

# SCOUTING AND CONTROLLING CRANBERRY INSECTS

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The University of Wisconsin started its cranberry Integrated Pest Management (IPM) program in 1986. With continuing university involvement, the cranberry industry, partnering with private and corporate pest management consultants, has overwhelmingly adopted IPM philosophies and methods such that the industry is widely recognized as a leader in IPM use. Routine pest monitoring (also called “scouting”) is an integral component of all IPM programs. With the current economic situation facing the industry, some growers have been forced to abandon professional IPM consulting. The purpose of this presentation is to provide information on how growers can conduct their own insect IPM programs, with emphasis on pest scouting.

## **Insect Scouting: Some generalizations.**

In order to be effective, insect scouting must be part of the weekly crop management routine. Failure to scout for as little as a week or two can result in significant crop damage. Although scouting is usually done weekly, certain scouting activities can be done more frequently (every 2-4 days) as a particular event, such as egg hatch or moth flight is anticipated.

Scouting is a “hands-on” activity. Although driving the dikes and observing the planting from the cab of a pickup can be an integral part of scouting, the real important aspects are done down amongst the plants.

Typical pest scouting activities include

- using pheromone traps
- using an insect sweep net
- careful observation for things out of the ordinary
- keeping accurate records.

## **Insect Scouting: Equipment needed.**

- ✓ A good set of eyes.
- ✓ A good quality, large-field, 10-15x magnifying glass (hand lens).
- ✓ An agricultural insect sweep net, with a standard 15" diameter rim.
- ✓ Pheromone traps and lures.
- ✓ Small containers to catch and store unknown samples for later identification.
- ✓ Data forms and bed maps for recording problem areas and scouting data.
- ✓ Survey flags for marking problem sites.
- ✓ A shovel to look for soil insects.

- ✓ Knowledge of pest identification, pest biology, action thresholds, etc.
- ✓ **Commitment!**

### **Insect Scouting: Be a keen observer.**

Observe beds from the dikes to look for damaged, weak, or discolored areas. Check such spots up close in an attempt to discover the cause of injury. Don't forget to check the soil for insects such as white grubs or the larvae of cranberry girdler or flea beetle. If damaged spots require further examination or treatment, mark with a wire flag. Watch for unusual bird activity foraging in the vines as birds like grackles and starlings may be foraging for insects.

Closeup observations should be conducted while sweep sampling. In each area swept, inspect the vines closely in two arbitrarily chosen spots. Look closely for insects, their webbing, or damage to leaves, flowers, or fruit. Some insects such as cutworms and armyworms are nocturnal (active at night); these tend to hide low in the plant canopy during the day. Collect any unknown insects and get someone to help in identification.

### **Insect Scouting: Sweep sampling.**

Sweep sampling is one of the most effective and commonly used methods to monitor agricultural pests. Be sure to use an agricultural sweep net with a standard 15" diameter rim. Smaller nets are available for general insect collecting, but action thresholds are based on a 15" net.

In cranberry, sweep sampling is most useful for fireworm, sparganthis, spanworms, cutworms, and flea beetle adults.

Sweep sampling is normally done during daylight hours. Vines must be dry in order to keep the net from getting waterlogged. Although night sampling has been shown to catch more nocturnal insects, action thresholds are based on daytime sweeping. Sweeping should continue to be conducted as the berries continue to size, but sweep only the new growth at the tops of the plants in order to prevent premature harvest of fruit by the netfull.

Sweep samples are taken in continuous sets of 20 sweeps. The number of sets varies with size of bed, with a minimum of two sets in small beds (of 1 acre or less). Large beds (6-8 acres or more) should have a total of 6 sets taken; beds of intermediate size require an intermediate number of sets of sweeps. Sweeps should be taken both along the bed margin ("exterior"; within 5 ft of the edge) and in the interior part of the bed (at least 15 ft from the closest edge). Bed edges tend to warm faster in the spring, and both plant growth and insect activity often starts first along the edges. Therefore, sampling here gives you a head start on activity that will soon be more widespread throughout the bed. However, more sets of sweeps (and accompanying visual samples) should be conducted in the bed interior where the majority of the vines occur. If you do only two sets of sweeps, take one exterior set and one interior set. For larger beds, take one exterior set for every two interior sets.

### **Insect Scouting: Using pheromone traps.**

A pheromone is an odor used by individuals of the same species for chemical

communication. One type is called sex pheromone. These scents are given off by adults of one sex (usually females) to attract members of the opposite sex (usually males) for mating purposes. Almost each insect species has its own unique pheromone. These chemicals are identifiable and can be artificially synthesized. When a female sex pheromone is loaded into a lure and placed in a trap covered with sticky material, it attracts males that come to the trap and are captured. Because the lures are very powerful, they can result in the capture of males even when population levels are very low, such as at the beginning of the seasonal flight period. Such lures and traps are used to monitor hundreds of types of insects in dozens of types of crops worldwide. In cranberry, pheromone traps are commercially available for blackheaded fireworm, sparganothis fruitworm, cranberry girdler, and cranberry fruitworm.

There are three main reasons to conduct pheromone trapping. First, it is an excellent first indicator with moths are starting to fly and lay eggs. Even though only males are caught in the traps, females are flying at essentially the same time. The capture of first moths in a generation can be used to predict when egg hatch is going to be, either by using rough estimates or more precise degree day models. Because insecticides generally work best against the youngest larvae, pheromone traps are very important tools in timing insecticide applications.

A second function of pheromone trapping is that, if the data are kept from year to year, you get a relative indication of how big the population is in any given year. However, trap catches are not precise enough to use as action thresholds.

