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Crops in the southeastern part of the state are suffering from excessive rainfall and frosts earlier this year. The Southeast Purdue Ag Center near North Vernon has received over 22 inches of rain since April 1. These conditions have been very bad on strawberry yield and quality. Japanese beetle emergence is being reported in Kentucky so it won't be long before they show up in the southern part of the state. Berry growers should scout often and keep the populations in check to reduce direct losses of fruit. Grape growers should monitor populations and act if leaf damage becomes significant. Blueberry growers across the northern part of the state are expecting better than average yields this year due to good fruit bud development last year and plentiful rainfall.

A Banner Year for Apple Summer Diseases: Black rot, white rot, bitter rot, sooty blotch & flyspeck will all be on the increase as we progress into the summer months. With all the rain we've had it could be a banner year for apple rot and smut diseases as we (plant pathologists) so affectionately call them. Since I can no longer remember which fungicides are most effective for the summer rots (I can hear Rick & Peter snickering), I turn to page 27 of the '2002 Commercial Tree Fruit Spray Guide' to check out the table on effectiveness of fungicides against apple diseases. I first note that the SI fungicides (Nova, Rubigan, Procure and Bayleton) are pretty much worthless for control of most summer rot diseases. On the other hand, mancozeb and Polyram are excellent for control of summer diseases, however they can only be applied up to 77 days of harvest. After the 77-day to harvest restriction has passed captan and ziram remain our best options for summer cover sprays; they should be used at the full-labeled rate and on a tight schedule if cool, wet summer weather prevails. We also suggest tank mixing with Topsin-M or Benlate if it turns into a 'sooty blotch/fly speck year'; however, Benlate and Topsin-M should be used sparingly (no more than once a month) to avoid harm to predator mites and

lessen the possibility of the development of resistance. NOTE: Benlate, and to a lesser extent Topsin-M, are reported to cause 'scarf skin' if used within 40 days of petal fall. Scarf skin is a physiological condition in which the fruit surface develops a milky white or grayish appearance. Scarf skin has no effect on fruit quality or storage ability, but impairs the appearance and shine on a red apple.

Added help in control of sooty blotch and flyspeck is now available with the strobilurin fungicides, Flint and Sovran - See below article on Sovran & Flint for details.

Infection from summer diseases, especially sooty blotch and flyspeck, can further be reduced through IPM strategies that lower humidity and promote rapid drying. These include keeping grass mowed during summer and keeping trees well pruned. Tree spacing within and between rows should allow air movement between all trees. Removing adjacent woods or cutting breaks in hedgerows will also help improve airflow in the orchard. Of course it goes without saying (so I'll say it) that all the above suggestions are pretty much a waste of time if **good sanitation** measures are not strictly followed. (Pecknold)

Sovran & Flint for Control of Sooty Blotch & Flyspeck:

As mentioned above, we now have added help in control of sooty blotch and flyspeck with the strobilurin fungicides, Sovran and Flint. In an earlier edition of this newsletter we suggested a 1st, 3rd, and 7th cover spray program using Sovran (our study included only Sovran, not Flint). This program is based on our research in which Sovran was applied at the maximum rate of 1.6 oz per 100 gallons to Golden Delicious at first cover (May 11th), third cover (June 9th), and seventh cover (August 3rd). The 1-3-7 program provided excellent control of both fruit scab and sooty blotch and flyspeck under extremely high disease pressure for all diseases. The 3rd and 7th cover sprays were especially critical in control of sooty blotch and flyspeck. Just so there is no confusion, this program is IN ADDITION TO your regular summer fungicide cover sprays, we simply are suggesting you substitute Sovran for those fungicides you generally use in the 1st, 3rd and 7th covers. Also, a reminder...we STRONGLY suggest no more than three sprays of the strobilurins per year, and as the label states: “do not apply as the final spray of the season.” (Pecknold)

What Should You Do About Insect Control If You've Lost Your Crop? A number of growers, particularly in the northern part of the state, lost much or all of their tree fruit crops as a result of the extremely cold weather we experienced in late May. Obviously, there is nothing we can do to make up for those losses, but we need to consider where to go from here. Should growers who have lost their crop just stop spraying insecticides?

