

BRAMBLE DISEASE MANAGEMENT- AN OUNCE OF PREVENTION IS WORTH A POUND OF CURE!



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What does it take to consistently produce high quality bramble fruit? Some would say sheer luck; others might cite things like favorable weather, excellent soil, the “proper” cultivars, a good fertilizer program, ample irrigation, excellent pest management, etc. And, in fact, all of these things in concert determine final fruit quality.

That said, let's consider in particular disease management and the direct and indirect impact it has on fruit quality. Gray mold is a perennial problem in bramble fruit production, and is the number one cause of loss of fruit quality and yield. Cane diseases and root rots (spur and cane blights, Phytophthora root rot, Verticillium wilt) weaken brambles over time to such a degree yields are reduced or in some instances, lost. They may also make brambles more susceptible to winter injury and subsequent death. Other bramble pathogens such as powdery mildews, rusts and anthracnose may infect multiple plant parts including leaves, canes, flower buds, and fruit. Virus diseases such as Raspberry Mosaic Virus Complex or Crumbly Berry may reduce plant vigor and productivity and/or fruit quality.

What's the secret, then, to good bramble disease management? It's quite simple: Bramble disease management needs to be proactive to be successful!

While the concept itself is simple to understand, the implementation of it involves serious forethought and energy. Successful bramble disease management requires a short-term commitment to get it started in your operation, and a long-term commitment to sustain it as part of your every day operation. Let's take a look at the steps involved in setting up a proactive bramble disease management program. We will start at ground zero with a new planting and then work through disease control strategies for established plantings. We will finish up with a bramble disease management checklist by way of review. Ready? Set? Go!

Before You Grow

Whether you are a first time grower or have been in the business for an extended period, there are some basic things to consider in terms of disease management before you put in a new planting. There are 4 key items that you need to identify before you begin: your plant host, potential diseases, environmental conditions favoring their build up, and potential control strategies.

Know your hosts

There is, for the most part, some degree of host susceptibility/resistance to each of the bramble diseases previously discussed. That means the cultivar you select may determine in part what disease problems you face. Do your homework and determine to which diseases your host is most susceptible. Does the dollar return on sales substantiate the investment needed for disease control on a particularly susceptible variety? If not, consider selecting an alternate variety of comparable quality with greater host resistance. Does the planting site or some portion of it favor development of a particular disease? If so, be sure to put your most resistant varieties in that area and locate more susceptible varieties on more favorable sites. A word of warning, in the case of root rot diseases, even the most resistant cultivars may fail under favorable environmental conditions and high disease pressure...

Identify potential diseases

Now that you have researched your hosts and know their relative susceptibilities to various diseases, you need to explore what diseases may pose a threat in your area. What bramble

diseases are most common in your geographic region? Your locality? Are there other operations in the vicinity? What disease issues do they have?

Determine Environmental Conditions Favoring Disease Development

Take a good look at your planting site. Then look again. And again...Is there an air or water drainage issue that cannot be redressed? Is it located next to hedge rows or abandoned fields with high populations of wild brambles? Is it in a frost pocket that may result in cane injury? Perhaps it's an exposed site with a lot of strong winds. Or a site next to a hedgerow which is shaded a good part of the day. What were the crops previously grown on that site? Crop history in solanaceous plants such as potatoes, tomatoes, peppers etc. may have facilitated population buildup of Verticillium, which may persist in soil over periods of 10 years or longer. Even solanaceous weeds, such as nightshade serve as hosts for Verticillium.

One or more of these factors may favor disease development in your new planting.

What time of year are diseases most likely to occur? How often do they occur during the season? What conditions favor their build up? Are they weather related? Related to host growth stage? At what point do you need to take action? Are there established action thresholds?

Explore short-term and long-term control options

What are your options to help prevent an outbreak? They are three-fold: cultural, biological, and chemical.

Cultural methods - Exclude, Inhibit or Limit, and Eradicate! Starting with disease free plants is important for all diseases, but particularly important for orange rust and viruses. Always check to see if disease resistant cultivars are available and use them if feasible.

Select sites, soils and planting designs carefully to maximize air and water drainage. Maintain plant health by properly managing soil nutrition and irrigation, and minimizing plant wounding. Use physical barriers such as distance, mulches, row covers etc. Remove and destroy debris from pruning and harvesting operations immediately. Harvest ripe fruit promptly.

And finally, remove infected plants as soon as they are identified; this is especially important in the case of orange rust or viruses.

