

# CRANBERRY BACK TO BASICS COURSE

Welcome to the Cranberry Back to Basics Course, a modular self-paced training to walk you through basic production and integrated pest management (IPM) options in Wisconsin.

This course will provide a primer on cranberry production, hit on key aspects in fertility, water, insect, disease, weed and fruit quality management, and include some new hot topics for the industry. Each of the modules has a quick overview and several topics with a corresponding video with further details. You can go in the sequential order below or skip around to topics that interest you! (For a link to the complete playlist, see the last page.)



*Why do we need a back to basics course for cranberries?*



## MODULE 1: IN-SEASON PRODUCTION

Cranberries are woody plants grown in beds. They bloom in late June or early July and need pollinators to help transfer pollen between flowers. Cranberry fruit is then formed and harvested about 75 to 100 days after pollination. This section focuses on irrigation, fertilization and crop management to ensure proper fruit quality.



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### 1. Why is in-season production management important?

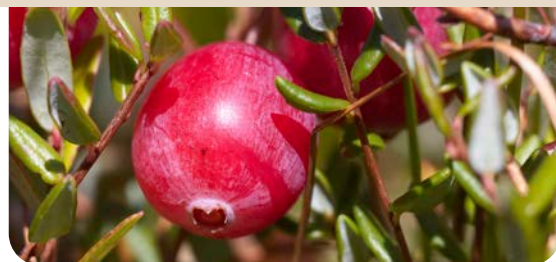
In-season management is essential to maximize fruit quality and yield. An overview of the practices that optimize fruit quality will be found in this section.



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### 2. How does crop management affect berry quality?

Berry color develops when light is intercepted, so the crop canopy needs to be managed to ensure all cranberries receive light. Nitrogen fertilization and irrigation encourage vegetative growth. Optimizing nitrogen rates will help limit vine growth so berries can receive the light needed for good color at harvest.



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### 3. How do you design a crop fertility management program?

Application records, bed history and accurate tissue samples are essential to develop a proper fertility plan. A comprehensive nutrient management plan includes fertilizer application rates and timings to ensure proper plant fertility. Split applications of nitrogen fertilizer can help avoid the risk of vine overgrowth. For tissue analysis, sample the new growth in mid-August to mid-September. This information will help make a fertility plan for the next growing season.





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#### 4. What are the challenges in irrigation management?

Irrigation is critical to ensure proper crop growth and berry production in the current and future growing season given the perennial nature of the crop. Tensiometers are the preferred method to measure soil moisture levels. Irrigation systems vary, but checking sprinklers and moisture in each bed helps ensure proper water management.



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#### 5. What affects fruit quality?

Proper nutrient management is essential to high quality fruit. For example, too little nitrogen will limit fruit size development but too much can result in soft berries and increase fruit rot risk. Frost protection, especially in spring, is also important as it can affect fruit quality, so temperature monitoring is essential.



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#### 6. What is the view from a family cranberry farm?

Cranberries are native to Wisconsin and have been grown commercially for many generations. Listen to a view from the farm where Amber Bristow discusses their family cranberry operation.



Amber Bristow

## MODULE 2: IN-SEASON INSECT MANAGEMENT

Several insects are pests of cranberries. Some are major pests that are problems each year, while others are occasional pests. Some attack fruit directly causing yield and quality concerns, while others harm vines and limit growth. In either case, damage can reduce economic returns. In this section, the focus will be on identification, management and control options.



1 of 7

#### 1. What is IPM for cranberry crops?

Integrated pest management (IPM) consists of a combination of decision-making tools and diversified management strategies used within a system to combat pests. Here is an overview of IPM for cranberry systems.



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#### 2. Why is in-season insect management important?

Insect pests are often native and have evolved along with the cranberry plant. In Wisconsin there are around 10-15 insect pests, a few that are problematic every season while most are secondary, occasional pests. Direct pests feed on the fruit directly while indirect pests feed on the foliage or roots causing plant damage that ultimately reduces crop growth and yield. Proper identification, knowledge of the life cycle, and scouting are important aspects of insect management.