The first thing to remember is that you have already spent a lot of money to get to this point. That money is already gone, and while you may not have a crop, you still have a lot of trees that, hopefully, can produce good fruit crops in the future.

If you have completely lost your crop in some blocks for this year, then there is no point in continuing to spray insecticides that are designed to protect the fruit. Most of your regular cover sprays of Guthion or Imidan are targeted at codling moth or apple maggot, which only affect the fruit. If you have no crop, there is no need to make those applications. However, you want to keep the trees as healthy as possible, so keep a close eye on pests that might reduce the vigor of the trees, such as leafhoppers, mites, aphids, leafminers, borers, etc. Most of those pests are not controlled by the cover sprays, but need a special spray to control them. If you want to have productive trees next year, you have to keep these pests at reasonable levels this year. It is certainly understandable to want to cut back expenditures in a year when income is going

to be severely reduced, but you need to consider the long-term effects on the productivity of your orchard.

If you have a severely reduced fruit load, but not a complete loss, the situation gets a little more complex. You have to decide if the value of the remaining crop is sufficient to offset the rest of the cost of growing and harvesting that crop. If you decide that it is, then you should continue to apply regular cover sprays of insecticides as you normally would. Again, there may be a temptation to try to cut some corners by skipping sprays, but most of you know that missing a spray at the wrong time can be disastrous.

If you decide that the remaining crop is not enough to justify continuing expenditures, you have to balance saving money by eliminating additional insecticide sprays and the possibility of building up large populations of codling moths in those unsprayed apples that can infest next year's crop. These are not easy questions to answer and I would not presume to tell you how to spend your money. However, I would encourage you to consider the long-term implications of your decisions. (Foster)

Sap Beetles on Strawberries: As the strawberry harvest continues, I have received lots of calls about picnic beetles in strawberries. These insects are not difficult to control, but growers must worry about pre-harvest intervals (PHI) when using insecticides. Sevin used to be the material of choice, but for the past couple of years the PHI has been 7 days, which pretty much eliminates it as a potential control material. There are several insecticides available with shorter PHIs, but the one that probably has the most practicality for strawberry growers is Brigade, which has a 0 day PHI. Brigade is a pyrethroid insecticide that will control most beetles quite well. The Restricted-Entry Interval (REI) is 12 hours, so you should time your sprays so that at least 12 hours will pass before you or anyone else needs to re-enter the field. (Foster)

White Apple Leafhoppers: Last week I observed some pretty healthy infestation of white apple leafhoppers. Both adults and nymphs feed with their sucking mouthparts on the underside of the leaves, but the damage is easily observable as stippling on the upper leaf surface. These leafhoppers are resistant to the OP insecticides, so if you have a serious infestation, you will need to use another insecticide to control them. Provado has proven to be a very effective leafhopper control material. (Foster)

Effect of Rain on Fungicide Wash-Off: (Source: J. W. Travis, Plant Pathologist, PennState, Fruit

Times Newsletter Vol. 21, No.7) If you are using protectant fungicides you need to consider the effect of rain on wash-off of the materials. The Strobilurin (Sovran, Flint) and sterol inhibitor (Nova, Procure, Rubigan) fungicides are absorbed into the leaf and fruit tissue after application (once the residue has dried) and are not affected by rain wash-off. The protectant (Dithane, Manzate, Penncozeb, Captan, Ziram, Thiram, Polyram) fungicide residues can be affected by rain. A general rule-of-thumb for the effect of rain on washing-off protectant fungicides follows:

- Less than one inch of rain since the last spray will not significantly affect residues.
- One to two inches of rain will reduce the residue by one half. Reduce the number of days until the next spray by one half.
- Over two inches of rain since the last spray will remove most of the spray residue. Renew the fungicide deposit as soon as possible.

