mali that causes defoliation in the southeast may be different from the common Alternaria mali present in northeastern orchards. None of our fungicides are very effective for preventing Alternaria leaf spot or Alternaria blotch.

Causes of Early Summer Leaf Spots, Part II: Phytotoxicity by Dave Rosenberger, Plant Pathology, Highland (Source: SCAFFOLDS Fruit Journal, Geneva, NY Volume 15, No. 12)

Leaf spotting caused by phytotoxicity from pesticide sprays can be confused with leaf spotting diseases caused by fungi. Phytotoxicity may result when pesticides are applied at inappropriate rates, under unusual environmental conditions, or in untested mixtures with other products. It is impossible to list all of the potential materials or mixtures that might cause phytotoxicity because no one can evaluate all of the combinations that fruit growers mix in a spray tank, or to duplicate all of the foliage and environmental conditions that occur in orchards. Some of the more common culprits of phytotoxicity are listed below. Photos illustrating some of the leaf injuries described are included in the electronic version of this article available at http://www.nysaes.cornell.edu/ent/scaffolds/2006/.

Captan is a potent fungicide on leaf surfaces, but captan is phytotoxic when it moves inside leaves or fruit. Most growers know that captan, if applied shortly before or after an oil spray, can cause severe leaf spotting, especially on Delicious. There is no set delay that can be used for separating captan sprays and oil sprays because leaf condition at the time of application, rates of the two products, and varietal susceptibility to captan make a simple answer impossible. Captan-oil leaf spotting occurs because oil acts as an emulsifier that enables captan to diffuse into leaf cells. Even in the absence of oil, captan penetrates leaves more easily when leaves have developed under extended periods of cloudy, cool weather, because sunlight and dry conditions are required to stimulate development of the cuticle layer that prevents captan from reaching leaf cells. As might be expected, leaf spotting caused by captan-oil interactions is also more severe and the period of susceptibility is more extended when cloudy weather has limited cuticle development.

Captan-related leaf spotting can also occur when captan is tank-mixed with other products that are formulated with special wetting agents or penetrants. The captan label specifically states "The use of spreaders that cause excessive wetting is not advised."

Captan almost always causes some leaf spotting and/or shot-holing on captan-sensitive cultivars of sweet cherry and plum. The severity of the injury varies with the prior weather conditions and resulting leaf condition at the time of application. Leaf injury can be especially severe if captan is applied following cloudy, cool weather during a period of rapid shoot growth.

Over the past 20 years, I have seen cases of leaf spotting that have been traced to applications of various other pesticides, including Sevin XLR, Guthion, Lorsban, and Asana. In some cases, these products had been applied in mixtures with captan, whereas other cases involved mixtures with other pesticides. Most of these incidents did not result in serious leaf damage, and they are cited here only to illustrate that many different pesticides may cause phytotoxic leaf spotting under certain conditions.

In some cases, unusual sequences of pesticide combinations may contribute to phytotoxicity. Last week I visited an orchard with rather severe leaf spotting on mature Red Delicious trees where a tank-mix of Azinphos-methyl plus urea was applied in mid-May and was followed four days later with an application of Agrimek plus 1 gal of summer oil per acre. Adjacent Rome and Spartan trees showed very little injury, and no injury was evident in other orchard blocks that received the first spray of Azinphos-methyl plus urea but not the follow-up spray of Agrimek plus oil. I suspect that the urea softened the leaves enough to allow increased uptake of oil or of oil plus Azinphos-methyl residues when the second spray was applied 4 days after the first spray. Cool, cloudy conditions throughout mid-May was also a contributing factor.

As noted on the product label, Sovran can cause leaf spotting on some sweet cherry cultivars. I have seen this damage on several farms where cherries were growing adjacent to apple trees that had been sprayed with Sovran.

The strobilurin fungicide azoxystrobin (Abound, Quadris, Heritage) is extremely phytotoxic to McIntosh, Gala, and some other apple cultivars. Drift from azoxystrobin applied to other crops can cause a leaf spotting on McIntosh that is indistinguishable from frog-eye leaf spot. Higher concentrations (as may result from residues left in a sprayer when switching from one crop to another) will cause extensive necrosis of leaf tissue and browning or russetting of the skin on apple fruit. The large number of labeled uses for azoxystrobin raises the probability that apple growers in the northeast will experience occasional problems due to off-site drift of azoxystrobin. Azoxystrobin injury should be easy to diagnose because the leaf spotting will appear suddenly, will be evenly distributed throughout the canopy, and will occur only on McIntosh, Gala, and other Mac-related cultivars, whereas adjacent cultivars will be completely unaffected. The varietal susceptibility of apples to azoxystrobin injury is a useful distinguishing characteristic, because no other pesticide or fungal pathogen that might cause leaf spotting on apples would be similarly delimited by cultivar.

