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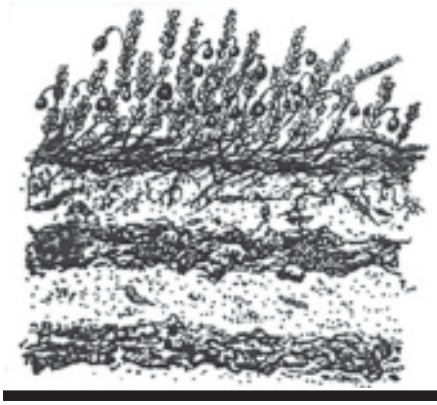
Insect Management

Carolyn DeMoranville
Cranberry Station, carolynd@umext.umass.edu

Hilary A. Sandler
Cranberry Station, hsandler@umass.edu

Tom Bicki



BEST MANAGEMENT PRACTICES GUIDE FOR MASSACHUSETTS CRANBERRY PRODUCTION

Insect Management

Minimizing damage to the plants and crop by insect pests is one of the most important challenges in cranberry production. Failure to manage pest insects properly can result in severe crop loss, vine damage, or in extreme cases, the death of large areas of the bog. The most effective insect management strategy is an integrated approach using scouting techniques to monitor insect populations. Cultural, biological, or chemical control measures are applied only when the pest pressure (insect population) reaches an action threshold. The action or economic threshold is the 'break even' point where damage by a certain pest population begins to exceed the cost of the control measure (usually a biological or chemical pesticide application). The threshold number varies depending on the potential of a given insect species to cause economic damage.

Recommended Practices

- **Learn to properly identify cranberry insect pests.**

  The success on any management strategy depends on the correct identification of the insect pest and knowledge of its life cycle. This information is available in the University of Massachusetts Cranberry IPM Notebook and in separate fact sheets.

- **Natural populations of beneficial organisms can help to control insect pests.**

  Predators and parasites which coexist in the bog environment play an important role in regulating cranberry pest populations. This role should be enhanced wherever possible by avoiding unnecessary insecticide treatments and encouraging growth of natural enemy populations through conservation. Non-specific 'clean-up' sprays destroy natural enemies, parasites, and other beneficial organisms. Avoid applications of insecticides unless pest populations exceed the action threshold. Whenever possible, if there is a control option that will preserve other beneficial species, use it.

- **Use appropriate cultural control methods.**

  Late water floods affect many insects in the year of the flood. Emergence of insects is delayed and often synchronous (all individuals hatching over a short period of time rather than spread out over several weeks). Late water can be used to manage the following pests: **cutworms, gypsy moth, cranberry fruitworm, Southern red mite (SRM)**. Late water is especially effective against SRM; control often lasts for more than one season. It is best to limit the use of late water to every third year. For specific information regarding late water and management of insects and mites, see the Cranberry Chart Book.

  Summer floods (May 12 to July 20) can be used to control **cranberry root grubs** and **white grubs**. No other pesticide or cultural method is available for the control of grubs. The only remedy beyond the summer flood is to renovate (rebuild) the bog. The drawback to the summer flood is that the ***crop for that season will be lost***. The advantage is that a single season crop loss is less costly than renovation. Additional benefits of the summer flood include control of all insects and reduction of

dewberry (bramble) populations. One should continue to scout for cutworms that may migrate back onto the bog after the flood.

Detrashing floods and ***sanding*** are important in the management of **cranberry girdler.** The girdler insect larvae live in the trash (leaf litter) layer on the floor of the bog. Regular removal of this layer by using detrashing floods and at harvest can aid in the management of this insect. Sanding on a regular basis also suppresses cranberry girdler by burying the trash layer and insect pupae. Sanding has horticultural and disease suppression benefits as well. For further information see the Sanding BMP.

Adequate nutrition prior to and after infestation is important in the management of bogs impacted by **cranberry tipworm**. Damage by this insect only becomes apparent (visible to the naked eye) 2-4 weeks after the insect has infested the upright tip. **Presence of visible damage does not mean presence of active insects in the tips.** Furthermore, early season damage continues to be visible for the entire season. Insecticides are ineffective against cranberry tipworm. In addition, tipworm goes through several generations per year, increasing the potential for development of resistance to insecticides.

Cranberry tipworm immatures and adults are most numerous from May to early June and are especially active in areas of lush growth. Use fertilizer conservatively in the spring (10 lb/A or less) to minimize lush growth. Adequate nutrition following tipworm infestation will encourage recovery by the plants (production of side shoots *or* side buds to replace the destroyed terminal bud). Uprights damaged early in the season often recover by producing side buds in the axils of the leaves near the tip. These buds should be visible upon *close* examination by late August. Research has shown that *healthy*, properly fertilized plants recover fully (no yield reduction) from early season (before mid-August) tipworm infestations. **New** damage after mid-August may result in economic loss. Further research regarding this phenomenon is planned. It has been observed that tipworm populations are typically *very low* late in the season.

