
Pesticide Use in Cranberries

An Information Fact Sheet

Cranberries are native to the wetland environments of the northeastern United States. To successfully cultivate cranberries this wetland habitat is mimicked through the construction of cranberry bogs. The bogs are built in natural or man-made depressions with subsequent layers of clay, peat, and sand from bottom to top. Traditionally, bogs were constructed as part of a natural water systems with a stream running through or adjacent to the bogs to provide the water necessary in so many facets of cranberry cultivation. Newer bogs have been built from uplands and are built so that water can be pumped or diverted onto the bog with a system of dikes and flumes. In the close to 200 years that cranberries have been cultivated growers have become adept at replicating the wetland environment required for cranberry growth.



Inherent to the wetland environment required for cultivation is intense pest pressure. Many weeds and insects thrive along side the dikes and ditches of the bog as well as on the bog itself. The cultivated environment with adequate water and mineral needs represents optimum growing conditions for many of the cranberry's natural and introduced competitors. Specialized insects in turn are offered thousands of acres of one of the few foods they are adapted to eat, the cranberry. Moreover, fungi become an increasing threat in the moist environment of the bog.

The remarkable thing crops and their predators is there mutual ability to adapt for survival. Many of the varieties cultivated commercially in southeastern Massachusetts are also native to this area. Consequently, herbivorous insects, pathogenic fungi and parasitic weeds have adapted and thoroughly permeated the local environment. The cranberry has a natural ability to resist pest pressure whether it is through high tannin levels, making the fruit less palatable for many insects, or an ability to compensate for injury by reproducing vegetatively. However, when cranberries are grown commercially pest pressure may increase along while consumer tolerance for damaged fruit decreases.



Parasitic Dodder

How Pests are Managed

To manage this combination of pest pressure, growers and researchers have developed numerous techniques. These approaches are listed below with a brief description:

1. **Cultural Controls** eliminate conditions that are favorable for pests. For cranberry cultivation, strategies include holding late water floods, post harvest floods, sanding, proper timing of irrigation, and good drainage. In some way, all of these practices upset the natural lifecycle of cranberry pests. Flooding is useful for relieving insect pressure by killing problem insects. It can also kill plants that are less tolerant to wet conditions. Sanding, which is done every three to five years, works to cover up old organic material underneath the vines. Burying this layer in sand impedes weed germination and insect reproduction thus giving the cranberry vine an advantage.

2. **Biological Controls** use other organisms to eliminate problem pests. The use of nematodes to control certain pests or the use of *B. thuringiensis* bacteria for caterpillar control constitute biological control. Recently synthetic chemicals which mimic insect pheromones have been developed and are now successfully used for mating disruption.
3. **Mechanical Controls** control pests by physically removing them. Hand weeding would be a mechanical control.
4. **Chemical Controls** include the use of insecticides, herbicides, and fungicides.

Integrated Pest Management

Together these four approaches constitute IPM, or Integrated Pest Management. IPM has become a guiding approach to pest control. IPM uses all available means to control pests in an environmentally conscious and economically sustainable manner. Because the cranberry industry has cultural, biological, and mechanical controls as tools it has been able to reduce, though not eliminate, its reliance on pesticides. However, chemical controls are an extremely effective tool and are essential in providing adequate supplies of quality food for a rapidly expanding world population at a sustainable price. The industry remains dependent on chemicals for the control of select pests species.

What About Organic?

Organically grown produce has obtained a degree of popularity in recent years. Organic farming controls pests without the use of synthetic chemicals and is a system of cultivation with fewer inputs and lower impact than conventionally grown food. There is acreage in cranberry production in southeastern Massachusetts that is grown organically. Unfortunately cost of production for organically grown fruit is much higher than that grown with the help of chemical control. It is important to keep in mind that the wetland-growing environment of cranberries is host to many competing and predatory organisms for the vines. Without the assistance of chemical controls, costs rise rapidly to cover losses from increased labor and reduced yields. Ultimately the grower is in a business and must respond to the market to stay in it. As demand for organic fruit rises, undoubtedly so will organic acreage. Until then, conventionally grown fruit will supply safe and affordably grown fruit for the public.

How are Pesticides Made to be Safe?

Pesticides can be innately hazardous so a common concern is what is done to make them safe for food and in the natural environment. The United States has some of the strictest environmental and worker protection standards in the world. Moreover, the Commonwealth of Massachusetts has among the strictest laws in the country. Below you will see how pesticides are created, regulated and used responsibly from their creation to the application in the field.

1. EPA Federal Registration

Ensuring pesticide safety starts at the very earliest stages of the development of a pesticide. For a pesticide to become registered and legal for use in any given state, it must go through a pesticide evaluation by the Environmental Protection Agency (EPA). Pesticide registration is the process through which EPA examines the ingredients of a pesticide; the site or crop on which it is to be used; the amount, frequency and timing of its use; and storage and disposal practices. EPA evaluates the pesticide to ensure that it will not have unreasonable adverse effects on humans, the environment and non-target species. A pesticide cannot be legally used if it has not been registered with EPA's Office of Pesticide Programs.



