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Crop Conditions: Harvesting is well underway. Peaches are just finishing up in the lower part of the state with bumper crops this year. Apples are also being harvested, with early apples in the north and Gala just finishing in more southern areas. Grape harvest is underway in most areas of the state.

***A reminder on apple cider regulations*:** Under federal law, all juice (including cider) producers under the regulation must have an HACCP system in place by the effective date of the regulation. Some frequently asked questions are:

What is the effective date of the regulation? The effective date for the juice HACCP regulation depends on the size of the business. I think all cider makers in Indiana fall under the federal definition of "very small businesses". To fit this definition, any ONE of the following must apply to your operation:

- You have annual sales of less than $500,000
- Annual sales are greater than $500,000 but food sales are less than $50,000
- Employ less than 100 full-time equivalent employees and sell fewer than 100,000 units of juice

As a "very small business", you have until January 20, 2004 to comply with the law. If you exceed the requirements for a "very small business" and are a "small business" then the effective date was January 21, 2003.

Who must comply with the regulation? The main exemption from the regulation is in the operation of retail establishments. A "retail establishment" includes establishments in which juice is produced and sold directly to consumers e.g., in stores, from roadside stands, at farmers' markets and in food service operations, such as juice bars. This does not included sales through supermarkets unless the cider maker owns the supermarket.

What about warning labels? The HACCP regulation supercedes the warning label rule, so once you are following the HACCP regulation, then you no longer have to use warning labels. However, if you are using the retail exemption and not under the HACCP rule, then you need to continue using the warning label. You have all been doing warning labels for a few years now, so know the drill, but remember that they need to be incorporated into the principal display panel on the cider jug.

Hopefully those cider makers under HACCP have participated in the HACCP workshops that Rich Linton and Les Bourquin have conducted over the last 2 years, as well as the presentations Les gave at Hort Congress last year, and therefore, are well up to speed on HACCP. (Hirst).

Are your trees legal? A recent story in "The Fruit Growers News" highlighted a recent settlement of a lawsuit involving patent and trademark infringement of protected trees. According to the article, the nursery industry has established the Nursery Licensing Association (NLA) to educate the industry about patent and trademark rights, and to protect those rights and prevent trees being propagated illegally. If you are propagating your own trees of patented varieties, you are legally bound to pay the royalty to the patent owner for those trees that you propagate. The formation of the NLA should serve as a warning to those people propagating their own trees to keep it legal. (Hirst)

Getting the most from the "old" stop-drop: NAA: The use of NAA (Fruitone N, K-Salt Fruit Fix) 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. With the effective application time so close to 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 McIntosh with Macoun, or Empire with Delicious. While it is not the purpose of this article either to promote or condemn the use of ethephon (Ethrel, Ethephon II) to promote fruit coloring, those growers using one of these products also need to use NAA to prevent excessive fruit drop resulting from accelerated fruit maturation. The following tips and reminders are offered to help growers brush up on using NAA to best effect.

Timing NAA stop-drop sprays 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. A single spray of 10—20 ppm NAA offers drop control for about seven days from the date of application, but it takes two or three days to "kick in". Apply NAA three days too early and the window of effective drop control is about halved. Apply three days too late and perhaps a quarter of the crop will be on the ground before the NAA takes effect!

Stem loosening coincides with the climacteric rise in ethylene that signals fruit ripening. Unlike ReTain, which delays drop by delaying fruit maturation, NAA stops drop by delaying stem loosening. Predictive degree-day models and the pattern of starch disappearance measured by the starch index test do not provide a precise guide to timing NAA stop-drop sprays. These techniques can indicate whether the threat of drop is earlier or later than normal, but more direct monitoring is required for the actual timing of the sprays.

Varieties such as McIntosh that are highly susceptible to preharvest drop require careful monitoring to determine when fruit drop is beginning. Limb tapping should 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.

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 three days after the ethephon.

