

KTFREC News – Electronic Fruit Newsletter

October 5, 2010

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Upcoming Events:

November 8-10, 2010: Southeast Strawberry Expo, at the Wyndham Hotel in Virginia Beach, VA. Workshops and farm tour on Nov. 8, educational sessions and trade show on Nov. 9-10. For more information, visit www.ncstrawberry.com or contact the NC Strawberry Association, 1138 Rock Rest Rd., Pittsboro, NC 27312, 919-542-4037, info@ncstrawberry.com. Exhibitor inquiries welcome. We are excited about meeting in Virginia Beach, the first time the Expo has been held outside of North Carolina.

December 20, 2010: Irrigation of Specialty Crops, Plant Water Relations and Cropping Efficiency, Penn State Extension In-Depth Fruit School, 8:30 a.m. - 3:30 p.m., Penn State Fruit Research and Extension Center (FREC), 290 University Dr., Biglerville, PA, Space Limited—Please Register Early. Contact Penn State Cooperative Extension—Adams County, 670 Old Harrisburg Rd, Ste 204, Gettysburg, PA 17325 Phone: 717-334-6271; Fax: 717-334-0166 for more information and a registration form (or see the September Fruit Times Newsletter). Registration deadline is December 8.

Disease Management “To Do” List – 3 things to think about and, maybe, do...

Apple scab urea application: A spray of 5% solution of urea (46-0-0) in water may be applied as late as green tip (2011) to apple leaves on the ground if this was not done in the autumn (42 lb. urea in 100 gal. water, applied at 100 gallons/acre). The nitrogen will hasten leaf litter decomposition and will result in reduced ascospore production by 60 to 90%, thereby changing high-inoculum orchards into low-inoculum orchards. Moving leaves from under the trees to the row middles with a leaf blower and then shredding them with a flail mower is a good alternative to the urea spray for small acreages on level land (mud, rocks, and weeds can turn this into a futile exercise). If you had enough scab that you easily noticed it at the end of the 2010 growing season, one of these inoculum reduction measures should be implemented. If the urea spray is used, remember to reduce other nitrogen applications accordingly. I would estimate that about half of the urea nitrogen will land in the sodded row middles, and thus will not be available to the trees.

Peach leaf curl control that is virtually 100% effective can be achieved by a single fungicide application during the dormant season. A dilute application should be made under calm conditions any time after most (no less than 90%) of the leaves have fallen and before hard freezing weather sets in. Thorough coverage of each bud is essential for controlling the leaf curl fungus. If leaf curl was severe in your peach or nectarine blocks in this year, make fungicide applications this fall and next spring before bud swell. In orchard blocks that have been intensively scouted and where the grower knows with certainty that the disease is entirely absent from the block for a period of two or more years, this spray can be omitted

until the disease begins to recur. Treatments with copper compounds for leaf curl are recommended where **bacterial spot** has been a problem. See the *2010 Spray Bulletin* for fungicides and rates of application. We like to try to do this in the fall because, sometimes, spring weather is unfavorable for spraying or there are too many other things happening all at once!

Bacterial Canker on Cherries: (I'm reprinting this from the October 2009 *Orchard Monitor* because of the many new sweet cherry plantings that have established to meet local demand for sweet cherries.) Bacterial canker is different from bacterial spot (which is caused by *Xanthomonas arboricola* pv. *pruni* and is a serious disease of peach, nectarine, apricot, almond, and plum). For a thorough description of bacterial spot and its management, please refer to the October 13, 2008, issue of the *Orchard Monitor*.

Bacterial canker is a serious disease of sweet cherry and, to a lesser extent, sour cherry and other stone fruits, in the Eastern United States. It is caused by the bacteria *Pseudomonas syringae* pv. *syringae* and *Pseudomonas syringae* pv. *morsprunorum*. The pathogens cause three different disease forms: the typical canker that affects trunks, branches and twigs, a dead bud form that kills buds in the spring, and a leaf spot form. The bacteria overwinter in bark tissue at canker margins, in apparently healthy buds and/or systemically in the vascular system. In the spring, particularly when conditions are cool and wet, bacteria multiply and emerge from their overwintering sites and are disseminated throughout the orchard by wind and rain. Natural plant openings (i.e., stomata, nectaries, and lenticels) or wounds provide entry sites for bacteria. In addition, the bacteria enter tree limbs and the trunk through pruning wounds and/or sites of freeze injury in autumn and early winter. The bloom period is the time when the bacteria are most active; rapid multiplication and spreading is facilitated by cool, wet weather and rain. The level of infection is greatly influenced by the occurrence of frost damage or extended periods of cool, rainy weather. Since infections are so weather dependent, the severity of this disease varies greatly from year to year.