Biological methods – Perhaps you have heard the saying “Little bugs have little bugs to bite ‘em, lesser bugs have lesser bugs, and ad infinitum!” More and more biological control organisms are now being produced on a commercial basis and may be available for use in disease suppression or prevention. For example, there is now a benign strain of the crown gall bacterium (K84) that maybe applied to bramble cuttings to help prevent infection by more virulent strains. Other pathogen predators, parasites or competitors may have been identified and made available commercially to help in the fight against bramble diseases.

Chemical methods - What disease control products, if any, are available to you as a commercial grower, as an organic grower? Check out these websites for more information:

Products labeled for use in NY State:

<http://www.pmep.cce.cornell.edu>

OMRI approved products (organic)

http://www.omri.org/OMRI_datatable.htm

When You Suspect a Disease

Like death and taxes, disease problems are inevitable. The steps above can often help delay or minimize the occurrence of diseases, but will not completely eliminate them. So, what to do if you suspect a disease? Now's the time to get out your hand lens and do a little detective work!

Sleuth out the Suspects

There are three prerequisites to disease detection- a keen eye, frequent observation, and good notes!

It's good to get out in the field early in the season and keep good notes about your plants' health. Use notes on healthy growth and development as a "baseline EKG" to evaluate how plants are doing during the course of the current season or between seasons. This makes it easier to spot occurrences of an unusual nature: one section of field that is behind in growth compared to another, brown flecking on leaves, wilting, spots on canes, yellowing of green tissue, dead canes, swellings, stunted plants, etc.



Be sure to bring along the tools of the trade and do some CSI investigating of your own. These tools might include a field pack with the following: hand-lens, sample bags, trowel, pocket knife, pruner, permanent marker, note book, pencils or pens, and a map of each field to be scouted, pocket ID guides.

Record disease information on the maps during scouting; use maps to calculate areas for control measures, if needed.

Look for anything out of the ordinary. Record the specific plant part affected, and how it differs from a healthy plant (symptoms). Note the presence or absence of a pathogen (signs). Are there patterns of distribution on the plant, in the row, in the field? Does the appearance of damage (symptoms) correlate with a specific event: weather, crop production procedure, chemical application, other...)?

Table 1. Bramble Development and Associated Diseases

<u>Summer-Fruiting Raspberries/Blackberries</u>	<u>Primocane-Fruiting Raspberries</u>
<ul style="list-style-type: none">• <i>Bud break</i><ul style="list-style-type: none">○ Anthracnose○ Spur blight (red raspberries)○ Cane blight• <i>Early bloom</i><ul style="list-style-type: none">○ Gray mold○ Powdery mildew• <i>Full bloom</i><ul style="list-style-type: none">○ Gray mold○ Powdery mildew	<ul style="list-style-type: none">• <i>From petal fall through the beginning of harvest</i><ul style="list-style-type: none">○ Gray mold <p><u>Special Pests</u></p> <ul style="list-style-type: none">• Raspberry leaf spot• Orange rust• Verticillium wilt• Phytophthora root rot• Crumbly berry• Mosaic virus complex•

Confirm Your Diagnosis

Have good diagnostic resources and/or references at your disposal on the farm or online to help in making your initial diagnosis. A list of suggested bramble resources is provided for you in the bibliography following this article.

Remember, not all disease is caused by a living organism such as a fungus, bacterium, virus, etc. Abiotic diseases often occur and may have symptoms similar to those caused by pathogens. Here is a short review of probable causes of abiotic disease:

- *Nutrient extremes*
 - deficiencies, toxicities
- *Temperature extremes*
 - winter/frost injury, ultraviolet radiation/heat
- *Moisture extremes*
 - drought, flooding, relative humidity
- *Phytotoxicity*
 - adverse reactions to chemicals

- *Environmental damage*
 - wind, hail, lightning strikes
 - air pollution, acid rain, wildlife
 - mechanical injuries and wounds

Consult your local cooperative extension office or regional specialist if you are unable to identify the disease with resources at hand. Or alternatively, send a sample to a diagnostic lab for further testing or confirmation.

Apply Control Strategies

Carefully follow all label instructions when applying control products. (Note: Both the crop **and** pest must appear on the NY label!) Always apply products or biologicals at the label recommended rates. Use sufficient volume and pressure to get thorough coverage of plant material. Maintain and calibrate application equipment on a regular basis. Store any remaining product according to manufacturer instructions.

