PHYTOPHTHORA ROOT/RUNNER ROT—WHAT DO WE KNOW?

It's been a few years since Drs. Steve Jeffers and Mike Drilias studied the effect of different species of Phytophthora on cranberry. The intent of this article is to review what they did and what their conclusions were.

Approximately 34 marshes in Wisconsin (a total of 63 beds) were surveyed during the late 1980s for species of Phytophthora. *Phytophthora megasperma* or *Phytophthora cryptogea*, or both, were isolated from 82% of the marshes and 73% of the beds. *Phytophthora cinnamomi*, the species that causes severe root and runner rot in Massachusetts and New Jersey was never isolated. *P. megasperma* and *P. crytogea* were found in beds without root rot symptoms as well as those with symptoms.

In greenhouse tests, flooding was a prerequisite for root/runner rot caused by *P. megasperma* and *P. cryptogea*. The longer the duration of the flooding, the more stunted the growth of the plants. In fact, flooding alone was more deleterious to plants than was infection by *P. megasperma* or *P. cryptogea*. There was no significant difference in susceptibility of various cultivars to species of Phytophthora.

In the field, root/runner rot was usually remedied by improving drainage (e.g., digging deeper side ditches, adding a center ditch, sanding). Applying metalaxyl (Ridomil) at monthly intervals from June through October, resulted in fewer plants infected with species of Phytophthora. On established plants, yield was greater in untreated plots than in plots treated with metalaxyl. The fungicide did not increase the survival or growth of rooted cuttings planted into a bed that previously had root/runner rot. Metalaxyl plus improved water management has helped growers on the east coast to bring Phytophthora root/runner rot under control. But the major pathogen they are controlling is *P. cinnamomi*, a species never identified in Wisconsin.

For growers, the most important conclusion of Drs. Jeffers's and Drilias's work is that proper soil water management is the best way to keep roots and runners healthy on marshes in Wisconsin. Contact me (608-265-2047) if you want further information on the biology of this soil-borne fungus or the root/runner rot disease.

Patty McManus, Extension Plant Pathologist

I pray we are still a young and courageous nation, that we have not grown so old and so fat and so prosperous that all we can think about is to sit back with our arms around our money bags. If we choose to do that I have no doubt that the smoldering fires will burst into flame and consume us—dollars and all.

Lyndon B. Johnson

If a man has a talent and cannot use it, he has failed. If he has a talent and uses only half of it, he has partly failed. If he has a talent and learns somehow to use the whole of it, he has gloriously succeeded, and won a satisfaction and a triumph few men ever know.

Thomas Wolfe

FRUITWORMS: CRANBERRY & SPARGANOTHIS

Each year many Wisconsin Cranberry growers are faced with dealing with somewhat troublesome insect pests referred to as "fruitworms". These are those pesky little critters that like to enter and feed inside the berries normally starting sometime during bloom and continuing throughout berry development. In much of Wisconsin two different species of fruitworm are present, Cranberry Fruitworm, *Acrobasis vaccinii*, which belongs in the family of moths Pyralidae (common name, snout of grass moths similar to our Cranberry Girdler) and Sparganothis Fruitworm, *Sparganothis sulfureana*, which belongs to the Tortricidae family (commonly referred to as leafrollers) of moths similar to our Blackheaded Fireworm and Fruittree Leafroller. In general, Cranberry Fruitworm is found throughout the state while Sparganothis is more concentrated in the southern growing areas. Generally speaking our growing friends to the west (Oregon, Washington and British Columbia) do not have fruitworm while eastern growers (in New Jersey, Massachusetts, and Quebec) face a similar situation.

Although we can safely identify larvae feeding within berries as fruitworm, except for that occasional Blackheaded Fireworm which sometimes also feed within the berry. The question remains, are we always sure which fruitworm species is present? This can be very important because some insecticides may perform very well against Cranberry Fruitworm, while not having any value for Sparganothis. Proper identification is key to understanding these insects from both a biological standpoint as well as knowing how to properly manage the insect. Here are a few tips on how to differentiate between the two larval species.