3 of 7

### ***3. How do you monitor for insects?***

Proper monitoring is essential to know when pests arrive in cranberry beds, when they peak, when they decline and when is the proper timing and effectiveness of management strategies. Monitoring also gives an idea of the spatial distribution of the insect pests. Sweep nets are used to monitor insects in cranberry beds. Pheromone traps placed at the bed edges can be used to determine population of lepidopteran pests. Finally, scouting the field and looking at signs of infestations especially on berries or on webbed uprights should be used.



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### ***4. What are the key insect pests in cranberries?***

Cranberry fruitworm, sparganothis fruitworm, blackheaded fireworm and flea beetles are the most important insect pests of cranberry in Wisconsin. Understanding pest biology and life cycles will help determine the best control methods for these pests. This video will encompass these pests, injury seen in cranberry, and some control options for growers.



5 of 7

### ***5. How do pollinators affect cranberry production?***

Insect pollinators move pollen between flowers which helps fruit to fully develop. Bees are essential to cranberry production and most growers rely on rented honeybee hives or purchased bumble bee colonies. Cranberry also hosts a great diversity of wild native bees; promoting and protecting native bees can be done with the establishment of pollinator gardens which maintain flowering plants throughout the season on the marsh.



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### ***6. What control options are available for insect pests in cranberries?***

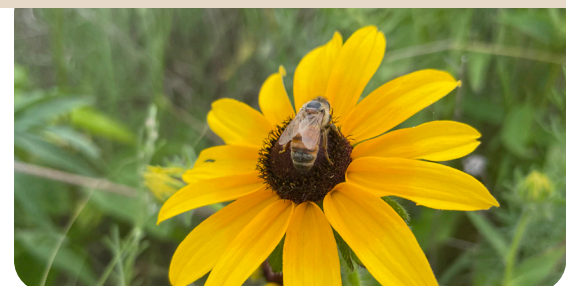
Other management practices for insect control are available, and two keys are mating disruption (limiting insect mating to produce more) and flooding (in late spring for insect pests). Pheromones sources are put out into the system to ultimately limit mating for specific species. Mating disruption has been found to be successful in other fruit systems. Flooding is a successful cultural control strategy for insect controls as it may help limit needs for some insecticide sprays.



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### ***7. Is biological control for cranberry insect pests a viable option?***

Biological control involves using natural enemies, including predators, parasitoids, nematodes, and pathogens. In cranberry, biocontrol options include augmentation (rearing biocontrol agents to be used to attack insect species) and conservation (the ability to help foster naturally occurring biocontrol agents via natural areas or in pollinator gardens).



# MODULE 3: IN-SEASON WEED MANAGEMENT

Weed control is essential to maintain good fruit production and quality and in-season weed management programs should be used to properly manage weed pests. Proper weed management programs include weed identification, integrated pest management (IPM) approaches, resistance management for herbicides, and alternative strategies. This section will explore proper in season weed management options.



1 of 4

## 1. Why is in-season weed management important?

Weeds compete with cranberries for light, water and nutrients and can reduce berry yield and quality. They can also harbor insect and disease pathogens that affect cranberries. Perennial weeds are most problematic in cranberries, so it's important to start with clean beds and maintain them in weed-free conditions to avoid crop competition.



2 of 4

## 2. Why is weed control important?

Weed control in cranberries is a necessity, since weeds use water and nutrients to grow and when they do, they take those needed resources away from the cranberry plants. Other weed concerns include the addition of weed seeds to the weed bank, hosts for alternative cranberry pests (insects or diseases) and reduction in yield and quality of the cranberry fruit.



3 of 4

## 3. How do herbicides work?

Herbicides are the primary method to control weeds. Cranberry herbicides can be broken down into several categories based on how they work: pre-emergent vs. post-emergent weed control, contact vs. residual control and based on the weed control spectrum. Proper application timing is critical for optimal weed control and varies by herbicide. Residual weed control with herbicides varies with soil type and pH, organic matter and weather conditions.