'Royal Ann', 'Bing', 'Lambert', and 'Van' are very susceptible to bacterial canker. 'Corum', 'Sam', and 'Sue' appear to have sufficient tolerance to canker to be grown commercially without serious tree loss. Mazzard seedlings, particularly the F12-1, seem to be the most resistant rootstocks. Size controlling rootstocks may also have useful resistance but field performance trials are lacking. Trees on Gisela rootstock have exhibited increased susceptibility.

Bacterial canker is difficult to control. The cultural practices listed should be employed (particularly 1 through 10), as they will increase the likelihood that copper applications (described later) will be effective.

1. The most effective control known is to use the resistant F12-1 Mazzard rootstock. Use only scions from virus-tested (and found to be free of all known viruses), canker-free trees. Make buds or grafts at least 12 to 15 inches away from the trunk. If F12-1 rootstock is unavailable, Mazzard seedling rootstock is the next best choice.
2. Do not interplant new trees with older trees that may be a source of the bacteria.
3. Locate orchard in an area less likely to be affected by frost. If planting in the spring, establish orchards after the risk of frost subsides. It is common in more northern locations to paint trunks white to help reduce the risk of injury due to rapid temperature fluctuations in the bark.

4. Test soil for ring nematodes before planting. Also test for incorrect pH and other physical characteristics that can be corrected prior to planting.
5. Provide optimal soil conditions for growing cherries including attention to pH and nutrition. Keep irrigation off above ground parts for the first few years. Application of excess nitrogen, especially late in the growing season, will promote late season growth that is susceptible to low temperature injury in early winter, followed by bacterial infection.
6. Control weeds. They often support large populations of *P. syringae*, especially grasses. Clover and vetch ground covers support lower populations.
7. When training young sweet cherries, use clothespins to spread the main scaffolds. Steep crotch angles are more susceptible to winter injury that often leads to damaged tissue that can provide the bacteria a means to enter the tree.
8. Pruning is best done prior to the cool, wet periods of the spring, when the trees are still fully dormant and temperatures are still generally below freezing. If you have to prune later, avoid pruning sweet cherry trees when cool, wet weather is in the near forecast. A few days of warm, dry weather can allow those pruning cuts to dry off and reduce their susceptibility, although it won't prevent all infections from occurring. Summer pruning should be done after harvest, when weather is dry.
9. Completely remove infected trees or branches girdled and killed by cankers. Do not allow trees to regrow from roots or trunks left after a major trunk canker has been removed.
10. In summer, small cankers may be cut out using the following method. Cut away bark above and around the edges of the infected area. Use sharp tools, and leave wound margins smooth and neat. Wounds may be left uncovered, but avoid overhead sprinkler irrigation. Sterilize all pruning tools between cuts with 10% Clorox (bleach) solution or 70% ethyl alcohol.
11. Caulerizing cankers using a hand-held propane burner has been used with some success in New Zealand.
12. Scoring tree trunks has been practiced by Willamette Valley (Oregon) growers for several years. Grower testimonials point to some benefits but there has been no research on this possible efficacy of the practice. A sharp pocket knife is used to make a vertical shallow cut in the tree trunk. The resulting wound tissue that develops is supposed to resist canker development and prevent trunk girdling. Knives should be disinfected between trees.

Copper has been widely proposed as offering some level of control of this disease; however, the use of copper on sweet cherries to aid in the control of bacterial canker is a controversial subject. Some growers swear that it helps and others don't bother applying it, as they see little value in it. Generally, copper-based products have not worked well under conditions favorable for disease development and where pathogen inoculum is high. The likelihood that copper will help at your location will depend on inoculum levels, disease history, cultivars and rootstocks, and weather conditions.