Short floods may be used for effective insect control. **Cranberry girdler** can be controlled by flood of 6 days duration applied between September 20 and 30, beginning no later than September 25. A flood of 12-14 days duration applied immediately post-harvest controls **black vine weevil** and **strawberry root weevil**. A flood on or about May 18 for a duration of 10 hours controls **false armyworm** and **blossomworm**. A flood of 10 hour duration applied between June 1 and June 12 controls several insects, but crop reduction and impact on fruit quality should be expected if this flood is used.

- **Use biological control strategies to manage insect pests whenever possible.**

Use biological along with cultural controls as your first line of defense against insect pests. Biological controls available for use in cranberry production are *Bacillus thuringiensis* (B.t. products) and several formulations of entomophagous (insect-eating) nematodes.

B.t. is a naturally occurring bacterium that is fatal to the larval stage of lepidopteran insects (including spanworms, cutworms, gypsy moth caterpillars). B.t. works as a stomach poison specific only to the target insects. This material is very safe for non-target organisms including beneficial insects, honeybees, bird, fish, wildlife, pets, and humans. This material is especially benign to the environment. B.t. is most effective against small larvae (less than 1/2 inch). As the larvae grow larger, B.t. may still be effective if a low rate of synthetic insecticide is added. Short-lived insecticides like Pyrenone (3 to 6 oz./A rate) have been shown to be effective in combination with B.t. products. Consult the University of Massachusetts Cranberry IPM Notebook, Cranberry Chart Book, and B.t. Fact Sheet for further information and compatible combinations.

Nematodes are available for the control of cranberry girdler, black vine weevil, and strawberry root weevil. Timing for the use of nematodes to control cranberry girdler is based on moth flight data collected with the use of a pheromone trap.

Nematode applications for control of black vine weevil and strawberry root weevil are applied in May and/or September. For specific information on use and timing of nematodes for insect control, see the Cranberry Chart Book.

- **Use proper techniques to maximize efficacy of biological controls.**

  When using B.t. products, thorough coverage is essential and repeat applications may be necessary. Addition of a sticker may be critical; see label instructions. Aerial application of these products usually improves performance compared to chemigation. Check the label of the B.t. product for proper dose and application method as these vary depending on the product.

  Nematodes should be applied in the evening under low wind (less than 5 mph) conditions. Irrigate before application to thoroughly wet the bog and immediately after the application for 4-5 hours (1/2 inch) in order to drive the nematodes down to the proper depth in the soil. Nematode applications are most effective when soil temperatures are above 56^{O} F. Excessive leaf trash on the bog floor may reduce nematode effectiveness. Remember to time applications of nematodes for cranberry girdler control based on moth flight data.

- **When planting or renovating bogs, interplant only those cultivars that bloom at the same time.**

  Timing of cranberry fruitworm control is based on the percent out-of-bloom of the cranberry plants. In order to get effective control, all of the plants being treated must be at the same growth stage. Avoid planting Early Black and Howes under the same irrigation system. Having all plants at the same developmental stage within each treatment unit (sprinkler system) will also increase fungicide efficacy.

- **Only apply insecticides if damaging numbers of insect pests are present.**

  Insecticide use must be restricted to situations where it is needed to avoid crop or plant loss. Intensive scouting and accurate pest identification should be used to measure insect infestations. Action thresholds (where economic loss due to insects exceeds the cost of controlling the pest) are then employed to ensure that only essential applications are made. Current standards allow zero tolerance for cranberry fruitworm larvae in fresh fruit.

  An effective scouting program for insect management should include:
  sweep netting the bog on a weekly basis to monitor populations of cutworms, cranberry weevils, gypsy moths, fireworms, spanworms, and SRM;
  calculating percent out-of-bloom;
  inspecting cranberry fruit for cranberry fruitworm eggs;
  trapping and counting *Sparganothis* fruitworm, cranberry girdler, and black-headed fireworm moth populations with pheromone traps.

  The information gathered by sweep netting and counting eggs is used to make decisions regarding the need to apply pest control measures. Percent out-of-bloom and trap information are used to time control sprays. For threshold and timing information refer to the Cranberry Chart Book. For further information see the Integrated Pest Management BMP.

- **Consider spot-treating when insect pests are confined to small areas of the bog.**

  Many cranberry insects populations are distributed unevenly on the bogs. This is especially true of cranberry fruitworm (ditch edges), cranberry weevil, spanworm, and gypsy moth. Weevils fly in from surrounding uplands and gypsy moth larvae travel in from surrounding trees on wind currents. This often leads to a situation where sweep net counts are only high in a confined area of the bog, usually an edge. Treating the population in the infested area may eliminate the need for spraying

the whole bog. However, spot treating for cranberry fruitworm is not recommended for fresh-fruit acreage.

- **Incorporate environmental risk into insecticide selection. Consider the vulnerability of the site and the pesticide toxicity.**

  When an insecticide application is necessary, product selection should be designed to avoid any potentially adverse environmental effects. Factors such as risk to non-target organisms, toxicity, persistence, and leaching potential should be considered. If the potential for adverse aquatic impact exists, because of a flow-through stream or downstream sensitive aquatic sites, use less toxic compounds, such as Orthene, B.t., or nematodes when possible. On mineral soil bogs with greater leaching potential, avoid highly soluble insecticides such as Orthene.