A word to the wise on fungicide resistance development; because brambles are a relatively small market share for fungicide companies, fewer numbers of products are available for use on these crops as compared to other major fruit crops, such as apples or stone fruit. To maximize the efficacy and minimize fungicide resistance development for the limited products available, it is wise to alternate chemistries. See product label instructions for more specific information on managing fungicide resistance.

Once Disease Control Strategies are in Place

Continue to monitor disease-related information after control measures are in use. Was the control measure effective? Has the occurrence or frequency of the disease been reduced to acceptable levels? Is there a need for future concern? Keep records to help determine the effectiveness of your control strategies, and provide information for next year's disease scouting forays. Adjust strategies as needed until acceptable levels of control are achieved.

In Summary

The process described above may seem rather time consuming and involved at first, but will pay big dividends in return for your investment. Once you have implemented it fully, it takes only a small amount of time each week to keep it running smoothly. And by the way, many of the general pest management principals listed above may also be used for insects, weeds, and wildlife! How's that for killing several birds with one stone (no pun intended...well, maybe!) Remember that checklist I promised earlier? Here it is!

Disease Control Strategies- Preplant

- Preplant cover crops for suppression of weeds and soil-borne diseases.
- Resistant cultivars.
- Certified, disease-free planting stock.
- Do not establish new plantings next to wild brambles.
- Select sites with good soil and air drainage.
- Orient crop rows with prevailing breezes.
- Space plants properly.

Disease Control Strategies- Established Plantings

- Maintain overall plant health.
- Thin to proper cane density.
- Maintain narrow rows.
- Avoid high rates of nitrogen; succulent growth encourages disease development.
- Prune out old fruiting canes.
- Remove dead and dying canes after harvest.
- Remove and destroy prunings, infected canes, fruit, and debris promptly.

- Consider dormant applications of lime sulfur.
- Scout weekly.

Bramble Disease Management Resources

PUBLICATIONS:

From Cornell CCE Press:

[Cornell Pest Management Guidelines for Berry Crops](#) (2006) by Pritts, Heidenreich, Carroll, English-Loeb, and Wilcox.

From NRAES Press:

[Bramble Production Guide](#) (NRAES-35) (1991) edited by Marvin Pritts and David Handley. **NOTE:** Second edition is getting ready to go to print.

From APS Press:

[Compendium of Raspberry and Blackberry Diseases and Insects](#) (1991) by M. Ellis, R. Williams and B. Williamson.

From Cornell University Press:

[Weeds of the Northeast](#) (1997) by Richard Uva, Joseph Neal and Joseph DiTomaso.

DIAGNOSTIC SERVICES:

Diseases

To submit samples for disease diagnosis, contact Plant Disease Clinic, Cornell University, Department of Plant Pathology, 334 Plant Science Building, Ithaca, NY 14853-4203, (607) 255-7850, or visit <http://plantclinic.cornell.edu>.

Insects

To submit samples for insect diagnosis or for phone consultations, contact Insect Diagnostic Laboratory, Cornell University, Department of Entomology, 4140 Comstock Hall, Ithaca, NY 14853-2601, (607) 255-3250, or visit www.entomology.cornell.edu/Extension/DiagnosticLab.

Soil/Leaf Analysis

Write to Cornell University, Nutrient Analysis Lab, 804 Bradfield Hall, Ithaca, NY 14853, (607)-255-4540, or visit www.css.cornell.edu/soiltest/.

USEFUL WEBSITES:

Cornell Pest Management Guidelines for Berry Crops

<http://www.fruit.cornell.edu/Berries/pestman/index.html>

Cornell Fruit Website

<http://www.fruit.cornell.edu>

Nursery Guide

<http://www.hort.cornell.edu/nursery>

Berry Diagnostic Tool

<http://www.hort.cornell.edu/diagnostic>

The Tree Fruit and Berry Pathology Website

<http://www.nysaes.cornell.edu/pp/extension/tfabp/>

New York State IPM Program

<http://www.nysipm.cornell.edu/>

IPM Fact Sheets for Berry Crops

<http://nysipm.cornell.edu/factsheets/berries/default.asp>

New York Berry News

<http://www.nysaes.cornell.edu/pp/extension/tfabp/newslett.shtml>

Food Safety

<http://www.gaps.cornell.edu/>

National Clonal Germplasm Repository for Berry Crops

<http://www.ars-grin.gov/cor/>

New York State Berry Growers Association

<http://www.nybga.org>

Wildlife Management Information

<http://wildlifecontrol.info>

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