### Herbicide leaching

- Greatest in coarse textured soils with low organic matter, like sands
- Determined by herbicide solubility in water and adsorption to soil
- Herbicides in soil water are most biologically active, but can leach



4 of 4

## 4. What are the benefits and risks of reducing pesticide use?

Pesticides can be a costly input in cranberry production so growers often consider reducing rates or applications. In this section, the benefits and risks of this practice are discussed beyond the cost savings, such as the risk for selecting resistant pests and pest buildup in soil over time.

How do you know when to reduce rates?

Pest resistance risk – Is it a high pesticide site of action? How many already resistant?

Is there a pest threshold established? What does that look like relative to the crop?

What is your on-marsh experience? target pest susceptibility and crop tolerance to the pesticide?



# MODULE 4: IN-SEASON DISEASE MANAGEMENT

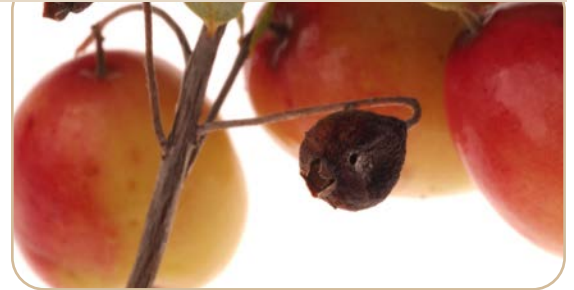
Timely disease prediction, management intervention and cultural controls are necessary to ensure cranberry growth and development. Traditionally, fungicides are used to prevent diseases, but in this section we will discuss the basics of disease management and disease development, scouting options and integrated tactics for disease management.



1 of 4

## 1. Why is in-season disease management important?

In-season disease management is important because this is when pathogens are active and can be spread in cranberry beds. Diseases manifest when there is a susceptible host, a virulent pathogen, and a conducive environment. Fortunately, in-season disease control strategies aim to protect the vines at their most vulnerable stages from virulent pathogens and reduce conditions that favor the pathogen.



2 of 4

## 2. What are the key diseases in cranberries?

Wisconsin has four main cranberry diseases: fruit rot, cranberry false blossom, cranberry viruses, and stem gall. These are either fungal, bacterial or viral diseases. Different management options, from maintaining fruit quality, minimizing damage, or limiting insect vectors are discussed for each disease.



3 of 4

## 3. What are the monitoring options for diseases?

False blossom symptoms should be monitored starting at bloom and require scouts to closely examine plants for concerns such as malformed flowers or aborted fruit from the previous year. After harvest, fruit rot can be minimized by limiting prolonged exposure to water and refrigerating fruit since colder temperatures are not conducive to fruit rot development.



4 of 4

## 4. What are some occasional disease concerns?

Some diseases of cranberry occur less frequently, including various leaf spot diseases and upright dieback. Leaf spot diseases are caused by fungi and are generally managed by fungicides used to control fruit rot. Upright dieback is also caused by a fungal pathogen and development of the disease is frequently linked to vine stress. To ensure proper diagnosis, samples can be sent to the UW-Madison Plant Disease Diagnostic Clinic.



## MODULE 5: HARVEST MANAGEMENT

Cranberries are harvested in the fall and typically sent to either the fresh or processed markets. This section briefly reviews the harvest process and then will provide an overview of market expectations for berry yield and quality.



1 of 2

### 1. How can berry quality be protected during harvest?

Fruit quality is influenced by flooding and temperatures which can stress plants at harvest. Improper harvest management can result in fruit rot, especially when temperatures are high and flood waters are warm. Harvest timing should be coordinated with the handler to optimize fruit quality such as color and berry firmness.



2 of 2

### 2. How are vines protected during harvest?

Training vines to effectively harvest can reduce plant damage. Initially vines are grown upright, but training vines in one direction helps protect the vines during harrowing (similar to raking the vines to knock berries off) and harvest must be done in the same direction each year. Drive in ramps for in- and out-traffic help prevent vine damage. Harvest floods float the berries to make fruit harvest more efficient and cause less stress and damage to the fruit. Fruit is then lifted with plant residue sorted out from the berries and transported to handlers.