Sweet cherries on Gisela rootstocks have demonstrated an increased susceptibility to bacterial canker, so are good candidate orchards to receive copper treatment. One and two year old sweet cherry trees that have been partially debudded to aid in proper limb placement should be treated with copper immediately after debudding takes place – if debudded before bud opening. Also, consider treating orchards with a past history of bacterial canker problems.

There are some differing ideas about how to deploy copper for bacterial canker control. Having worked in Ontario for several years, I am partial to that approach (see below) but have included some other ideas, as well.

Control with Copper in Michigan: When using copper to help control bacterial canker, full rate applications of copper should be applied during the dormant to early bud swell periods only. Researchers in some regions have shown success with applications made in the fall at 75% leaf drop. Most applications in Michigan are applied in the spring prior to the bud burst stage. Rates are typically cut in half if the applications are made beyond the mid to late swollen bud stage. Once bud burst occurs and they begin to expose the tender, green tissue inside, then copper may cause serious phytotoxicity particularly if warmer temperatures prevail. However, if copper is applied between bud burst and bloom, follow labeled rates for blossom blight (generally 25-35% of the dormant rate). Again, it should be stressed that significant phytotoxicity may occur when copper is applied to green tissue on sweet cherries. Copper applications later in the growing season are not recommended, as the bacteria do not thrive in the warmer weather.

Control with Copper in Oregon: Traditional recommendations encourage the first spray to occur in October before fall rains, again in early January. Growers may wish to consider adjusting the timing of sprays to coincide with leaf fall. Thorough coverage is needed. Protect both orchard and nursery trees (sweet cherry, prune, and plum). Some growers use low rates of copper-based products during bud break to reduce symptoms of dead bud. Copper-based products have not worked well under conditions favorable for disease development. Bacteria resistant to copper products have been detected throughout our cherry growing regions, which compromises chemical control tactics. Heavy use of copper products is not recommended as concentrations in the soil can build up to toxic levels after several decades of use.

Control with Copper in Ontario: (Note: this program uses Bordeaux mixture instead of fixed copper because Bordeaux (which is copper plus lime) is less likely to injure foliage. The addition of vegetable oil further reduces the potential phytotoxicity of the Bordeaux mixture. I don't see any reason why you can't switch to fixed copper without oil after the trees are fully dormant). Cankers get started mainly in the autumn after most of the leaves have fallen and the trees have begun dormancy. The bacteria that start these cankers are found on the surfaces of mature leaves and other green tissues, and do not come from existing cankers. The only effective way to control the disease is to reduce the number of bacteria before the trees enter their susceptible period. Successful control has been obtained with repeated sprays of Bordeaux mixture.

Bordeaux mixture may be sprayed on cherry trees two or three weeks earlier than 75% leaf fall if a vegetable oil safener and spreader are added to the tank mix. An oil such as canola (rape seed) oil, or cotton seed oil, used at the rate of 7 L per 1000 L of mix (use a multiplication factor of 0.007 to calculate the amount of vegetable oil in your required gallons; for example, for a 500-gallon tank, $500 \times 0.007 = 3.5$ gallons of vegetable oil), has been shown to reduce early leaf fall caused by Bordeaux mixture alone. The advantage of starting the biweekly sprays earlier than is recommended with straight Bordeaux mixture is that bacterial populations can be reduced and held at low levels prior to the onset of

dormancy which is the period of maximum susceptibility to the bacterium. It is not necessary to use the oil after the leaves have fallen off the trees.

Ontario growers use a 5-spray program with Bordeaux formulated as shown (copper sulfate/spray lime/gallons of water): First spray - 3rd week in September (3-5-100); Second spray - 14 days later (3-5-100); Third spray - 14 days later (5-7.5-100); Fourth spray - 14 days later (8-12.5-100); Spring spray - before bud swell (5-7.5-100).

Potential copper choices: (Note: verify all organic recommendations with your certifier prior to application).