This rule has been used for many years to provide growers with general guidance. Newer protectant fungicide materials may be less subject to wash-off, but information is limited.

Spray Adjuvants and Foliar Fungicides: (Source: John Hartman, University of Kentucky Extension Plant Pathologist, Kentucky Fruit Facts, June 2002) Spray adjuvants are normally thought of as chemical additives, which are not pesticides, that are designed for pesticide applications primarily to enhance pest management, spray operations, or environmental safety. Adjuvants include surfactants, supplements, detergents, wetting agents, penetrants, oils, crop oils, petroleum oils, vegetable oils, phytoblends, stickers, film foamers, extenders, spreaders, spreader-stickers, deposit builders, binders, thickening agents, film makers, foams, emulsifiers, dispersants, antiflocculants, stabilizing agents, synergists, sequesterents, safeners, coupling agents, co-solvents, compatibility agents, buffering agents, humectants, antifoam agents, modifiers, and all-purpose spray adjuvants. Many of these terms are used interchangeably. For example, wetting agents and spreaders reduce surface tension of the spray on the target surface while stickers, binders, and extenders are adjuvants that allow spray residue to resist wash-off.

It is important to realize that commercial fungicide formulations often contain additives along with the active ingredient to aid in fungicide spread and retention. Some pesticides might serve as adjuvants themselves, because when tank-mixed with a fungicide, they may modify the performance

of the spray. For example, when maneb or mancozeb are added to copper sprays, bacterial spot control from copper is enhanced on tomato and pepper. However, maneb or mancozeb are not considered to be adjuvants commercially because they are used primarily as fungicides.

Not all adjuvants are alike. Growers need to consult the fungicide label and the adjuvant label to determine if their fruit disease management program will be enhanced with an adjuvant. Fruit growers are increasingly using dilute horticultural oils not only late in the dormant season but also during the summer to enhance insect management efforts. Some of these oils can affect the performance of fungicides; indeed some oils are mildly fungitoxic.

Enhancement of protectant fungicides is attained primarily by utilizing adjuvants that possess spreading (wetting) and sticking properties. The spreader helps to evenly cover as much of the leaf surface as possible with the spray and the sticker helps to maintain the spray residue on the leaf surface for periods of time. There is some uncertainty on whether or not adjuvants enhance systemic fungicide performance. Growers need to be aware that an adjuvant that increases solubility or penetration of fungicides into the plant might cause phytotoxicity. Thus, only use adjuvants recommended on the fungicide label.

Considerations for adjuvant use:

- Many chemicals should perform well by themselves when applied under normal to ideal conditions. Spray adjuvants offer a degree of performance insurance when environmental conditions or application practices are less than ideal.
- Determine what type of adjuvant, if any, is needed by reading the relevant labels.
- For many wettable powder fungicides, spray adjuvants possessing spreading and sticking agents will enhance effectiveness to some degree when used at the prescribed rate.
- Use of adjuvants with spreading or sticking agents in conjunction with flowable fungicide formulations does not appear to be as essential as with the wettable powder formulations. In fact, some flowable fungicide labels clearly discourage use of adjuvants, while others make general statements about adjuvants such as "Add a spreader-sticker spray adjuvant if needed" (usually with glossy-leaved crops).

