scaffolds
Update on Pest Management and Crop Development
FRUIT JOURNAL

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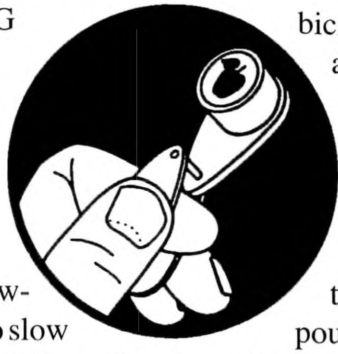
INSECTS

CAUSTIC & EFFECT

A DEBASING EXERCISE
(Art Agnello, Entomology, Geneva)



❖❖ The first measurable snowfall of spring provides us a chance to slow down in our race to get the earliest of the early season sprays applied, and a good opportunity to review some useful advice about the effect of spray water pH on pesticide activity. To review, there may be times when you don't observe the results expected from a pesticide application, even though you used the correct concentration of the recommended material and applied it in the same way that has given acceptable control at other times. Although one may suspect a bad batch of chemical or a buildup of pesticide resistance, poor results may in fact be due to alkalinity — that is, a solution with a pH higher than 7.0. A close inspection of the pesticide label will often reveal a caution against mixing the chemical with alkaline materials such as lime or lime sulfur. The reason for this is that many pesticides, particularly insecticides, undergo a chemical reaction under alkaline conditions that destroys their effectiveness. This reaction is called alkaline hydrolysis, and it can occur when the pesticide is mixed with alkaline water or other materials that cause a rise in the pH.

Hydrolysis is the splitting of a compound by water in the presence of ions. Water that is alkaline has a larger concentration of hydroxide (OH^-) ions than water that is neutral; therefore, alkaline hydrolysis increases as the pH increases. Insecticides are generally more susceptible to alkaline hydrolysis than are fungicides and herbicides, and of these, organophosphates and carbamates are more susceptible than pyrethroids. A survey of fruit-growing areas in N.Y. some years ago showed that water from as many as half of the sites in western N.Y. had pH values above 8.0. Water at this pH could cause problems for compounds that will break down in only slightly alkaline water, such as ethephon (Ethrel). Compounds that break down at a moderate rate at this pH, such as Carzol and Imidan, should be applied soon after mixing to minimize this process in the spray tank. A smaller number of sites (less than a quarter of them) had pH levels greater than 8.5. Above this level, the rate of hydrolysis is rapid enough to cause breakdown of compounds such as Carzol and Imidan if there is any delay in spraying the tank once it is mixed. In a few sites having a pH above 9.0, compounds such as Guthion and malathion, which would not break down in most situations, may have problems. It is also important to note that in any one

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site, ground water pH can vary substantially (by nearly 2 pH units) during the season.

To prevent alkaline hydrolysis, you should:

1 - Determine the pH of your spray solution; because of seasonal variability, this should be done more than once during the growing season. Measuring your spray water pH before mixing can be misleading, because the chemicals you use can raise or lower the pH of the overall spray solution. It makes more sense to take the time to run some bottle tests of your most-used spray materials after they have been mixed with your spray water. The most accurate method is by using an electronic pH meter; however, these are expensive and not very practical. Another, less accurate method uses dyes that change color in response to pH. These are available in the form of paper strips, or in solution for use in soil pH test kits. In general, the indicator is mixed with or dipped into the water, and the resulting color is compared against a standard color chart.

2 - To minimize loss of chemical effectiveness from hydrolytic breakdown in the tank, it is a good practice to make the application right after it is mixed (as quickly as allowed by the weather and other factors). If a delay occurs, a buffering agent may be added to the tank if the pH is high and the chemical you are using is susceptible to alkaline hydrolysis; these agents work by lowering the pH and resisting pH change outside of a certain range. A pH in the range of 4–6 is recommended for most pesticide sprays. Buffering agents are available from many distributors; some examples are: Buffer-X (Kalo, Inc.), Buffer P.S. (Helena), Spray-Aide (Miller), and LI 700 (Wilbur Ellis). Some sources for pH testing materials are (pH Indicator Paper): Ward's Natural Science Est., PO Box 1712, Rochester, NY 14603; VWR, PO Box 1050 Rochester, NY 14603; Fisher Scientific, PO Box 8740, Rochester, NY 14642; (Soil pH Test Kits): Agronomy Soil Test Lab, 804 Bradfield Hall, Cornell Univ., Ithaca, NY 14853.

