



INDEX

Crop Conditions
Grape Harvest Conditions
Fall Small Fruit Care
Judging Apple Maturity
Pinpoint Scab
Collar Rot
HACCP Workshop:
NAA For Control Of Preharvest Drop
Midwest Apple Improvement Association
Annual Meeting
Upcoming Meetings

FFF04-10

September 13, 2004

Crop Conditions: Apple harvest is progressing well. Gala is still being harvested in more northern parts of the state but finished in the south. Size and quality are looking good, and the season is still running 7-10 days early. Grape harvest is winding down in the southern part of the state with only the late ripening varieties remaining. In central and northern areas harvest got underway this past week. Fall bearing raspberry harvest continues. A late infestation of Japanese beetles is causing some problems. Strawberries in the region look good and the cooler temperatures and plentiful moisture should help assure a good crop for next year.

Grape Harvest Continues: Grape harvest is underway in central and northern areas. Despite the recent rains, fruit quality has been good. Unusually high bird damage has been reported by a number of growers this year. One of the most worrisome pests is the multi-colored Asian lady beetle. They were a serious problem in 2001 and 2003, but appear to be in very low numbers so far this year, as they were in 2002 season. We are trying to monitor the problem and would like to hear from any fruit grower that sees a significant build up of this insect in their plantings. If you have any questions or want to report sightings of this pest, please contact Bruce Bordelon or Rick Foster. Our contact information is at the end of this newsletter. And "thanks" in advance for your help. (Bordelon)

Fall Small Fruit Care:

Grapes-

Grapes should be encouraged to harden off for winter by avoiding nitrogen fertilizers at this time. Apply non-nitrogen fertilizers and lime, as needed based on soil and tissue test results. It is especially important to maintain

healthy leaves through fall to promote proper hardening. Downy and powdery mildews often build to epidemic levels on susceptible cultivars in fall. Both can cause defoliation and reduce winter hardiness so it's important to maintain protection against these diseases throughout the fall until leaves drop naturally.

Blueberries-

Blueberry plants should be encouraged to harden off for the winter. However, growers should continue to irrigate if dry weather persists. Fruit buds are developing now for next year's crop so it is important to avoid water stress on the plants during this time. Apply non-nitrogen fertilizers and materials for soil pH adjustment based on foliar analysis and soil tests. Apply these before fall rains begin and also before adding any supplemental mulch to plantings.

Strawberries-

Flower bud initiation occurs during late summer and fall, so maintaining good plant health into the fall is important for high yield potential next year. Dry conditions can

significantly reduce fruitfulness next year. Irrigate to provide at least 1 inch of water per week through October if rainfall is not adequate. We mentioned the importance of an application of nitrogen fertilizer in the last issue of this newsletter. If it hasn't been done yet, it's not too late. If tissue analysis shows deficiencies in magnesium or boron, early fall is a good time for foliar applications of Epsom salts (15 lb./100 gal./acre) for magnesium and Solubor (3 lb./100 gal./acre) for boron. Phytotoxicity can be a problem with these materials so read the labels. In addition to fertility, controlling leaf diseases improves the ability of the plant to carry on photosynthesis and store starch in the crowns. Check fields for infestations of leafhopper or aphids. Generally, plants can take a fair amount of feeding by these insects, but heavy infestations can be a problem.

Brambles-

Encourage hardening off of canes in summer bearing varieties of brambles by avoiding nitrogen fertilizers and supplemental watering at this time. Spent floricanes can be removed now, or later during fall, winter or early spring. Fall bearing raspberries can still benefit from irrigation in dry weather to help maintain fruit size. Apply non-nitrogen fertilizers and lime as needed based on soil and tissue test results. If Phytophthora root rot has been identified in a field, treat the affected area with Ridomil Gold EC, Alliette or phosphorous acid in September or early October. This timing is important to get the material in place in the root zone before the onset of cool wet weather in the fall. (Bordelon)