- Be aware of differences in leaf texture (hairy vs smooth or old vs young) and their effects on adjuvants.
- Avoid using detergents for spreading agents. Most adjuvants sold on the market are non-ionic, whereas detergents are ionic and are likely to cause or enhance burns on the leaves or fruit. Also, non-ionic adjuvants are less likely to combine with minerals in hard water.
- With low-volume sprays, spreaders can enhance initial spray coverage. Sticking agents can enhance redistribution of the fungicide on plant tissues. Where small spray droplets are formed by a mist blower, spreader adjuvants may reduce “bounce”, thereby allowing a greater amount of the fungicide to remain on the plant surface.
- Silicon-containing adjuvants should not be added to spray mixes on crops where bacterial diseases are likely to be present because they enhance ingress of bacterial cells into leaves. Growers should not expect adjuvants to perform miraculous functions.
- Adjuvants are not recommended with fungicides such as Bravo Weather Stick or Sulfur.

Some examples of adjuvants (not an inclusive list):

- **R-11 Spreader Activator:** Can be used, for example, with Abound, Benlate, Copper, Mancozeb, Rally, Rovral (also has good sticking properties by itself), Topsin-M, and Ziram.
- **R-56 Spreader Sticker:** Can be used, for example, with Abound, Benlate, Captan (avoid excessive wetting or injury may result), Mancozeb, Rally, Rovral (also has good sticking properties by itself), Topsin-M, and Ziram.
- **Nufilm P or 17 Pinolene Sticker:** Tenacious stickers (i.e., Nufilm) usually are not the adjuvant of choice for systemic products. Milder stickers with good spreading properties (R-56) or spreader activators (R-11) would be more appropriate choices. Can be used, for example, with Copper, Mancozeb, and Ziram.
- **Sylgard 309 Organosilicone Spreader:** Organosilicones are extremely effective

spreading agents. At low rates they are very effective spreaders, while at higher rates they also act as penetrants. Low volume applications may benefit from the use of organosilicones by improving coverage. Can be used, for example, with Abound, Benlate, Captan (avoid excessive wetting or injury may result), Copper, Mancozeb, Rally, Rovral (also has good sticking properties by itself), Sulfur, and Topsin-M.

Spray Incompatibility: (Source John Strang University of Kentucky via email) It has recently come to our attention that there is a compatibility problem between the new insecticide Danitol and the fungicide Ziram. Both of these are labeled for apple, pear, and grape production. We suggest that you avoid mixing these in your spray tanks. We will let you know more about this as we learn more. Many thanks to Bill Jackson, Jackson’s Orchard and John Phillips, UAP Richter for bringing this to our attention.

Strawberry Renovation: Matted row strawberry plantings must be renovated after harvest to establish new crowns for next year’s crop. For best results, renovation should be started immediately after the harvest is completed to promote early runner formation. The early a runner gets set, the higher its yield potential. Renovation should be completed by mid-July in normal years. Harvest is winding down in southern areas so growers should begin renovation as soon as the last marketable berries are harvested. The following steps describe renovation of commercial strawberry fields.

1. **Weed control:** Annual broadleaf weeds can be controlled with 2,4-D amine formulations. Check the label as only a few products are labeled for use on strawberries. (e.g. Formula 40 [2,4-D alkanolamine salts plus 2,4-D Triisopropanolamine salt (4 lbs./gal.)] or Amine 4 [Dimethylamine salt of 2,4-D (3.74 lb./gal.)] at 2 to 3 pts./acre in 25-50 gallons of water applied immediately after final harvest. Be extremely careful to avoid drift when applying 2,4-D. Even though the amine formulation is not highly volatile, it can volatilize under hot, humid conditions and can cause damage to desirable plants a considerable distance from the site of application. Some damage to strawberries is also possible. Read and understand the label completely before applying 2,4-D amine. If grasses are a problem, sethoxydim (Poast) will control annual and some perennial grasses. However, do not tank mix Poast and 2,4-D. See ID 169 and the product label for rates and especially for precautions.