The more common Cranberry Fruitworm typically has a light to grassy green body with a yellowish-green rounded head. As the larvae mature they develop a reddish cast or color that runs along the back or top (dorsal) of their body or abdomen. Full grown larvae mature they develop a reddish cast or color that runs along the back or top (dorsal) of their body or abdomen. Full grown larvae reach about ½" long and about 1/16" wide. Young Cranberry Fruitworm frequently enter the fruit near the stem end or the top part of the berry with a very small inconspicuous hole. It has been recently noted that often times as they first enter the berry the larvae will actually "spit out" that first bite of fruit (do you think they "know" or sense something?). Typically only the younger stages of the Cranberry Fruitworm cover their entrance holes with a white silken "window". This is thought to aid in protecting them from predators as they are more vulnerable as young larvae. Older larvae will actually fend off other intruders (like other fruitworm) as they try to make their entrance. As larvae mature, they pass from one berry to other adjacent berries sometimes consuming as many as six to eight berries. Usually succeeding entrance and exit holes are very round in shape and are left uncovered as larvae become more mature. Infested berries are also normally filled with brown fecal matter or waste and turn red or ripen prematurely. Most often you will find Cranberry Fruitworm to be more concentrated along bed edges. When the larvae are ready to pupate they drop from the berry and form a silken cocoon made from sand or other debris found on the bog floor. This is where they spend the winter until moths emerge in June. There is only one generation of Cranberry Fruitworm per year.

Sparganothis Fruitworm have two generations per year. The first generation occurs early in the growing season similar to Blackheaded Fireworm. Like Fireworm this generation webs uprights feeding on foliage and developing hooks. It has been recently noted that when they first hatch Sparganothis too have a black head like Fireworm but only as a first instar larva. As larvae enter the second stage or instar, Sparganothis typically have a pale yellow to light green and somewhat hairy body with a yellow to brown head that appears rather flat in shape. Mature or full grown Sparganothis have a

somewhat two-tone body color with pale yellow coloration on the bottom or venter with a darker greenish dorsum containing paired white spots on each abdominal body segment. Second generation Sparganothis will also web uprights together but do so with berries surrounding them. As they consume fruit entrance holes appear to be larger and more irregular in shape (rough around the edges) and are not covered by a silken "window" unlike Cranberry Fruitworm. Sparganothis Fruitworm infested berries are much "cleaner" inside because larvae often times shunt their fecal material or waste outside the fruit. As they mature the pupate we oftentimes find the pupae right inside the berry.

Adult moth flight for both Sparganothis and Cranberry Fruitworm is just underway. If you need assistance in managing these direct fruit pests, consult with your IPM Scout or UW Extension Agent.

Tim Dittl, Ocean Spray Cranberries

OBSERVATIONS FROM THE FIELD

PLANT STAGE: Mother Nature is truly in charge. Last Monday we were only seeing 5% in bloom, now on July 1 we are observing 45% in bloom on Ben Lear with pinheads and peas showing on the bed edges. Searles and McFarlins across the entire Lady Bug region have impressive hooking this year. Stevens have some fantastic potential and LeMunyon and Pilgrim are showing 4 to 6 hooks per reproductive upright.

INSECTS: On June 17th we spotted our first nocturnal feeder (from the cutworm family) and today (July 2) those that slipped by our insecticides are now posing a threat to our blossoms. (I have issued all my employees a genuine miner's helmet with light and all; for night time scouting!) Aster leaf hoppers have migrated in the beds. We are hoping that they migrate out as quickly as they came in. Second generation BHFW is close at hand. Hot spot treating is in the foreseeable future. Sparganothis and Cranberry fruitworm flight is on the increase. Girdler flight is becoming more of an issue for some of us as well. Fruit tree leaf rollers were abundant in the beds this spring, and we are visually seeing their flight on and around our properties.

DISEASE: Early signs of Cottonball were discovered on June 19th and now we are seeing the frosted mantels of conidia. Red leaf spot was observed in some Ben Lear beds along with a brown fungus. Keep in mind that excessive nitrogen promotes some types of disease.

