Bacterial Soft Rots of Vegetables Crops

Plant diseases called soft rots occur commonly on vegetable and agronomic crops in Florida. Such diseases may occur in the field or on the commodity after harvest. Most soft rot diseases are caused by bacteria. Bacteria are microscopic one-celled plants that multiply by cell division. A typical cell of a bacterium is about 1/12,000 of an inch long. Bacteria which cause soft rot in Florida include *Erwinia carotovora pv carotovora*, *E. carotovora pv atroseptica*, *E. chrysanthemi*, *Pseudomonas marginalis* and *Clostridium* sp.

Initially, soft rot lesions appear water soaked, sunken and darker in color than surrounding healthy tissue. Later a whitish, cloudy liquid may ooze from breaks in the plant tissue. Such lesions often have a rotted odor. Any plant tissue with such symptoms should be suspected of having soft rot. Fruits, tubers, fleshy roots, fleshy stems, and leaves are susceptible to soft rot.

Environmental conditions that are conducive for soft rot development include high humidity, abundant rainfall or irrigation, poor drying conditions and warm temperatures. Specifically, temperatures of 73 to 95°F are best for soft rot development. Soft rot diseases in the field often occur in lower, wetter portions of the field where drying is delayed in the morning because of trees and hedge rows.

Infection of plant tissue occurs when free water is present. Natural openings in the plant and wounds or potato seed pieces and insect damage are some of the more common means by which soft rot bacteria enter tissue.

Soft rot of stems occurs commonly in plants such as collards, broccoli, and tomatoes. Such diseases are called hollow stalk. First, the fleshy inner part of the stem becomes slimy and discolored. Eventually the stem becomes hollow. The rot may extend into the leaves or fruit remaining on the plant. When the leaves or fruit are infected in such a manner, they become sources of inoculum during post-harvest operations. Sweet and field corn sometimes become infected in the stem causing a wet, slimy stalk rot.

Tomato and pepper fruit are commonly infected with soft rot bacteria but other vegetable fruits are also susceptible. Fruits are infected prior to harvest if wounded by insects or other means or the rot may progress from infected stems and branches into the fruit.

Postharvest infection of fruit may occur through wounds made during harvesting, transit or storage periods or when warmer fruit are washed in cooler contaminated water.

Symptoms at first include small, sunken, water-soaked lesions that progress rapidly and liquefy the tissue. Rot may begin anywhere on the fruit if wounding, insect damage or cracks occur. On peppers soft rot often begins at the broken stem attached to the fruit after harvest. Rot will progress from this point into (Continued on page three)

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For persons requiring special accommodations, please contact Aparna Gazula at (352) 955-2402 (voice) or TDD/TYY (352) 955-2406 or at the Alachua County Extension Service, 2800 NE 39th Avenue, Gainesville, FL 32609. Please contact the Extension Office at least five working days prior to the program so that proper consideration may be given to the request. Upon request, for persons with print-related disabilities, this newsletter is available in alternate format. Funding for the duplication of this publication is provided in part by the Alachua County Board of County Commissioners.
Pesticide Updates

Eptam: On February 11, the Florida Department of Agriculture and Consumer Services (FDACS) approved the revised labeling of EPA SLN FL-070007, (Eptam® herbicide to control weeds under plastic mulched tomato) to utilize higher density plastics for using fumigants more efficiently. (FDACS letter of 2/11/09).

Thiophanate: The FDACS has again submitted paperwork to EPA to retain the use of thiophanate (Topsin®) for control of white mold in fruiting vegetables. The current section 18 specific exemption will expire on April 24, 2009. (FDACS letter of 2/23/09).

Propiconazole: The Subtropical Horticulture Research Station in Miami has been exempted from state experimental use permit requirements to treat avocado trees with propiconazole (Alamo®) fungicide. The exemption is effective immediately and will expire at the end of 2010. (FDACS letter of 3/2/09).

IR-4 has been successful in revising the fruiting vegetable crop group. The revision will add okra to this group as well as 14 other orphan crops such as pepino, roselle, tree tomato and groundcherry. (IR-4 January 2009 newsletter).