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 drop control for about 12 days from the date of the first application.

Research 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 this technique on McIntosh resulted in more advanced ripening and 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 later varieties. Use it only on a trial basis until more is known about how varieties other than Delicious grown in different climates will respond.

As with thinning sprays, stop-drop sprays of NAA work best when 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. Use a non-ionic or organosilicone surfactant to enhance uptake.

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 matu-

rity is reduced storage potential of the fruit, particularly in the loss of firmness. This effect is not consistent from year to year or block to block. 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 good firmness and starch values for CA storage for the variety (e.g., McIntosh with 14 lb pressure and a Cornell chart starch index rating of 6 or lower), 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 Apple Storage Workshop: "We do not have any data yet, but we assume that induced ethylene production that results from use of NAA will deleterious[ly] 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. (by Dr. Jim Schupp, Cornell University, Scaffold Fruit Journal).

Grape Harvest: Grape harvest is underway in most areas. The heavy rains over the Labor Day weekend have caused some significant cracking and fruit rot problems on some varieties in some areas. Those varieties that were close to harvest have the worst damage. About the only solution is to harvest as soon as possible after the damage if the fruit is ripe enough. This will help avoid damage from wasps, bees, and fruit flies, and subsequent spoilage by various microorganisms. Quickly processing the fruit can minimize oxidation problems. Wine makers may want to be sure to maintain adequate sulfur dioxide levels after crush. Varieties that are holding well should benefit from the cooler temperatures. Continue to monitor fruit chemistry to determine optimum ripeness. (Bordelon)

***Strawberry Fruit Bud Development*:** Now is the time to fertilize strawberry fields with 20 to 50 pounds of nitrogen. Applications in late August to September stimulate flower bud initiation during the fall months. Rates depend upon amount of nitrogen supplied at renovation and plant vigor. New fields with high vigor may not need additional

nitrogen now, but most older fields should benefit. Irrigation during this time is also extremely important, if rainfall has not been sufficient. We suggest about 1 inch per week. (Bordelon)

Fall Herbicide Applications for Strawberries: A number of herbicides can be used on strawberries during late summer and fall to prevent weed germination, kill emerged weeds, and provide residue control until the following spring. The key set of weeds you need to control during this period are fall germinating winter annuals such as chickweed and shepherdspurse. You may also need to control wheat, oats, or rye that come from seed in the straw mulch that you apply for winter protection.

Devrinol (napropamide) is a preemergence herbicide. It can inhibit rooting of daughter plants so it should be applied after early forming daughter plants have rooted. Late forming (after late August) daughter plants do not contribute to yield and Devrinol can be applied before these plants root. Devrinol must be applied before winter annuals and small grains emerge. Devrinol provides excellent control of small grains and some winter annuals such as chickweed. Devrinol must be moved into the soil by cultivation or water after application.

Dacthal (DCPA) is a preemergent herbicide that can be used in new plantings or immediately after renovation. It provides good control of many grasses and some broadleafs such as purslane and lambs quarter. Like Devrinol, it must be applied before weeds emerge.

Sinbar (terbacil) is primarily a preemergent herbicide but it has some post-emergence activity against small susceptible weeds. Fall applications of Sinbar should only be applied after the strawberries are completely dominant. If Sinbar is applied to actively growing strawberries, injury can occur. Cultivars differ in tolerance to Sinbar. In general, less vigorous cultivars have greater injury. Applications are most effective when applied to the soil and activated by rainfall or irrigation. Sinbar provides excellent control of many winter annual weeds. Fall applications of both Devrinol and Sinbar will persist to the following spring.

Poast (sethoxydim) is a post-emergent, grass active herbicide. The grasses must be actively growing. Thus, Poast should be applied in late summer or early fall before plants become dormant. Also make sure that you scout your fields to determine which grass weeds are present. Summer annual grasses, such as foxtails and crabgrass, will be killed by fall frosts, and do not require Poast applications for control. Poast is more effective against annual than perennial grasses. Poast can be used in the fall to suppress perennial grasses such as quackgrass; control early emerging small grains, and kill winter annual grasses such as wild oats and downy brome.