## MODULE 6: PESTICIDES AND RESISTANCE MANAGEMENT

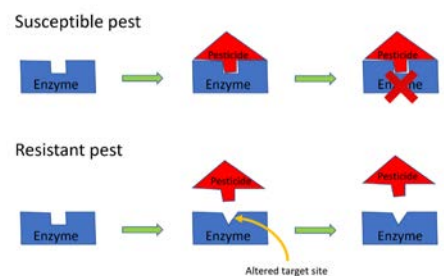
Pesticides are key components and needed for production, but also need to be used in appropriate and timely manners. This section reviews pesticide risks, resistance management & sprayer calibration to ensure proper pesticide application.



1 of 2

### 1. Why is resistance management important?

Pesticide resistance is a genetic change in insects, diseases and weeds. Target site resistance is when an altered mutation occurs in the pest so a pesticide can no longer work. Metabolic resistance is when the pest is able to metabolize (break-down) the effectiveness of the pesticide using various plant enzymes. Along with other control strategies, pesticide resistance planning both within the season and over the rotation is key to help maintain pesticide effectiveness.



2 of 2

### 2. How are sprayers calibrated for accurate applications?

Sprayer calibration and proper pesticide application help maximize product efficacy. Growers should know the proper nozzle types and spray rates for each application. This video will provide details on how, when, and why you should calibrate your sprayer.



## MODULE 7: OVERWINTER MANAGEMENT

As a perennial crop, cranberries need a mechanism to survive during Wisconsin's winters. To achieve this, growers use ice to protect the vines beneath from freeze damage. This section provides an overview of plant management during winter and describes the need for ice over the beds to protect vines and how that's made. Details on vine acclimation to winter and de-acclimation in spring are discussed.



1 of 2

### *1. Why is winter ice important and how is it formed?*

An ice flood is put on cranberry beds when weather forecasts include consistently low temperatures that will support rapid and thick ice formation.



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### *2. How does ice protect cranberry vines?*

A layer of ice over the vines will act as insulation, protecting the buds and leaves from extreme cold temperatures and desiccating wind during winter. Thick ice above the vines protects the plants from excessively low temperatures and variable weather conditions. Cold damage is a result of vines experiencing freezing conditions and the formation of ice in their tissues. Cold damage is expressed through leaf drop in the spring, limited bud break, and/or reduced bloom. Proper winter protection can help prevent cold damage.



## MODULE 8: NEW DIRECTIONS IN CRANBERRY PRODUCTION

New technologies such as aerial imagery, remote sensing and drones are now becoming part of agriculture. This section explains how these technologies and resulting images are starting to be used in cranberry production and how they can benefit growers.



1 of 1

### *1. Is there potential for using remote sensing & aerial imagery in cranberries?*

Remote sensing and using drones for images and video analysis of cranberry beds is new to the cranberry industry. These approaches could be very applicable to the industry in the near future. This video will discuss ways to use remote sensing and how this can translate to benefits for cranberry producers.





# MODULE 9: THE IMPORTANCE OF GENETICS IN CRANBERRY PRODUCTION

Cranberry breeding creates new varieties with specific quality and industry plant characteristics. This section highlights the history of cranberry domestication, how breeding is initiated in greenhouses, and when genetic tests are used to ensure purity and quality.



1 of 2

## 1. What is the history of the cranberry breeding program?

Learn about cranberry domestication, current varieties, and how new varieties have been developed.



2 of 5

## 2. How and why do we breed cranberries?

Cranberry breeding starts with the process of cross pollination in the greenhouse to create new hybrids with ideal characteristics.



3 of 5

## 3. What is 'cranberry x blueberry' interspecific hybridization?

New hybrids are being created using alternate crops (like blueberry) to introduce desirable characteristics into cranberries.



4 of 5

## 4. Is genetic testing used in cranberries?

Cranberry production is a monoculture but if genetic contamination concerns arise, growers can use genetic testing to evaluate their crop.



5 of 5

## 5. How do you evaluate cranberry fruit quality?

Fruit quality is routinely tested for color, size, shape and firmness; these are considered key traits in cranberry production.



[Click or scan to view the entire Cranberry Course playlist on YouTube](#)



## CREDITS

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