Growers may add technical flake calcium chloride to the tank when spraying cultivars such as McIntosh, which is susceptible to storage disorders related to inadequate levels of fruit calcium. However, research done in Massachusetts indicates that, although calcium chloride does not itself affect pH, a contaminant present as a result of the manufacturing process does increase the pH of the solution; this could in turn encourage alkaline hydrolysis. There are a few pesticide materials that should not be acidified under any circumstances, owing to their phytotoxic nature at low pH. Sprays containing fixed copper fungicides (including Bordeaux mixture, copper oxide, basic copper sulfate, copper hydroxide, etc.) and lime or lime sulfur should not be acidified. But if the product label tells you to avoid alkaline materials, chances are that the spray mixture will benefit by adjusting the pH to 6.0 or lower.

For further information on water pH and pesticide effectiveness, refer to N.Y. Food & Life Sci. Bull. No. 118, "Preventing decomposition of agricultural chemicals by alkaline hydrolysis in the spray tank", by A. J. Seaman and H. Riedl, from which much of this information was adapted (available from Communications Services Bulletins, Jordan Hall, N.Y.S. Agric. Expt. Sta., Geneva, NY 14456; 315-787-2249, FAX: 315-787-2276). ❖❖

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Dept. of Entomology
NYSAES, Barton Laboratory
P.O. Box 462
Geneva, NY 14456-0462
Phone: 315-787-2341 FAX 315-787-2326
E-mail: ama4@cornell.edu

Editors: A. Agnello, D. Kain

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DISEASES

SPOT REMOVAL

MANAGEMENT OF BACTERIAL SPOT OF PEACH: PART 1

(Dave Ritchie, NC State Univ. & Phil Brannen, Univ. of Georgia)

[Edited by Bill Turechek; for complete article with pictures see the Southeast Peach Regional Newsletter Vol. 3 No. 2 at http://newsletters.caes.uga.edu/SRPN/]

The following article is taken from the Southeast Peach Regional Newsletter, in which Dave Ritchie and Phil Brannen address the concern of managing bacterial spot in the absence of Mycoshield (oxytetracycline), the standard for controlling bacterial spot. You may read that southeastern growers are anticipating a shortage of Mycoshield for the 2003 growing season, apparently because of production issues. I have spoken with representatives from Syngenta and, at this time, they have told me that this DOES NOT apply to New York. Nevertheless, this article describes several other options growers have for managing bacterial spot, particularly when disease pressure is low.

Since this article covers the management of bacterial spot over the course of the entire season, I will offer the article in two parts. Part 1 will cover early-season disease management strategies. Part 2 will focus on later season strategies and will be published in a few weeks.

Bacterial spot is a disease that affects virtually all stone fruits, but is particularly damaging to peach, nectarines, and apricots. Except for Long Island, the disease does not typically cause significant losses in New York. This last winter was colder than the past few we've had and the cold temperatures may have substantially knocked back overwintering populations. However, the bacteria can multiply very rapidly, and even limited bacterial carryover can result in severe disease pressure under favorable conditions. Frequent periods of rainfall, extended periods of high humidity, and increasing temperatures, are the conditions favorable for bacterial spot infections on newly emerging leaves this spring. There are enough bacteria in a single peach leaf with angular, water-soaked bacterial spot lesions to infect all the fruit on a single tree, assuming the bacteria could be splashed to all fruit. One objective of applying copper sprays from bud-break through shuck-split is to prevent these early (primary) infections, which provide an enormous bacterial population for fruit infection (starting at shuck split or possibly while in the bloom if frequent rainfall occurs).