Judging apple maturity: If you want a long answer to a short question sometime, ask a post-harvest physiologist about what is the best way to assess apple maturity. All kidding aside, as an apple becomes more mature, a whole heap of complex chemical changes take place inside that apple. Generally speaking, the longer you intend to store fruit, the more important it is to accurately determine maturity. Luckily this lets most of us in Indiana off the hook to some extent, since most growers only store fruit for short periods. There is no one single test that will give you the whole apple maturity picture, but for short-term

storage perhaps this is not too important. Many growers go by calendar date to get in the right ballpark, then use the taste test to determine when to harvest. If you are going to perform just one test, probably the most useful is the starch-iodine test. Many of you will have heard of this already. As an apple ripens, starch stored in the flesh of the apple is converted to soluble sugars – this is why fruit are sweeter as they become more mature. As any nurse will tell you, iodine stains anything with starch in it black. So cutting an apple in half then dipping it in an iodine solution will give you a visual picture of how far along the conversion of starch to sugar is, since the iodine stains the starch black but not the sugar. To make up the iodine solution with easily available materials, David Bedford of University of Minnesota suggests the following: purchase a one-ounce bottle of tincture of iodine at a drugstore. Pour the entire contents into a one-pint spray bottle. Fill the bottle with water. The iodine solution is light sensitive, so wrap the bottle in aluminum foil. The solution and the fumes are poisonous. Label it and store it away from children and pets, and use it in a well-ventilated area.

Cut apples in half through the equator so that one half has the stem and the other half has the calyx. Spray the cut surface of one half with the iodine solution and wait 30-60 seconds. Compare the pattern with that on p.99 of the Tree Fruit Handbook or look under "Bulletins" on the Purdue Tree Fruit Connection site <http://www.hort.purdue.edu/fruitveg/> Although apple varieties differ slightly in their pattern of starch to sugar conversion, the 8 point scale shown in the handbook should give a reasonable guide. Fruit harvested for immediate sale should have a rating of 6-7. If left until they are an 8 where virtually all the starch has disappeared, fruit may be too soft. For storage of 1-2 months, a starch rating at harvest of 3-5 is more appropriate. Bear in mind that starch will continue to be converted to sugar following harvest, and this process still continues slowly in cool storage. (Hirst)

Pinpoint Scab: Wet weather during the apple harvest period can lead to the development of pinpoint scab and other fruit infecting diseases, such as sooty blotch and fly speck. Pinpoint

scab can infect fruit up to and during the harvest period if wet weather persists at this time, however, the symptoms of pinpoint scab may not show up until the fruit have been stored for several months. Late season apple scab can also build up on leaves after harvest, resulting in large quantities of primary scab spores the following season, even though a good spray program was followed early this year. Help prevent such problems by maintaining scab fungicides in late cover sprays; also do not stop cover sprays too early. Check the label for days-to-harvest restrictions before making the final application. (Pecknold)

Collar Rot: Late summer is a good time to inspect trees for aboveground symptoms of collar rot. Look for weak trees with premature leaf reddening (especially on Goldens); sparse, yellow foliage; and many small, highly colored fruit. Keep in mind that such symptoms are general stress symptoms that may be caused by a number of factors, such as wet feet, mouse injury, trunk decay, root rot, etc. However, trees that show the above-described symptoms *AND ALSO* have a canker at or just below ground level are likely infected with collar rot. If collar rot is suspected we advise the use of Ridomil Gold EC in the fall after harvest. Apply Ridomil as soon as possible after harvest so it will be in place before the fall rainy periods begin and possible new infections occur. Also be sure to concentrate your Ridomil treatment on surrounding healthy appearing trees, not just trees already showing symptoms of collar rot. Ridomil is best used to prevent collar rot, not cure it. NOTE: The soil-borne fungus, *Phytophthora*, which causes collar rot can be even more of a problem on stone fruits, such as cherry and peach. Don't forget to check out your stone fruits for symptoms of collar rot as described above. (Pecknold)

HACCP Workshop: As all cider makers should be aware, HACCP is now mandatory unless you are selling all your cider directly to the consumer and therefore qualify for the retail exemption. For those performing HACCP this year for the first time, you should have at least one person from your operation attend a HACCP training course. Dr. Rich Linton, in food science here at Purdue, along

with colleagues from the University of Arkansas, is organizing a Workshop "Development and Implementation of HACCP and Prerequisite Programs" from September 27-29, in West Lafayette. This 2 1/2 day program will cover all aspects of HACCP, with break out sessions focusing on fruit and vegetable juice production. Cost of the program is \$350. I have brochures and registration forms, so please contact me if you require further information. (Hirst)

NAA For Control Of Preharvest Drop: Shortly after synthetic auxins (NAA, 2,4-D, 2,4,5-TP) were discovered it was learned that these materials had activity as stop drops. Auxins interfere directly with the enzymes that create the abscission zone. Today the one remaining auxin that is registered for this use is NAA (Fruitone N).

Unlike ReTain, fruit maturity of apples treated with NAA is not delayed, and in some cases may be accelerated. For this reason, the use of NAA for control of preharvest drop has been overshadowed in recent years by that of ReTain. However, ReTain use must be planned weeks prior to harvest. Since the optimal application time for NAA is just before the onset of drop, NAA offers a "rescue" treatment, should the threat of preharvest drop be increased due to unforeseen circumstances. Examples of such situations include unavoidable delays in harvest due to bad weather or labor issues, slow red color development, and overlapping harvest schedules of varieties with similar maturity windows, such as that of Empire with Delicious.