A third function of pheromone trapping is in conjunction with pheromone-mediated mating disruption (see article elsewhere in this proceedings). Here, two types of traps are used, one with a conventional high-strength monitoring lure to identify the beginning of flight, and a second lure with a very low dose of pheromone to determine if mating disruption is still occurring or if there is a need for an additional pheromone application.

We recommend using one trap for each species every 10 acres, with a minimum of two traps per section of beds. Place traps within the beds, where they will get minimal water damage from sprinklers, and so that the prevailing winds blow the pheromones over the beds, not immediately out of the bed. Label the traps as to the insect species and the date the fresh lure was put into the trap; be sure to use a waterproof marker such as a “Sharpie.” Lures should be replaced every 2-3 weeks; do not leave old lures within the beds. Traps should be changed as needed as they weather or become filled with insects or debris. Traps should be checked at least weekly and records kept of the trapping results.

Note that although the pheromones are relatively specific, occasionally other insects can be attracted to the traps or randomly fly into them. Therefore it is helpful to be able to recognize the appearance of each moth species.

### **Insect Control: Some brief economic considerations.**

Generally, decisions about pest management are based on economics. If the pests are causing more damage than the price of controlling the pests, then it is economically advantageous to control the pests. In the following sections on specific insects, we make reference to specific “economic thresholds” at which control is normally recommended.

However, the thresholds provided were researched when the value of berries was at least \$50 per barrel. Although new thresholds have not been researched for the current market, when prices are low, higher insect populations can be tolerated before controls are justified. These pest management decisions are short-term, based upon the current value of the crop and the current numbers of pests. (See the more detailed discussion about Economic Injury Levels in the Proceedings of the 2000 Cranberry School.)

Pest management decisions must also be based on long-term economics, especially in perennial crops such as cranberry. There are two long-term considerations. First, the plants must be maintained in sufficient health to be vital and productive. Insects that impact leaves, stems, or roots can be sufficiently bad to seriously stress plants or even kill them outright. At least some minimal pest management program must be conducted to maintain plant health. A second long-term consideration involves reduction in fruit quality at harvest by insects that damage the surface or bore into the fruit. A high incidence of damaged or infested fruit has, in some types of crops, resulted in the reduction in value or even the rejection of the crop by handlers. Therefore, although the immediate economics of pest management may not justify substantial control costs, it will continue to be important to keep large populations of fireworm, fruitworm, and sparganothis from developing.

#### **Blackheaded Fireworm: Summary of biology and damage.**

Blackheaded fireworm (BHFw) has historically been one of the most serious pests of cranberry in Wisconsin. There are two generations per year. Young larvae appear at about the time plants are coming out of dormancy. This generation feeds on foliage, causing it to turn brown. Leaves and the tips of uprights are webbed together. In addition to foliage, the summer generation also feeds on the surface of fruit.

#### **Blackheaded Fireworm: Scouting.**

- ✓ Observe for webbed uprights. In first generation this will first be seen along bed edges next to ditches.
- ✓ Sweep sample for larvae. Threshold is an average of 2 larvae per set of 20 sweeps.
- ✓ Use pheromone traps to determine beginning of flight and peak flight, and to time controls.
- ✓ Scouting for egg hatch is possible but not always conducted. Egg hatch will be underway about 3-5 days after peak flight, which often is during bloom for second generation.
- ✓ Remember that other insects can cause fruit and foliage damage similar to that of BHFw.

#### **Blackheaded Fireworm: Summary of control.**

Flooding is one effective option to control first generation BHFw. The flood should occur after most of the overwintering eggs have hatched. The flood should be totally over the top of the vines for 48 hours, although floods of shorter duration will be partially effective. Try to pick a period that will be cool and overcast. If it is predicted to be warm and sunny, apply the flood late in the day and hold it as long as possible into the

following day. For more information on flooding, see the Proceedings of the 1992 Wisconsin Cranberry School.

Pheromone-mediated mating disruption is an effective control of BHFV. See the article elsewhere in this Proceedings.

Chemical control is still the most commonly used method for BHFV control. Insecticides should be applied shortly after peak egg hatch. Orthene, Lorsban, Diazinon, and Imidan are effective materials used by many growers; other effective materials are also available (see current UW Extension Cranberry Pest Management publication). In first generation, insecticides should be applied in the morning for day-long activity if frost protection is anticipated that night (sprinkling may wash off effective residues). Second generation BHFV often occurs during bloom. Confirm, which can be used during bloom without an impact on pollinators, is recommended; follow label recommendations for timing. Two applications of Confirm may be necessary. Microbial insecticides containing *Bacillus thuringiensis* (Bt) can also be used during bloom; use as soon as possible as eggs hatch; thorough coverage is important and at least two applications are usually necessary.

### **Spanworms: Summary of biology and damage.**

There are several species of spanworms or loopers (also called inchworms) that can damage cranberry. Most occur from early season through the blossom period; some occur while fruit are developing. Examples include green spanworm, rannoch looper, spiny looper, and big cranberry spanworm. Each has just one generation per year. Larvae do not produce noticeable webbing and are generally bigger than fireworm and sparganothis. Spanworms feed on leaves, buds, and flowers and may nibble on the surface of fruit. Spanworms are often patchy in distribution with a bed.

Spanworms can be confused with armyworms and cutworms, but action thresholds are quite different, so the scout must be able to distinguish the two groups. Generally, spanworms walk in an inchworm fashion while armyworms and cutworms walk in an undulating manner (however, some of the latter group “inch” when they are young). An important distinction is the arrangement of the legs (see cartoons below).