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Disease Management

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CROP AND PEST MANAGEMENT BMPs

Disease Management

Applying an integrated scheme for the control of plant diseases can be a viable approach for many cranberry growers. Sanitation, proper irrigation schedules, resistant varieties, fungicides, and various cultural techniques can be used as components of a disease management program. Success of any control measure hinges upon the correct identification of the causal agent (the pathogen). Some diseases have distinctive field symptoms, but most disease identification should be confirmed by a diagnostic clinic or plant pathology laboratory. By utilizing more than one control measure, a grower may be able to reduce the chance of significant crop loss from infection by plant pathogens.

Disease management implies more than the application of chemicals at the appropriate time in the season. Knowledge of the life cycle of the pathogen, symptoms, as well as the conditions that predispose the plant to infection, contributes to effective management of cranberry diseases. Implementing cultural practices, such as trash removal, sanding, or improving bog drainage, offers opportunities to broaden the baseline defense against crop loss due to plant disease. Follow the recommended practices to encourage the natural defense mechanisms in the plant, make conditions in the bog less favorable for disease development, and decrease the presence and activity of plant pathogens.

Recommended Practices

Scout for disease problems.

Measure areas of affected vines or mark with flags. Make adjustments in your disease management program before appreciable economic loss occurs. Keep annual records that document the presence or increase of specific diseases for each bog. Incorporate keeping quality forecasts into your fruit rot management program.

Obtain proper diagnosis of new disease problems.

If the disease problem is unfamiliar or atypical of symptoms observed in the past, or if you are not getting expected response to control measures, consult with a plant pathologist. Improper diagnosis can delay the implementation of appropriate control measures and result in considerable economic loss. Refer to the Compendium of Blueberry and Cranberry Diseases for aids in identification and more information.

Adopt cultural disease control practices.

Sand on a regular basis to bury pathogen-infested leaf litter. Use late water floods to reduce the incidence of fruit rot for that season. Plant new bogs with vines taken from healthy bogs.

When leaving a Phytophthora-infested site, wash down picking equipment and boots with a 5% bleach solution. Take all precautions to reduce the movement of soil, water, and plant material from diseased bogs to non-infested bogs in order to limit the spread of pathogens.

Prune lush vines to promote good air circulation, reduce localized humidity, and speed the drying-out process.

Properly dispose of trash piles following harvest to remove sources of fruit rot fungal spores.

Symptoms of fairy ring disease on a cranberry farm

Remove trash from the bog area during or after harvest.

Cranberry leaves, stems, and fruits left behind after harvest are colonized by fruit rot fungi. Trash can serve as a source of primary inoculum for infection of uprights, blossoms, or fruit in subsequent seasons. Do not leave trash in piles around the bog. Move trash to the furthest reasonable distance from the production site. Avoid stockpiling trash upwind from the bog wherever possible.

For dry-harvested bogs, use a post-harvest flood in the fall. Any remaining trash should be removed from the winter flood before it is released.

Remove trash from a water-harvested bog during harvest or as soon after as possible.

Proper use of water is an important component to successful disease management.

Run sprinkler systems for at least 4-5 hours in the early morning when irrigation is necessary. Short (1-2 hr), frequent intervals of watering on established bogs promote shallow root growth that is more susceptible to heat and drought stress.

Newly planted bogs may need to be watered daily in short episodes (about 2 hr) until vines are established.

Schedule your irrigation such that you do not extend the period of time that the vines are continuously wet. Infection by fruit rot fungi is favored when the fruit and vines are continuously wet for long periods.

Reduce the movement of water from diseased bogs to non-infested bogs to limit the spread of pathogens.

Use practices that minimize plant stress or lush growth. Avoid promoting conditions that favor pathogen infection.

Avoid excessive nitrogen applications and improve bog drainage. Thick vine growth and poor drainage often prevent rapid drying and favor infection by fruit rot fungi.

Example of lush vine growth

Reduce plant stress from drought and heat. Irrigate vines to provide evaporative cooling. Sprinklers should be run for at least 1 hour and continue irrigating to keep the vines damp until the sheltered temperature falls below 85 F.

When conditions favor oxygen deficiency (e.g., snow cover, clouded ice, sand on ice), withdraw water from beneath the ice to provide air circulation. Winter injury may be minimized by keeping the bog flooded when soil is frozen and/or cold, windy conditions are predicted. Vines under stress (including heat, drought, and those injured by frost) are more susceptible to upright dieback.