A single spray of NAA can provide about seven days of drop control. Since it is less expensive than ReTain, it may be more cost effective to use NAA when only a few days of drop control are needed to conduct an orderly harvest. For example, when using ethephon (Ethrel, Ethepon II) to promote fruit coloring, growers should also use NAA to prevent excessive fruit drop resulting from accelerated fruit maturation. When NAA is used to control drop on ethephon-treated trees, the two may be tank-mixed if the fruit is to be harvested within seven days. If the fruit is to be left on the tree longer than seven days after the ethephon, then

NAA should be applied two to three days after the ethephon.

Other than when applying NAA with ethephon, timing an NAA stop-drop spray is a little like a game of chicken, requiring both steely nerves and a good understanding of your opponent. The label says to apply NAA when the first sound fruit begin to drop. Based on research with McIntosh, a variety that is very prone to drop, a single spray of 10-20 ppm NAA can control drop for about seven days from the date of application, but it takes two or three days to “kick in”. If NAA is applied too early, then effective drop control may wear off when it is needed most. On the other hand, if NAA is applied just a few days too late, a significant portion of the crop may be on the ground before it takes effect. Predictive degree-day models and the pattern of starch disappearance, as gauged by the starch index test can provide a general indication of whether the potential for drop is earlier or later than normal, but more direct monitoring is required for the actual timing of the sprays.

Varieties that are susceptible to preharvest drop should be monitored to determine when fruit drop is beginning. Limb tapping is one method that can be used to determine the onset of drop as fruit near maturity. Bump several scaffold limbs of three or four inches in diameter throughout the block on a daily basis. Use the palm of your hand with a short firm stroke, striking the limb at its mid-point (just like golf, this skill improves with practice and experience). If zero to one apples per limb drop on average, it’s too soon to apply NAA. If the average is about two, check again later the same day or the next morning. When several apples drop in response to limb bumping, its time to harvest within two days or apply NAA.

Rates of 10-20 ppm NAA are usually needed to be an effective stop-drop. To obtain the maximum drop control, use a split application of 10 ppm in the first spray, followed by a second spray of 10 ppm five days after the first. Split applications can provide some drop control for about 12 days from the date of the first application.

NAA must be taken up by the spur leaves in order to be effective and does not translocate very far within the tree, so it must be applied with good coverage and plenty of water. Concentrating beyond 4X (less than 75 gallons of water per acre for 300 gallon TRV trees) may diminish the effectiveness. The use of alternate row spraying is discouraged. Use of a non-ionic or organosilicone surfactant is recommended to enhance uptake.

Calcium in the spray water is detrimental to NAA efficacy. This includes both tank mixed calcium for bitter pit control as well as calcium present because of hard water. If your water source provides hard water, use of a water conditioner is advisable.

Weather conditions following the application also impact efficacy. Rewetting within two or three days of the spray application and spraying under slow drying conditions (high humidity) both will increase the uptake of NAA. Temperatures in the mid-70s produce a better response than cooler temperatures, while excessively hot weather immediately following an NAA spray may result in accelerated ripening.

When used as a stop-drop, NAA may advance ripening, especially at the maximum label rate of 20 ppm. The primary impact of this advance in maturity is reduced storage potential of the fruit, particularly in the loss of firmness. This effect is not consistent from year to year, and may be attributed to high temperatures, as mentioned previously. Research by Rich Marini and Ross Byers in Virginia showed that the deleterious effects of NAA sprays on fruit maturity and fruit softening were minimized in Red Delicious by making repeated applications of 5 ppm NAA at four weekly intervals prior to harvest. This “pre-loading” technique has recently been included as an application option in the Fruitone N label. I have not repeated this research on Delicious, but using NAA pre-loading on McIntosh resulted in more advanced ripening, accelerated drop, and fruit softening, not less! I do not recommend NAA pre-loading for McIntosh and other early season, high-ethylene

varieties. I suggest that growers use caution when trying pre-loading on high ethylene varieties other than Delicious until more is known about how different varieties will respond.

The question then arises whether NAA-treated fruit has potential for CA storage or treatment with SmartFresh (1-MCP). Perhaps the simplest way to answer the question with regard to CA is to remember the adage “garbage in, garbage out”. If the fruit was left on the tree to the bitter end of the drop control, is measurably softer than previously harvested fruit, and has elevated starch index values, then it should be marketed in the short term. On the other hand, if the fruit was harvested within a week after treatment and has appropriate firmness and starch values for CA storage for the variety, there is little reason to expect it to perform differently than similar fruit that received no NAA.