WEATHER RELATED ISSUES: Uprights are showing a bright red leaf discoloration in the 1995 growth (one-year-old leaves). Slowly the 1996 growth is starting to show the same symptoms. In most cases the growth is so lethargic that a bright red is predominant and the new healthy green cast just does not exist. Water stress appears to be the culprit in this coloration. These areas tend to hold water for extended periods of time. With this cool, wet spring we seem to be adding to the problem. Many vines are showing stress that had been very healthy last fall. We feel that with improved drainage we can see health once again. (This does not happen overnight).

Drought stress is lurking around every hot day. It has caught us off guard. Wind, nozzles, water pressure, amount of moisture that we get per hour of irrigating must be checked on your own property. We have placed rain gauges out where stress has shown up and were surprised at our coverage. Take a moment to double check some of these items for it sure is a sad thing to see areas of drought when we spent so much effort in the bringing the uprights this far.

Remember to stop and admire the bloom.

Jayne Sojka, Lady Bug IPM

As machines become more and more efficient and perfect, so it will become clear that *imperfection is the greatness of man*.

Ernst Fischer

FOLIAR FEEDING

Do plants do better if "fed" through leaves orthrough roots?"Several popular fertilizer products available to growers promote leaf feeding as superior to soil application of nutrients," explains Sherry Combs, director of the University of Wisconsin-Madison/Extension Soil and Plant Analysis Laboratory and UW-Extension soil specialist.

"Advertised claims include more efficient nutrient uptake, bigger fruits and vegetables, ability to `spoon-feed' plants and better use of nutrients by the whole plant," she explains. "In reality, foliar `feeding' is not superior, but some crops under certain growing conditions do respond better to applying nutrients to leaves," Combs adds.

Soluble liquid fertilizers are used when applying nutrients to leaves. This results in rapid absorption and has the advantage of near-immediate correction of nutrient deficiencies. "However, leaf fertilization is not the best choice when applying large quantities of nutrients because of foliage burn," Combs adds. "Because of the small amount of nutrients applied and remaining on leaves, benefits often are only temporary. Repeated applications may be needed," she says.

Fertilizing leaves of fruit crops and ornamentals can help correct certain deficiency symptoms. "Roses commonly exhibit iron and manganese deficiency—interveinal yellowing—when grown on high pH soils," Combs says. High pH soils lacking in iron and manganese make it difficult for certain plants, such as roses, to get enough micronutrients from the soil to support good growth. "Applying iron or manganese to the leaves of plants supplies these nutrients directly and avoids the problem," Combs adds.

Plants take in nutrients applied to foliage through the leaf stomata, the cell openings of plant leaves. This process occurs most rapidly during the first hour after application.

"For leaf absorption to be most effective, applications should be made when temperatures are cool and humidity is high, such as in the early morning or early evening," Combs says. "Applications during these times are also less likely to cause leaf burn."

"Feeding" leaves should not take the place of traditional soil application of macronutrients such as nitrogen, phosphorus and potassium. "Trying to apply the quantity of macronutrients required by plants can cause severe leaf burn," adds Combs. "In fact, a large portion of the nutrients applied to the leaves of plants falls on the soil surface. These nutrients are then absorbed by plant roots in the same manner as nutrients initially applied to the soil surface."

Sherry Combs, UW-Soil Science

EXCESSIVE RAIN AND NITROGEN LOSS

Excessive rain in many cranberry growing regions creates the possibility of nitrogen loss on cranberries. The actual extent of the losses in specific beds or marshes is difficult to estimate. Several factors influence the amount of nitrogen loss including soil type, amount of water received and length of time between application and excessive rainfall.

Obviously, more water leaches through a sandy bed than a peat bed. Sand based beds have a greater potential for nitrogen loss to leaching than peat based beds. Peat has greater cation exchange capacity which would adsorb ammonium ions tightly and restrict leaching.

Cranberry growers apply nitrogen as ammonium rather than nitrate. Ammonium is far less likely to leach than nitrate. Urea N is leachable as a neutral molecule if heavy rains occur before the urea is converted to ammonium (about 3-5 days). Our preliminary research indicates that ammonium N will not be converted to nitrate N at a soil pH of less than 5.5, so it is unlikely that any ammonium was converted to nitrate and lost in cranberry beds. This is common in corn fields and has been widely discussed in ag publications since the heavy rains.