There are many different formulations of copper-containing compounds. Most labels specify that copper-containing products are to be used post-bloom only in 1st and 2nd cover sprays; after that, the risk of leaf injury and defoliation can be very damaging. Use rates are not greater than 0.25 to 0.50 lb metallic copper per acre in these two cover sprays. This is approximately 1.0 lb of formulated material per acre. For post-bloom sprays with copper, probably the most used formulation in the southeast has been TENN-COP 5E at 1/4 pt (4 fl oz) per 100 gal of water. Use rate per acre is 4–6 fl oz. There is a maximum of six (6) applications per season. However, use of TENN-COP 5E can still cause injury.

The effectiveness of copper for disease control and the incidences and severity of phytotoxicity can be variable. This may relate to several fundamental characteristics of copper. First, it is the ionic form of copper that is toxic. Thus, simply having copper present does not mean that it is toxic; it must exist as "free ions". The quantity of free ions is determined by the pH of the liquid in which the copper is present. The ionic form of copper is influenced by acidity. In acidic conditions (pH <7.0), the lower the pH (more acid), the more free ions of copper will be present and the more toxic the solution for both the bacteria and the peach leaves. If the liquid is basic (pH >7.0), then few or no free ions are present; in this case, though copper is present, its toxicity to the bacteria and foliage is greatly reduced. Thus, it is important

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to have the proper pH balance, which is an important consideration for using a copper material that has been properly formulated. The pH of the spray water, and ultimately the pH on the leaf surface, can influence the quantity of copper ions and subsequent disease control and phytotoxicity.

Weather conditions at the time of application can also influence the occurrence and amount of copper injury to peach foliage. Cool (temperatures of roughly 50 to 63°F) and especially slow drying conditions can significantly increase phytotoxicity. Ideally, drying should occur within 3–5 minutes to reduce the risk of phytotoxicity. If it takes 20–30 minutes or more for the copper spray to dry, injury is likely to occur — even at very low rates. **To reduce the risk of accumulating copper on the tree to levels that could become phytotoxic, consecutive applications should NOT be applied during extended dry periods.** Sprayers should always be properly calibrated, and the recommended rate should not be exceeded. If a copper material is used after shuck-split, it is recommended that the foliage be carefully examined 2 to 3 days later (or before the next copper application); following this examination, a decision must be made as to whether another copper application can be applied without excessive injury occurring. **The bottom line for use of copper when peach foliage is present: there is no rate of copper that has adequate activity against bacterial spot and will not cause some leaf injury.**

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Stay tuned for Part 2 of this article which will discuss the efficacy of Captan tank-mixed with dodine (SYLLIT 65W), the use of zinc-containing materials, and strategies for applying Mycoshield.

SCAB AVERT!

APPLE SCAB MANAGEMENT FOR 2003: PREVENTIVE PROGRAMS ARE ESSENTIAL

(Dave Rosenberger, Plant Pathology, Highland)

❖❖ Three simple concepts should dominate planning for apple scab management in 2003:

1. Start early: apply a protectant at green-tip or at least before the first scab infection period.
2. Use a protectant spray timing even when SI's (Rubigan, Nova, Procure) or strobilurin fungicides (Sovran, Flint) are included in the schedule.
3. Sovran and Flint function best as protectant fungicides and will NOT provide consistent post-infection activity of the kind that was formerly provided by SI fungicides.

Adopting these concepts means that we must abandon some of the scab management strategies developed and promoted over the past 20 years. Those strategies included delaying the first spray in low-inoculum orchards, using post-infection timing with SI and strobilurin fungicides, and using a four-spray SI program in which scab sprays were applied at tight cluster, pink, petal fall, and first cover (MacHardy et al., 1993; Wilcox et al., 1992). All of those strategies were dependent, at least somewhat, on availability of fungicides with post-infection activity. Because of the increasing frequency of orchards with SI-resistant strains of apple scab, none of those strategies remain viable today.