Properly apply insecticides, herbicides, and fertilizers throughout the season. Plants weakened by pest pressures, phytotoxicity, or poor nutrition management are more susceptible to disease.

Plant new or renovated bogs with varieties that exhibit disease resistance.

The most commonly used varieties in Massachusetts are listed from the most resistant to least resistant to fruit rot organisms: Stevens, Howes, Franklin, Bergman, Early Black, McFarlin, Ben Lear, and Crowley.

Black Veil, Foxboro Howes, Matthews, Shaw's Success, and Wilcox have shown good fruit rot resistance in experimental field trials. Current availability of these varieties is limited.

Thus far, Crimson Queen, Demoranville, Grygleski, HyRed and Mullica Queen all appear to be susceptible to fruit rot, although it is not possible to rate them from most susceptible to least susceptible at this time.

No variety appears to be resistant to *Phytophthora cinnamomi*, although Stevens and Black Veil appear to be less susceptible to attack by the pathogen than other varieties.

To confirm a variety is true to type, bring uprights and *attached fruit* to the UMass Cranberry Station. Varieties can also be identified by sending samples to the Marucci Center, Rutgers for DNA fingerprinting. There will be a fee for this service.

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Minimize mechanical injury to fruit during dry harvesting.

The incidence of storage rot may be increased when fruit are injured by improperly operating harvesting machines. Injured fruit are more susceptible to infection because the fungi can

enter though the wounds. Exercise caution when dumping berries into empty bins. Take all precautions to minimize fruit bruising.

Fungicides may need to be integrated with cultural controls to obtain adequate disease management.

For most fungal disease problems in cranberries, control is obtained by preventing initial attack by the pathogen. A steady increase or noticeable change in disease problems over a few years may indicate a need to adjust your disease management program.

When multiple fungicide applications are employed as they are for fruit rot management, utilize fungicides with different modes of action against the fungal pathogens to avoid resistance development.

If you use fungicides late in the season, use less persistent fungicides at the lowest effective rate to reduce fungicide residue on fruit.

For each application system, determine and use the optimum amount of water, pressure, injection timing, etc., needed to obtain a good distribution of fungicide.

Based on conditions on your bogs, use the lowest effective rate and number of fungicide applications for fruit rot control.

When the Keeping Quality Forecast, as reported by the UMass Cranberry Station, is favorable and/or a bog has a history of low rot, consider using reduced rates of fungicides that control fruit rot fungi. Fewer applications of mid to high range rates may also be considered.

If a late water flood was used, the number of fungicide applications for fruit rot control can be reduced without compromising fruit rot control.

Cranberries with fruit rot symptoms

Consider using less fungicide per season (lower rates or fewer number of applications) if berries are grown for the processed fruit market rather than the fresh fruit market. You are only protecting against field rot as compared to field and storage rot for fresh fruit. In years of good to excellent keeping quality forecasts, no fungicides should be applied on late water bogs with berries grown for the processed market.

Keep accurate records.

Accurate records of fungicide applications are essential for farm planning and performance evaluation. Fungicide application dates, formulations and rates used, keeping quality forecasts

(preliminary and final), and fruit rot history should be recorded on an annual basis. Maintain records of any clinical diagnosis performed.

For more information:

Caruso, F. L. et al. 2010. Compendium of blueberry, cranberry and lingonberry diseases. American Phytopathological Society Press, St. Paul, MN. (currently in press).

Cranberry Bog Construction and Renovation and Water Management BMPs in this series.

Cranberry chart book - Management guide for Massachusetts. University of Massachusetts Cranberry Station. http://scholarworks.umass.edu/cranchart/.

Sandler, H.A. and C.J. DeMoranville. 2008. Cranberry production: a guide for Massachusetts, CP-08. UMass Extension Publ.

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Disease Management Checklist

✓ Obtain proper diagnosis of new disease problems.

✓ Practice good sanitation measures.

✓ When using fungicides, alternate different fungicide classes to avoid resistance by the fruit rot fungal pathogens.

✓ Schedule irrigation to minimize leaf wetness periods.

✓ Use the Keeping Quality Forecast to plan fruit rot management.

✓ Employ cultural practices that maintain good air movement in the vine canopy.