- Bordeaux 12-12-100 (rate suggested in Oregon).
- Champ Formula 2 at 1 gal/A. Champion WP can be used for organic production. 24-hr reentry.
- C-O-C-S WDG at 8 to 12 lb/A plus dormant spray oil. 24-hr reentry.
- Copper-Count-N at 6 quarts/100 gal water. Use only 2 to 3 quarts/100 gal water during bloom. 12-hr reentry.
- Cuprofix Ultra 40 Dispers at 5 to 8 lb/A. 12-hr reentry.
- Kocide 3000 at 3.5 to 7 lb/A plus 1 pint superior-type oil/100 gal water. 24-hr reentry.
- Nordox 75 at 5 to 13 lb/A. 12-hr reentry.
- Nu-Cop 50 DF at 8 to 12 lb/A. Nu-Cop WP can be used for organic production. 24-hr reentry.

Suggestions for Mixing Bordeaux: Bordeaux should be used immediately after mixing. The standard tank-mix is best prepared as follows:

1. Start water flowing into the spray tank;
2. When the tank is about one-third full and the mechanical agitator is in operation, start washing the powdered copper sulfate into the tank through a screen with water from the supply hose. A wooden spoon is helpful in working the powder through the screen;
3. By the time the tank is half to two-thirds full, all of the copper sulfate should be in the tank. Next, add the lime (hydrated or builders') through the screen, using the water-supply hose. The lime should be dilute as possible before it mixes with the copper sulfate; therefore, presoaking the lime to make a slurry is preferred to washing the powdered lime directly through the screen;
4. Better leaf coverage can be achieved if a non-ionic (neutral) spreader is added to the tank mix. The spreader may be used at the rate of ½ pint per 100 gal. of mix (probably is not necessary if you are using vegetable oil also); add the oil last;
5. Keep the agitator running continuously and apply the Bordeaux mixture immediately. Do not allow the mixture to settle out.

(Information contained in this article was gleaned from articles by Dr. George W. Sundin, Michigan State University; Dr. William Turechek, USDA-ARS; Dr. Jay Pscheidt, Oregon State University, and Dr. Wayne Allen, Agriculture Canada). Additional reference: Kennelly, M. M., Cazorla, F. M., de Vicente, A., Ramos, C. and Sundin, G. W. 2007. *Pseudomonas syringae* Diseases of Fruit Trees: Progress Toward Understanding and Control. Plant Disease 91:4-17.)

Bitter pit on Honeycrisp. In 2010 at KTFREC, Honeycrisp apples were treated with 35.0, 50.0, and 65.0 lbs per acre per season using Briner's calcium chloride (95% CaCl₂). Each plot received 5.0 lb per acre on

a biweekly basis in cover spray applications beginning at first cover. The medium and high rate plots received additional calcium chloride in the intervening week of 2.5 and 5.0 lb. per acre, respectively; bringing the total biweekly application amounts to 5.0, 7.5, and 10.0 lbs per acre in split applications. The second week of the 7th cover application was not made because of weather conditions that led to early harvest. Trees were established in 2001 on M.7a rootstock spaced in the orchard at 16 x 20 ft.

Trees were harvested on August 23, 2010, tested for pressure and brix, and evaluated for bitter pit incidence immediately. Following the first assessment they were placed into refrigerated storage at approximately 34 F for 3 months and will be assessed again for bitter pit and rot incidence. Rot was primarily bitter rot, caused by *Colletotrichum acutatum*. Data were subjected to analysis of variance and means separation procedures to determine the significance of treatments.

Trees that received only 35 lb Ca had lower pressure than those that received the higher amounts (13.5 lb pressure vs 15.1 and 14.8 for the middle and high rates, respectively). There were no differences in brix values among the treatments. For bitter pit, trees that received 35 lb Ca had significantly more bitter pit (25% of fruit with symptoms), compared with the middle and high treatments, which were similar (9% and 2%, respectively). Trees that received 35.0 and 50.0 lb per acre per season CaCl₂ showed no foliar phytotoxicity. However, trees receiving 65.0 lb per acre per season showed foliar symptoms that were typical of salt injury (necrosis of the leaf margins and tips of leaves). No phytotoxicity to fruit was observed.

Thanks for reading!

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