One might assume that the delayed spray program, in which fall assessments are used to determine predicted ascospore dose (PAD), would still be an option because that program was developed and tested using only protectant fungicides in plots to control scab even after early season scab sprays were omitted. However, most NY growers who delayed their first sprays never calculated their PAD. NY growers have generally used subjective visual observations to determine if orchards had high in-

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oculum in the fall (i.e., if one can't see scab from the tractor seat, it's probably a clean orchard). By using SI fungicides at tight cluster and pink, growers were able to eliminate the few scab infections that might have occurred before the first fungicide spray was applied, even in orchards that had moderate levels of carry-over inoculum.

Even when growers performed fall scab counts to calculate PAD, the "insurance" provided by post-infection activity of the SI fungicides may have been more important than we initially recognized. Where SI fungicides are used in a post-infection timing, apple scab infections are sometimes suppressed and symptoms on leaves are obscured despite the fact that the fungus remains viable in the leaves (Falk at al, 1996). Infected leaves with suppressed lesions can be difficult to detect in fall assessments of scab inoculum, and they could therefore substantially increase inoculum dose in orchards that would be classified as low-inoculum orchards according to PAD counts. Higher-than-expected inoculum could translate to earlier-than-expected ascospore availability in so-called "clean" orchards. The post-infection activity of the first SI spray in delayed spray programs could have gradually become more critical for suppressing infections that occurred before the first spray if the frequency of suppressed lesions gradually increased from year to year. When SI-resistance reaches the breaking point in the field, then the delayed-spray program begins to fail, a phenomenon that is now occurring in New York State.

Sovran and Flint function primarily as protectant fungicides. Although we initially believed that they could be substituted directly for SI-plus-mancozeb sprays applied at 10-day intervals, experience has shown that Sovran and Flint will not provide 96-hr post-infection activity in many orchards. Thus, these fungicides are best viewed as protectants rather than as post-infection fungicides.

In orchards where activity of all post-infection fungicides has been compromised by resistance (i.e., orchards with resistance to SI's, benzimidazoles, and dodine), missing an early infection period can result in very high levels of fruit scab. This occurs because scab infections initiated between green-tip and tight cluster will begin producing conidia for secondary infections when trees are between full bloom and petal fall (Fig. 1). The

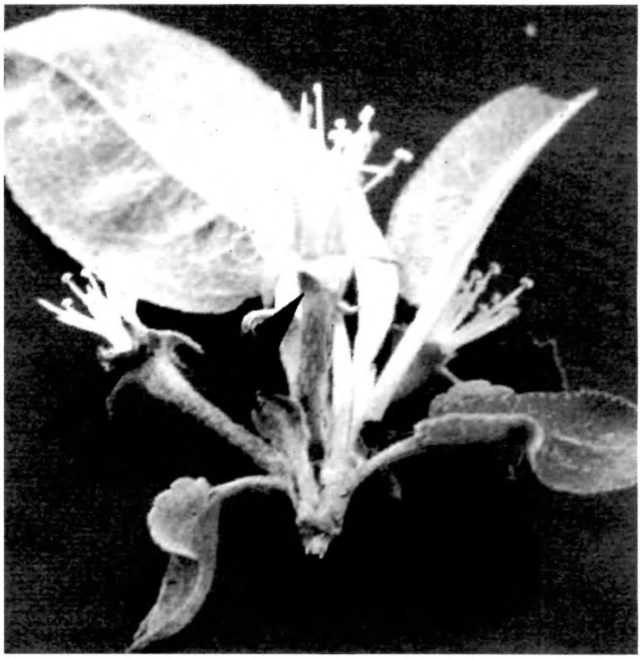

Fig. 1. Apple blossom cluster at petal fall showing scab lesions on flower receptacles (black arrows). These lesions, resulting from infection periods between green tip and half-inch green, produce conidia that can cause additional infections on fruit and leaves.

period between full bloom and first cover represents the period of peak susceptibility to apple scab because trees are producing large numbers of new terminal leaves during that time and fruitlets have not yet developed any of the resistance to scab that emerges as fruit gain more size. Just one or two green-tip infections per tree can generate so much inoculum by the time trees are in bloom that even a moderately effective protectant fungicide program (e.g., 3 lb. mancozeb/A) will not completely control secondary spread to terminal leaves and fruit. Sovran and Flint may also fail to provide adequate fruit protection when trees are exposed to high concentrations of conidial inoculum during the period shortly after bloom.