- **Use Lorsban only when no other control option exists. If you do use Lorsban, use it at the lowest label rate.**

  Because Lorsban (chlorpyrifos) is one of the most effective insecticides registered for use on cranberry, every effort should be made to avoid inducing resistance in the target insects. For this reason, it is in the best interests of all cranberry growers to use Lorsban as little as possible. There is evidence that use of low rates may also delay the onset of resistance. Lorsban has been shown to be effective against cranberry weevil and *Sparganothis* fruitworm at 1.5 pt. (aerial) or 2 pt. (chemigation) per acre.

- **When using insecticides, impound water to protect non-target organisms.**

  Holding water within the bog and ditch system is extremely important in reducing the potential for adverse aquatic impacts. This is especially important after the use of Guthion (5 days), Lorsban (5 days), diazinon (3 days), and Pyrenone (1 day). Regardless of the pesticide, water should be held no less than the required minimum holding times noted on the pesticide label and longer if practical.

- **If chemical pesticides must be used to control insect pests, make every effort to minimize application to non-target areas.**

  For further information see the Pesticide Application BMP.

- **Avoid inducing insecticide resistance in pest populations.**

  Repeated insecticide applications of the same compound or family of compounds can increase the likelihood of resistance in certain insects. This may be avoided by integrating biological and cultural controls into management programs and reducing insecticide inputs as much as possible. Alternate materials with different modes of action to minimize resistance. Avoid 'cleanup' and calendar sprays.

- **Time insecticide applications properly to target the vulnerable life stage of the insect pest.**

  Use pheromone traps to time management of black-headed fireworm, cranberry girdler, and *Sparganothis* fruitworm. Set traps in the field by June 1 following the protocol in the Cranberry Chart Book. Treatment for black-headed fireworm should be applied 10-14 days after peak moth flight, targeting the larval stage of the insect. Typical treatment for cranberry girdler consists of one application of pesticide or nematodes applied two weeks after the end of moth flight, targeting the immature insects in the soil. Treatment for *Sparganothis* fruitworm should be applied two weeks after peak moth flight, targeting the early larval stage of the insect.

  First fruitworm insecticide applications are timed based on the stage of the cranberry plants. Apply the first treatment 7-9 days after 50% of the blossoms have lost their petals or have become fruit (50% out-of-bloom stage). Timing of this spray is

critical. Further sprays are scheduled if the number of eggs found in the blossom end of the fruit exceeds the action threshold. If late water is used, all cranberry fruitworm sprays should be scheduled based on the presence of eggs in the fruit. Modify cranberry fruitworm management appropriately if growing for the fresh market. For further information, see the University of Massachusetts Cranberry IPM Notebook and the Cranberry Chart Book.

Do not spray insecticides to target cranberry fruitworm larvae already in the fruit. There is no evidence that such sprays are effective.

- **Avoid insecticide applications during bloom if possible to prevent killing bees. Avoid use of the miticide, Omite, during bloom to protect blossoms from phytotoxicity.**

  If application of insecticide during bloom is absolutely necessary, apply insecticide by sprinkler in the evening and turn the sprinklers back on early in the morning to delay bee foraging activity on the bog. Aerial applications should be delayed as late into bloom as possible and the bee keeper must be advised prior to application. Sevin-XLR+ has been formulated to have minimal toxicity to bees once the spray has dried. However, it is best to avoid all insecticide applications when bees are present.

For further information:

Averill, A. L., M. M. Averill, and C. J. DeMoranville. 1994. **Alternative management strategies: impact of late water on cranberry fruitworm and mites.** Cranberries Magazine 58(4):4, 23-25.

Averill, M. A. and H. A. Sandler. 1995. **B.t. products used in cranberry pest management.** Fact sheet. University of Massachusetts Cranberry Experiment Station.

Brodel, C. F. 1987. **Phenological timing of insecticide applications to control the cranberry fruitworm.** Cranberries Magazine 51(9):3-14.

Cranberry chart book - management guide for Massachusetts. University of Massachusetts Cranberry Experiment Station.

Cranberry IPM notebook. University of Massachusetts Cranberry Experiment Station. (Includes color fact sheets for insect identification.)

Franklin, H. J. 1948. **Cranberry insects in Massachusetts: part I.** Bulletin #445. Massachusetts Agricultural Experiment Station. (Part I covers fireworms, cutworms, spanworms, gypsy moth, cranberry fruitworm, cranberry weevil, cranberry tipworm.)

Franklin, H. J. 1950. **Cranberry insects in Massachusetts: part II-VII.** Bulletin #445. Massachusetts Agricultural Experiment Station. (Part II covers Southern red mite, blunt-nosed cranberry leafhopper, cranberry flea beetle; Part III covers cranberry girdler; Part IV covers soil insects including grubs.)

Franklin, H. J. 1952. **Cranberry insects in Massachusetts: supplement.** Bulletin #445. Massachusetts Agricultural Experiment Station. (This volume covers less common pests.)

Integrated Pest Management and **Pesticide Application** BMPs in this series.

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