The question of whether NAA stop-drop sprays have advanced fruit maturity may be most critical when using SmartFresh on McIntosh, where the maturity of the fruit is an overwhelming influence on whether the fruit will respond to 1-MCP. Quoting Dr. Chris Watkins in the Proceedings of the 2003 Cornell Apple Storage Workshop: “We do not have any data yet, but we assume that induced ethylene production that results from use of NAA will deleteriously affect fruit responses to 1-MCP. If you use stickers [NAA stop-drop], your storage operator should be informed.”

Finally, a comment about use of NAA on trees previously treated with ReTain. The use of both stop-drops at the respective correct times results in drop control that is superior to that obtained by using either one alone. Fruit treated in this manner, then left for an extended time on the tree, often have limited storage potential (see above); however, this combination can be an effective way of getting the ultimate in drop control. This drop control comes at a high price and should therefore only be used on high value fruit with little or no storage period, such as for a few rows of trees held for late picking in PYO blocks. (Dr. Jim Schupp, Penn. State University)

Midwest Apple Improvement Association Annual Meeting: Discussions of apple breeding and a tour of the Kazah seedling orchard will take place at the 2004 annual meeting of the MAIA, on Saturday November 13 at the Dawes Arboretum in Ohio. MAIA is a group made up primarily of growers, whose mission is “to develop economically and culturally viable apple cultivars for the Midwest”. Speakers will address topics related to fruit breeding, with an update and discussion of the MAIA program. More information and directions to the Dawes Arboretum are available at the MAIA website at <http://www.hort.purdue.edu/newcrop/maia/> (Hirst)

Upcoming Meetings:

Sept. 16 Commercial fruit and vegetable twilight meeting. Meigs Farm, Throckmorton Purdue Ag Center, Lafayette. Tours will highlight pumpkin, apple and grape research. Meet at 5.00 pm, tour plots, then have dinner. There will be informal presentations by Purdue Specialists. Directions: from Lafayette take US 231 S to CR 800S and turn left (east). Go for one mile and turn right (south) on CR 100 E. The Farm is approx 0.5 mile on the left. For more information contact Liz Maynard (219-785-5673), Peter Hirst, (765-494-1323), or Bruce Bordelon (765-494-8212).

Sept. 18 Throckmorton Purdue Ag Center Field Day at the Meigs farm. To showcase research activities to the local farmers, the public, and anyone else interested. Tours start at 10.00 am and the last tour leaves at 11.30 am. For more information contact Jay Young, 765-538-3422.

Sept. 27-29 HACCP training course. West Lafayette, IN. Cost \$350. Contact Peter Hirst (765-494-1323) or Richard Linton (765-494-6481), for brochures and registration forms.

Nov. 13 MAIA annual meeting-see article on this page.

Jan. 24-26, 2005 Indiana Horticultural Congress, Adams Mark Hotel, airport, Indianapolis.

Department of Horticulture &
Landscape Architecture
Purdue University
625 Agriculture Mall Drive
West Lafayette, IN 47907-1165

Bruce Bordelon
Dept. of Horticulture &
Landscape Architecture
Purdue University
625 Agriculture Mall Drive
West Lafayette, IN 47907-2010
765/494-1301
e-mail: bordelon@hort.purdue.edu

Peter Hirst
Dept. of Horticulture &
Landscape Architecture
Purdue University
625 Agriculture Mall Drive
West Lafayette, IN 47907-2010
765/494-1323
e-mail: hirst@purdue.edu

Paul Pecknold
Dept. of Botany & Plant Path.
Purdue University
915 West State Street
West Lafayette, IN 47907-1155
765/494-4628
e-mail: pecknold@purdue.edu

Rick Foster
Dept. of Entomology
Purdue University
901 W. State St.
West Lafayette, IN 47907-1158
765/494-9572
e-mail: rick_foster@entm.purdue.edu

Disclaimer: Reference to products in this publication is not an endorsement to the exclusion of others that may be similar. Any person using products listed in this newsletter assumes full responsibility for their use in accordance with current label directions of the manufacturer.

It is the policy of the Purdue University School of Agriculture that all persons shall have equal opportunity and access to the programs and facilities without regard to race, color, sex, religion, national origin, age, marital status, parental status, sexual orientation, or disability. Purdue University is an Affirmative Action employer. This material may be available in alternative formats.