2. Mow the old leaves off just above the crowns 3-5 days after herbicide application. Do not mow so low as to damage the crowns.
3. Fertilize the planting. A soil test will help determine phosphorus and potassium needs, but foliar analysis is a more reliable measure of plant nutrition. For foliar analysis, sample the first fully expanded leaves following renovation. Nitrogen should be applied at 25-60 lbs./acre, depending on vigor. It is more efficient to split nitrogen applications into two or three applications at regular intervals, rather than apply it all at once. A good plan is to apply about half at renovation and half again in late August.
4. Subsoil: Where picker traffic has been heavy on wet soils, compaction may be severe. Subsoiling between rows will help break up compacted layers and provide better infiltration of water. Subsoiling may be done later in the sequence if crop residue is a problem or if soils are too wet at this time.
5. Narrow rows: Reduce the width of rows to a manageable width based on your row spacing, the aisle width desired, and the earliness of renovation. A desirable final row width to attain at the end of the season is 12-18 inches. Wider rows lead to low productivity and increased disease pressure. This means that rows can be narrowed to as little as 6 inches during renovation. Use a roto-tiller or cultivator to achieve the reduction. Since more berries are produced at row edges than in the middle, narrow rows are superior to wide rows. Narrow rows will give better sunlight penetration, better disease control, and better fruit quality.
6. Cultivate: Work in straw between rows and throw a small amount of soil over the row by cultivation. Strawberry crowns continue development at the top, and new roots are initiated above old roots on the crown, so 1/2 - 1 inches of soil on the crowns will facilitate rooting. This also helps cover straw in the row and provides a good rooting medium for the new runner plants.
7. Weed control: Pre-emergence weed control should begin immediately. Dacthal, Sinbar or Devrinol are suggested materials. See ID-169 and check the product labels carefully. Devrinol must be incorporated by irrigation, rainfall, or cultivation to be effective. Rate and timing of Sinbar application is critical. If regrowth has started at all, significant damage may result. Some varieties are more sensitive to Sinbar than others. If unsure, make a test application to a small area before treating the entire planting. Use 2 to 6 oz/acre/application and no more than 8 oz/acre/year total. Sinbar should not be used on soils with low organic matter, or on sensitive varieties like Guardian, Darrow, Tribute, Tristar and possibly Honeoye. If Sinbar gets onto strawberry leaves, irrigate to wash it off.
8. Irrigate: Water is needed for both activation of herbicides and for plant growth. Don't let the plants go into stress. Ideally the planting should receive 1 to 1-1/2 inches of water per week from either rain or irrigation.
9. Cultivate to sweep runners into the row until plant stand is sufficient. Thereafter, or in any case after September, any runner plant not yet rooted is not likely to produce fruit next year and is essentially a weed and should be removed. Coulter wheels and/or cultivators will help remove these excess plants in the aisles.
10. Adequate moisture and fertility during August and September will increase fruit bud formation and improve fruit yield for the coming year. Continue irrigation through this time period and fertilize if necessary. An additional 20-30 pounds of N per acre is suggested, depending on the vigor. (Bordelon)

IHS Summer Meeting: Just a reminder of the Indiana Hort. Society summer meeting on July 1-2 in the Lafayette area. See the last issue of FFF for an itinerary, directions and information on accommodation. We hope to see you there.

Upcoming Meetings:

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| July 1-2 | Indiana Horticultural Society Summer meeting. See details above. Contact Peter Hirst, Bruce Bordelon, or Dick Hayden 765-463-6587 |
| July 9-12 | American Society for Enology and Viticulture-Eastern Section conference. Baltimore, MD. Contact www.nysaes.cornell.edu/fst/asev . |
| July 17-19 | Workshop on developing and implementing HACCP for Juice and Cider Industries. Holiday Inn at the Pyramids, Indianapolis. For a brochure and program see http://www.foodsci.purdue.edu/outreach/haccpcider/02brochure.pdf or call Peter Hirst for a copy of the program. |
| August 5 | Purdue Wine Grape Workshop and Indiana Winegrower's Guild summer meeting. Huber Orchard and Winery, Starlight. More details will follow. Contact Bruce Bordelon or Ted Huber 812-923-9463 |

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