Cranberry Fruitworm

2. State Registration

If the pesticide meets federal guidelines for efficacy and safety to humans and the environment, then some states, Massachusetts included, will require a state registration. The Massachusetts Department of Agriculture (DAR) and the Department of Public Health administer pesticide registration and evaluates a registration using the same criteria as the EPA but with tougher standards. Because the cranberry industry is a minor crop with far fewer acres than corn, soybeans etc. pesticide manufacturers may not have an economic incentive in paying for the cost of registration and evaluation of a new pesticide. To this end, the collaboration of science done by the UMass Cranberry Station and the work of the supporting cranberry trade organizations help to ensure that growers are equipped with the necessary tools to use in an environmentally responsible manner.

Registration of a pesticide is a vigorous process in the commonwealth. Once the review by MDAR and the Department of Public Health take place, the application is passed to The Pesticide Board Subcommittee for consideration. MDAR, The Department of Environmental Protection, The Department of Fisheries and Wildlife, The Department of Food and Health, and The Division of Food and Drugs all take part in the review of pesticides proposed for registration.

3. Sign Posting

As part of the registration process at both the federal and state levels, pesticide toxicity is quantified to determine its hazard to people. Because the majority of pesticides break down to non-hazardous by-products relatively quickly, one of the best ways to mitigate any threat to people is to keep them away from pesticide applications. Communicating potentially hazardous application is done with sign posting. “EPA Worker Protection Signs” and Federal Chemigation Signs” are two signs commonly used in the cranberry industry. During aerial application, an EPA worker protection sign will always be displayed. Chemigation signs are displayed only when restricted use (more hazardous) pesticides are being applied through the chemigation system. These signs have a slightly different look though both state very clearly that pesticides are being or have been used and that you are to “**keep out**”. The absence of sign postings is not a license to enter the bog. Ground applications rarely require sign posting though re-entry intervals onto the bog (as set by the pesticide label) may be up to two days after an application. **You should only enter the bog and its surroundings with permission from the owner.**



EPA Worker Protection Sign

4. The Pesticide Label

The label on the pesticide container details the EPA’s requirements for usage of that pesticide and is the law. This label will tell applicators the appropriate environmental conditions in which they may apply a pesticide and in what quantities needed to control specific pests. The pesticide label contains a set of “rules” relating to the application of that pesticide. Information included in the label is the **Re-Entry Interval (REI)** and the **Pre-Harvest Interval (PHI)**. The REI dictates how long people must stay off a bog after application. The PHI indicates how long the grower must wait after application until harvest, thus helping to ensure a safe food supply. Adherence to PHI standards is strictly enforced by the handlers that market cranberry products through audits of grower records.



Cranberry Weevil

5. Pesticide Licensing

In addition to new product registration, MDAR’s Pesticide Bureau also administers pesticide licensing and record-keeping requirements. Licenses are offered for those selling pesticides and for applicators, whether they are for hire or applying for themselves. Testing is required to obtain

a license. In addition, MDAR requires a certification for license holders who will be applying “restricted use” pesticides. To maintain their licenses growers pay annual fees and are required to participate in MDAR approved continuing education workshops throughout the year.

6. Record Keeping

MDAR and the EPA also require that growers keep records of their pesticide applications. These records help ensure that environmentally safe application procedures are being followed as well as the EPA established Worker Protection Standards. Ensuring that such records are kept are inspectors from MDAR’s pesticide bureau who occasionally come to a grower’s farm to evaluate their adherence to pesticide regulations. In addition to these site inspections MDAR conducts audits to make sure licensing requirements are being met. The Cape Cod Cranberry Growers’ Association is currently working to implement computerized record keeping in the industry in an effort to streamline the process for growers.

7. Pesticide Storage and Disposal

The EPA provides storage requirements for all pesticides. The Massachusetts Department of Environmental Protection (DEP) along with the Massachusetts Department of Fire Services regulates pesticide storage to protect water resources. Label requirements indicate how pesticides can be stored in a safe manner. In addition pesticide disposal is regulated and safely administered through MDAR’s pesticide disposal programs.

8. Worker Protection Standards

The people most in danger of pesticide exposure are the applicators, growers and their employees who come in contact with pesticides throughout the growing season. The United States EPA has developed Worker Protection Standards codifying what precautions applicators must take to ensure their own safety. These standards dictate what protective clothing and application procedures must be used when applying. Record keeping to ensure adherence to worker protection standards is required.

The Big Picture

A conscientious approach by growers and a strong network of researchers and industry specialists ensure that pesticides are used safely and responsibly from their inception to use to disposal. Growers rely on a healthy environment to successfully farm a cranberry bog. By following these established practices now and into the future the cranberry growers of Southeastern Massachusetts will continue to supply a safe, high quality product while remaining stewards of the environment.

For More information

For more information on cranberry production and related issues please visit the following urls:

- The UMass Cranberry Station: www.umass.edu/cranberry
- The Massachusetts Department of Agriculture: www.mass.gov/agr
- The Massachusetts Department of Environmental Protection: www.mass.gov/dep
- The United States Environmental Protection Agency: www.epa.gov
- The United States Department of Agriculture: www.usda.gov
- Cornell University Pesticide Management Education Program: <http://pmep.cce.cornell.edu/>

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