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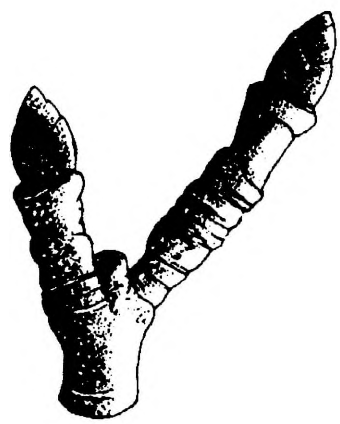
Fungicide protection for controlling scab between green-tip and tight cluster need not be expensive. Copper sprays applied at green-tip will provide at least 7 days of protection (equivalent to a mancozeb spray). Mancozeb or Polyram applied at 1 lb/100 gallons of dilute spray will provide good protection even in large trees or when applied on an alternate row basis in smaller trees during the prebloom period. It does not take a lot of fungicide to prevent scab at green-tip. However, one can hardly expect good scab control if the fungicide is still on the shelf in the spray shed when the first infection period occurs!

Bottom line: Because of fungicide resistance problems, we must revert to more conservative prebloom fungicide programs with particular emphasis on protecting trees from the very earliest infections. Even if delayed spray programs with SI fungicides have worked well in the past, we strongly advise that these programs be abandoned now, BEFORE that practice results in 25% fruit scab in the orchard❖❖



Relevant literature:

Falk, S.P., D.M. Gadoury, and R.C Seem. 1996. Impact of fenarimol on symptom expression and survival of stromata of *Venturia inaequalis*. Phytopathology 86:S121.

Mac Hardy, W.E., D.M. Gadoury, and D.A. Rosenberger. 1993. Delaying the onset of fungicide programs for control of apple scab in orchards with low potential ascospore dose of *Venturia inaequalis*. Plant Dis. 77 372–375.

Wilcox, W.F., D.I. Wasson, and J. Kovach. 1992. Development and evaluation of an integrated, reduced-spray program using sterol demethylation inhibitor fungicides for control of primary apple scab. Plant Dis. 76:669–676.

UPCOMING PEST EVENTS

	43°F	50°F
Current DD accumulations (Geneva 1/1–3/31):	78.4	34.2
(Geneva 1/1-3/31/2002):	87.1	28.6
(Geneva "Normal"):	69	29
Highland 1/1–3/31):	125.7	55.6

Coming Events:	**Ranges:**	
Green fruitworm 1st catch	36–173	9–101
Pear psylla adults active	2–121	0–49
Pear psylla 1st oviposition	25–147	1–72
Redbanded leafroller 1st catch	32–480	5–251
McIntosh at silver tip	54–137	17–58
Red Delicious at silver tip	54–117	20–59

PHENOLOGIES

Geneva:
All dormant

Highland:
Apple (McIntosh/Ginger Gold): green tip
Pear (Bartlett/Bosc): Swollen bud
Peach: Swollen bud
Plum: Dormant

PEST FOCUS

Albion:
Pear psylla eggs observed 3/28.

Highland:
Pear psylla egg numbers increasing.

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Dept. of Entomology
NYS Agricultural Exp. Sta.
Barton Laboratory
Geneva, NY 14456-0462

NOTE: Every effort has been made to provide correct, complete and up-to-date pesticide recommendations. Nevertheless, changes in pesticide regulations occur constantly, and human errors are possible. These recommendations are not a substitute for pesticide labelling. Please read the label before applying any pesticide.

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