Gramoxone herbicide drifting onto apple leaves can cause a brilliant yellow leaf spot, although the spots eventually turn brown and necrotic. Injury from herbicide drift is often more prevalent on low branches, but small spray droplets can drift throughout a tree canopy, sometimes causing an even distribution of leaf spotting that one might not associate with herbicide drift. The potential for foliage injury with gramoxone can be reduced by mixing a drift inhibitor with the herbicide. Drift inhibitors reduce the production of small spray droplets that are easily carried into the tree canopy by even the slightest breeze.

Summary: In commercial orchards that receive timely fungicide applications, most early season leaf spots are attributable to injury from agrichemical sprays. Risks of encountering phytotoxicity on leaves can usually be reduced by using proper sprayer calibration, following label restrictions on pesticide mixtures, and by keeping spray mixtures as simple as possible. The latter includes avoidance of untested mixtures of pesticides, micronutrients, and plant growth regulators, and avoidance of spray adjuvants not specifically required by either pesticide labels or unique water quality or other application conditions. Special care is required in years when the spring growth flush after bloom coincides with an extended period of cloudy, cool weather, because leaves that develop under those conditions are especially susceptible to injury by pesticide applications.

Comment on Fungicide Rates in the Cornell Pest Management Guidelines

by Dave Rosenberger, Plant Pathology, Highland (Source: SCAFFOLDS Fruit Journal, Geneva, NY Volume 15, No. 12)

Fungicide rates in the Cornell Pest Management Guidelines for Tree Fruit are generally presented as rates per 100 gallons of dilute spray, although rates per acre are given for a few of the more recently registered materials. In the 1990s, we attempted to present most pesticide rates for tree fruit as rates per 100 gallons of dilute spray so that growers could easily plug those rates into their tree-row volume calculations. (The method for calculating tree row volume is explained on page 23 of the 2006 Cornell Pest Management Guidelines for Tree Fruit.) Where rates on fungicide product labels were presented as rates per acre, we traditionally divided those rates by 3 to arrive at a recommended rate per 100 gallons of dilute spray. In research trials where fungicides have been applied using a handgun, all fungicides have provided good disease control when one-third of the per-acre rate was mixed into 100 gallons of water and trees were sprayed to drip. Rates per 100 gal of dilute spray (i.e., trees sprayed to drip) should not be confused with rates per 100 gal of final mixture in an airblast sprayer tank because a concentration factor is also involved in calculating the latter.

Calculating appropriate fungicide rates gets more complicated when fungicides are applied in airblast sprayers because tree spacing, sprayer calibration, and nozzle arrangement can affect the proportion of the fungicide spray that actually lands in the tree canopy as compared to the proportion that lands in the ground cover beneath or between trees. To avoid selection for resistance, we have generally advised against using low rates of SI fungicides (Nova, Rubigan, Procure) even if trees are quite small. Thus, I would never suggest airblast applications of less than 4 oz/A of Nova, 8 fl oz/A of Rubigan, or 8 oz/A of Procure even for small apple trees. Rates for SI fungicides applied to control brown rot on stone fruits should also be kept within the rate/A range than is shown on product labels. Unfortunately, these stipulations for minimum rates per acre do not appear in the Cornell Guidelines. That will be corrected when the guidelines are revised for next year.

Determining minimum rates per acre (both for effectiveness and for resistance management) becomes complicated with newer fungicides such as Flint, Sovran, Pristine, and Scala because we have less data on effectiveness of low-rate airblast applications on small trees. Product labels designate a minimum rate/A for pome fruits for Sovran (3.2 oz/A) and Pristine (14.5 oz/A). Because these minimum rates are included on the federal labels, there is no legal option for reducing rates below those minimums. Having minimum rates/A for tree fruits specified on product labels can cause problems for growers using "smart sprayers" that automatically shut off nozzles to compensate for missing trees. A block with numerous missing trees might end up getting less than the designated minimum rate/A, and some growers have reportedly been cited by NY State DEC inspectors for such infractions. Nevertheless, when minimum rates are posted on labels, there is no doubt concerning what minimum rate should be recommended.

Based on what we currently know about selection for fungicide resistance, it would seem prudent to limit the minimum rates/A of Flint, Vangard, and Scala to the lowest rate/A that is listed on the product labels because all of these products are also subject to selection for resistance. Reducing those rates via tree-row volume calculations may work in some situations, but risks of control failures are increased. Selection for resistance will occur more rapidly if low rates of these products are used on a consistent basis.

Bottom line: With older protectant fungicides such as Captan, mancozeb fungicides, Polyram, sulfur, and copper fungicides, tree-row volume calculations can still be used to calculate effective doses for small trees. For newer fungicides, check fungicide labels for recommended rates/A and avoid using less than the minimum rate/A suggested on the product labels.

Ohio Poison Control Number

(800) 222-1222
TDD # is (614) 228-2272