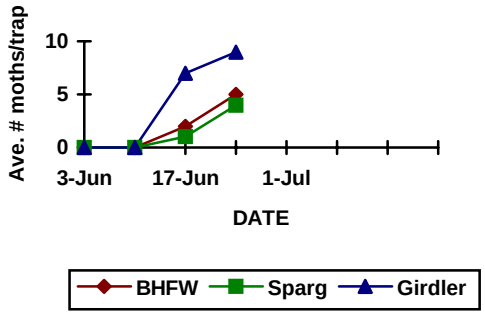
Continued on back cover.

1996 Pheromone trap counts

Cranmoor area includes:	Adams, Portage and Wood counties
Warrens area includes:	Jackson, Juneau and Monroe counties
Northeast area includes:	Forest, Lincoln, Oneida, Price, and Vilas counties
Northwest area includes:	Barron, Burnett, Douglas, Rusk, Sawyer, and Washburn counties

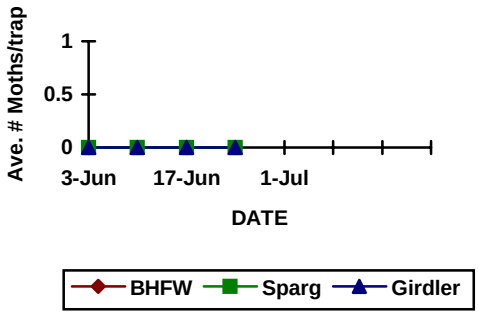
Please note that different regions may have different scales on the left axis. Doing this allows greater accuracy in determining actual values within a region. However, comparisons between regions are more difficult. Please use caution in making comparisons of these averages to trap counts on your marsh.

Northwest Area



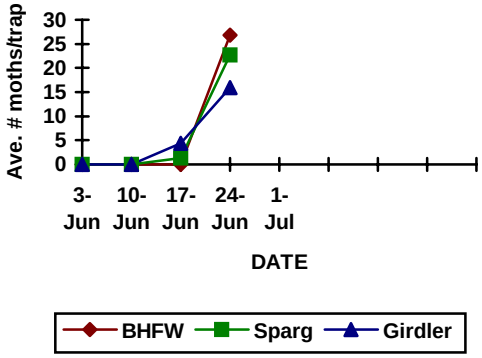
Means from 8 growers

Northeast Area



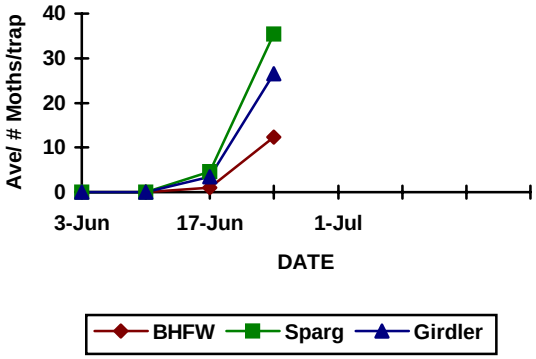
Means from 2 growers

Warrens Area



Means from 13 growers

Cranmoor Area



Means from 10 growers

Nitrogen Loss (continued from page 4)

The actual amount of nitrogen taken up between application and rainfall is difficult to estimate. This depends on the form of nitrogen applied, crop activity, soil temperatures and irrigation or minor rainfall after application. My opinion is that much of the nitrogen could have been taken up if a week or more elapsed between application and excess rainfall.

Making replacement nitrogen fertilizer applications potentially could lead to vine overgrowth if previously applied nitrogen is still in the root zone. Peat based beds should have been able to "hold on" to ammonium if it had been moved into the soil. Be conservative about making "replacement" fertilizer applications unless you see signs of reduced vigor that would warrant application.

Teryl Roper, UW-Extension Horticulturist

WEATHER

District	GDD[1]	Normal	Rain since 4/1/96	Normal rainfall
NW	620	770	10.5	9.7
NC	640	713	11.0	9.6
WC	878	942	10.0	10.5
C	829	907	12.1	10.0

1. Growing degree days (modified base 50)

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Inside:	Page
Phytophthora	1
Fruitworms	2
Observations	3
Foliar feeding	4
Nitrogen loss	4
Trap counts	5