Agri-Mek®: The EPA and FDACS have approved in mid-February the revised federal label of Agri-Mek® (abamectin) for aerial application to citrus to control leafminer and associated canker bacteria. (Plant Health Progress, 2/16/09).

Methyl Bromide: FFVA has announced that methyl bromide will be in extremely short supply by the fall fumigation period. Growers should be working hard on finding alternatives in the next months. (Florida Grower, February, 2009).

Maneb Cancellation: The manufacturer of the fungicide maneb (United Phosphorous) has voluntarily canceled the registration of the material and existing stocks may be gone before the end of this crop year. While there have been registration materials submitted mancozeb use in some of the crops in which Maneb was used, these will probably not be acted on until mid-Summer. Consequently, mancozeb for a certain crop may not be available for 2009. However, the EPA has recently approved several new vegetable crop use sites for chlorothalonil (Bravo® 720), which may cover the loss of maneb to some extent. The EPA also appeared amenable to a Crises Exemption for bacterial spot of pepper under Section 18 (to be treated with mancozeb), which is currently being prepared by a group of stakeholders. (Summary of Maneb Cancellation Teleconference #1).

Upcoming Programs

Embracing Change– Adopting Alternative Enterprises
Tuesday, May 5, 2009 at 5:00 pm
Angeles Farm LLC
8151 SW 44th Ave
Providence, Florida
Pre-registration required
Registration fee is $5.00
Registration deadline is May 1, 2009
No registrations will be accepted after the deadline
For more information call Union County Extension Office
386-496-2321

Good Agricultural Practices (GAPs): Developing a Food Safety Program For Fruit & Vegetable Growers
Monday May 11, 2009
8:30 am - 4:30 pm
Alachua County Extension Service
2800 NE 39th Avenue,
Gainesville, FL 32609-2658
Pre-registration required
Registration fee is $10.00 (for lunch)
Registration deadline is May 8, 2009
No registrations will be accepted after the deadline
Call 352-337-6209 (Voicemail)
By March 23rd, 2009

Fruit and Nut Twilight Field Day
Thursday, May 14, 2009
4:00 pm - 8:30 pm
North Florida Research & Education Center - Suwannee Valley
8202 County Road 417,
Live Oak, FL 32060
Pre-registration required
$20 if paid by May 1, 2009
$25 if paid after May 1, 2009
Registration deadline is May 8, 2009
No registrations will be accepted after the deadline
Price includes dinner and educational materials
Karen Hancock 386-362-1725 ext 101 or email to KHancock@ufl.edu

“Earn One Core CEU Online”
Read the article “Learn the Laws” on www.floridagrower.net and then take the test.
For further information contact Aparna Gazula your Commercial Horticulture Extension Agent at 352-955-2402, email agazula@ufl.edu
Bacterial Soft Rots of Vegetables Crops (continued from page one)

the fruit if the stem end is wet. Often such rot ceases if the stem end becomes dry.

Potatoes can be infected by either the black leg organism (*E. carotovora* var. *atroseptica*) or the soft rot organism (*E. carotovora* var. *carotovora*). Black leg is characterized by a wet seed piece breakdown, lower stem blackening, yellowed foliage and death of the emerged plant. Where black leg persists on older plants, young tubers may be infected. Soft rot occurs on developing or mature tubers as a wet, foul smelling water-soaked lesion that may engulf the entire tuber. In some situations soft rot infections are “walled-off” which appear as dried, discolored, and chalky white tissue.

Salad crops such as lettuce, endive and escarole may be infected at leaf margins or the stem end. Leaf edges become greasy with no definite margin between rotted and healthy tissues. Such decay often occurs when cold weather is followed by warm, humid weather. Leaf ribs may turn brown, red or pink.