A systemic, post-emergence broadleaf herbicide, 2,4-D, can be applied when strawberries are dormant to control some winter annuals. 2,4-D provides good control of many mustards and shepherdspurse, but is not very effective against chickweed. The herbicide should be applied to actively growing weeds. Be careful of 2,4-D drift causing injury to non-target plants.

Gramoxone Extra (paraquat) can be applied as a directed spray between strawberry rows, using shields to prevent contact with strawberry plants. Gramoxone is a nonselective herbicide, so it will kill or severely injure strawberries it contacts. Gramoxone is a restricted use pesticide and is extremely toxic to animals including humans. It provides excellent control of annual grass and broadleaf weeds. Gramoxone does not extensively translocate in plants so it does not control perennial weeds. Weeds should be actively growing when Gramoxone is applied.

In conclusion, there are a number of herbicide options that can be used on strawberries during the fall. Select herbicides that will control problem winter annuals and small grains. Herbicides such as Devrinol and Sinbar can provide residue weed control until spring. (Bordelon)

Perennial Weed Control: Late summer and fall is an excellent time to control troublesome perennial weeds by spot spraying with suitable herbicides. Perennial weeds tend to become established within the rows in fruit plantings because they are not fully controlled by the normal weed management program. Once established, these plants can be difficult to eliminate. Glyphosate (e.g. Roundup) is a particularly good herbicide for controlling perennial weeds in the fall. As perennial plants begin to slow growth and harden off for winter, carbohydrates are translocated to the roots for storage. Fall applied systemic herbicides will be similarly transported to the root system which leads to excellent control. Fall application works equally well on hard to control herbaceous perennial weeds such as thistle, dock, smartweed, and morning glory, as well as woody perennials such as poison ivy, Virginia creeper, multiflora rose, mulberry, blackberry and so on. The plants do not have to be actively growing for good results but should have sufficient active leaf area to take up the herbicide. Check the manufacturer's product label for specific recommendations. NOTE: Desirable crop plants are also translocating carbohydrates to the roots and can be severely injured by fall applied systemic herbicides. Be EXTREMELY CAREFUL when spot treating to avoid any contact with desirable plants. (Bordelon)

Soil Management and Cover Crops: Fall is a good time for cultivating fields, adding lime and fertilizer, and planting cover crops in fruit plantings. Cover crops can be an integral part of the orchard floor management plan. If you plan on establishing new orchards or vineyards next year, you should consider a pre-plant soil management program which includes deep subsoiling, soil pH adjustment, addition of fertilizer (especially P and K) according to soil test recommendations, and planting cover crops. Cover cropping a site the year before planting is an excellent way to increase organic matter and reduce weed problems. Several cover crops are available for fall planting, and mid to late September is the best time to plant in most areas of the state. A favorite among growers is winter rye because it performs very well under Indiana conditions. Rye not only adds large amounts of organic matter to the soil, but also suppresses the development of many annual and perennial weeds. There are several other cover crops and the choice depends on the grower's specific preferences and needs. (Bordelon)

Grape and Wine Fall Workshop: We have scheduled a fall workshop Sept. 15, for grape growers and wine makers that will focus on vineyard sampling and fruit processing. The workshop will be held on the Purdue campus in West Lafayette. For more information visit our web site at http://www.indianawines.org and click on Events or call Jill Blume at 765-494-1749. Registration is required and space is limited.

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.

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.

Upcoming meetings:

Jan. 26-28, 2004	Indiana Horticultural Congress. Put the date on your calendar and plan to attend.
Feb. 2-8, 2004	North America Farmers' Direct Marketing Association annual conference, "A bounty of golden ideas". Sacramento, Calif. For more information, http://www.nafdma.com/

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