**Control Measures**

**Cultural practices:** 1) Plant on well drained land or provide for adequate drainage. 2) Avoid excessive plant populations so that plants will dry faster. 3) For potatoes, purchase disease-free seed that do not have enlarged lenticels. 4) Cutting knives for potato seed pieces should be clean. If diseased seed pieces are cut inadvertently, clean knives with rubbing alcohol before continuing with the cutting operation. 5) Plant suberized seed pieces that are treated with a recommended seed piece fungicide. Seed pieces of potato must never be allowed to become wet. Storage areas should be shaded and well ventilated. 6) Plants should be dry when harvesting, pruning, suckering, tying or topping. 7) Prune promptly as removal of larger suckers results in larger wounds that are more apt to become infected. 8) When cutting collards use a sharp knife and cut leaves at an angle to minimize water accumulation on exposed stem. Clean the knife frequently with rubbing alcohol and clean the knife immediately if an infected plant is cut. Do not hand break stems. Better yet, do not touch infected plants. 9) Grow resistant varieties when possible. 10) When fertilizing tomatoes avoid excessive rates of nitrogen and use an N:K ratio of 1:1.5 or 1:2. Soft rot might be more severe where fertilizer is banded rather than where it was applied in a broadcast manner. 11) Control insects.

**Harvest practices:** 1) Avoid rough handling of fruit. For example, tomato fruit should be rolled out of baskets as opposed to dumping or throwing. Potatoes should not be allowed to drop further than necessary. 2) Harvest crews should be taught to recognize diseased plants or fruit and then be told not to handle them. If they do, they should wash their hands with rubbing alcohol. 3) Where possible harvest produce when plants are dry. 4) Also, potatoes that are harvested dry are not as susceptible to soft rot as those harvested when the soil is wet. 5) Harvested produce should never be allowed to sit in the sun. Move harvested produce to shade as soon as possible. 6) Baskets, pallet boxes, trailers, etc. should be clean. 7) Healthy produce is less likely to have soft rot during post-harvest periods.

**Post-harvest practices:** 1) Free chlorine from gas, bleach or other sources should be in water that first contacts tomato, pepper or radish. Maintain free chlorine levels at 75 ppm by periodically testing. Peppers should not be immersed in water. Rather, wash peppers with a warm water spray containing chlorine or use a dry belt line. Tomatoes should be water flumed as fast as possible and the water depth should be less than 12 inches. The deeper and longer fruit are in the water the greater the probability that water will infiltrate and soft rot bacteria will enter the fruit. Remove trash or use clean water (with chlorine) periodically as organic matter “ties-up” chlorine. 2) Surfactants added to produce wash water for cleansing action can promote water infiltration and softrot bacteria entrance into produce. 3) Never wash pepper or tomato fruit in water cooler than the produce. Washing warm produce in cooler water may cause water and bacteria to move into the produce. 4) Where precooling is used on produce, it should be done as soon as possible with produce stored and shipped at recommended temperatures. 5) Avoid freezing or excessively low temperatures during storage and shipment. 6) Do not wax wet produce. 7) Provide ventilation for stored produce but avoid excessive air velocity. Ventilation minimizes moisture condensation and reduces temperatures.
Publications of Interest

“Accuracy for Tree Scouting and Other Horticultural Uses”. This factsheet provides citrus producers using GPS for citrus greening disease scouting with some simple explanations of the causes of GPS error and the level of accuracy that can be expected from different classes of GPS receivers. http://edis.ifas.ufl.edu/AE438

“Impacts of EPA Proposed Buffer-Zone Restrictions on Profitability of Florida Strawberry Growers”. This factsheet by reports the results of a study to characterize the impact of the proposed buffer-zone restriction on the economic returns to Florida strawberry-growers. http://edis.ifas.ufl.edu/FE795

“Florida Blueberry Integrated Pest Management Guide”. This 35-page illustrated guide is adapted for Florida from the Southeast Regional Blueberry Integrated Management Guide. Primarily tabular in format, it also includes links to additional resources, text descriptions of key pests by stages of flower bud development, and an illustrated guide to recognized stages. http://edis.ifas.ufl.edu/HS380

“Quick Sheet: Insecticides and Miticides Recommended for Use in the Florida Citrus Pest Management Guide”. This quick reference guide lists citrus insecticides and miticides recommended in the Florida Citrus Pest Management Guide, their effects on important citrus pests, and their natural enemies. http://edis.ifas.ufl.edu/IN807

“The Dynamics and Implications of Recent Increases in Citrus Production Costs”. This article examines the magnitude of recent changes in citrus production costs for Florida growers and discusses their implications. http://edis.ifas.ufl.edu/FE793

If you need any of these publications email agazula@ufl.edu or request a copy from your Alachua County Extension Service Office.