



NEW HAMPSHIRE VEGETABLE, BERRY & TREE FRUIT NEWSLETTER

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greenhouses in Switzerland in 2001, Italy in 2003, and Belgium in 2004 as well as France in 2004, Israel and New Zealand. Basil downy mildew has also been detected recently for the first time in Iran and several African countries: Cameroon in 2007, South Africa in 2005, Benin and Tanzania. Prior to all these recent out-breaks, basil downy mildew had only been reported in Uganda and that was in 1933. It is possible that a more aggressive pathogen strain evolved in Uganda that is responsible for the recent developments.

EXPECT AND PREPARE FOR DOWNY MILDEW IN BASIL

By Margaret Tuttle McGrath, Cornell University, Long Island Horticultural Research & Extension Center

Downy mildew of basil is a new, destructive disease that is expected to occur routinely in the USA as it has been doing in Europe since first occurrence. Downy mildew was reported as severe at many farms in the northeast USA in 2008, the first year it was observed in this region. Growers generally did not realize their basil had a disease because the most noticeable symptom on affected plants was yellowing, which was assumed to be the result of a nutritional deficiency. The downy-appearing sporulation of the pathogen only develops on lower leaf surfaces. Complete crop loss occurred for some growers because leaves with any injury are unmarketable.

Photographs are posted at:

<http://vegetablemdonline.ppath.cornell.edu/NewsArticles/BasilDowny.html>

Basil downy mildew is a new disease in North America as well as Europe. It was first reported in south FL in October 2007. In 2008 downy mildew was confirmed in both field- and greenhouse-grown basil in many states: NC, PA, NJ, NY, MA, NC, KS, and MO. Likely it occurred elsewhere but was not observed. This disease was also reported in Canada in 2008 and in greenhouse-grown basil in Argentina in February 2008. In 2009 basil downy mildew was found in CA. Reports of basil downy mildew in Europe occurred a few years earlier:

The basil downy mildew pathogen (*Peronospora belbahrii*) can be spread in contaminated seed, in infected basil leaves, and as wind-dispersed spores. Downy mildew also was observed recently on ornamental plants related to basil, in particular coleus and salvia. These plants all belong to the Lamiaceae family, which includes basils (*Ocimum spp.*), mints (*Menta spp.*), sages (*Salvia spp.*) and other aromatics. Recently the coleus and basil downy mildew pathogens were demonstrated to be genetically different; therefore, these ornamental plants are no longer considered potential alternative hosts. However, there are many ornamental basils that are also hosts to the pathogen affecting basil grown for use as an herb. Contaminated seed is most likely the way that the basil downy mildew pathogen has been able to move between geographically-separated areas. Basil is also marketed internationally. The pathogen found in FL has been shown to be genetically the same as that in Switzerland (100% homology in their sequences).



Photo Credit Cornell University – Yellow sections on tops of leaves infected with basil downy mildew

Spores of the basil downy mildew pathogen are capable of being dispersed long distances. Infected basil leaves produce an abundance of spores. Thus the pathogen can spread widely once introduced to an area. This could explain the widespread occurrence of basil downy mildew in the eastern USA in 2008.

With basil downy mildew now established in Florida, a monitoring program is being conducted in 2009 to determine whether this pathogen can move northward through the eastern USA as can occur with the cucurbit downy mildew pathogen, and whether a monitoring program can assist growers to be prepared for downy mildew occurrence in their basil crop. Occurrence of downy mildew in basil is being posted in a spreadsheet accessible at:

<http://vegetablemdonline.ppath.cornell.edu/NewsArticles/BasilDowny.html>

At the bottom of this web page, which can be reached by clicking on 'Please report' at the top of the page, is a section about the program. Clicking on the first link in this section, which has the word 'spreadsheet' in it, opens up the web page with the spreadsheet in Google Docs. The success of this activity depends on reports from anyone growing basil; therefore everyone is encouraged to enter observations. Information is needed about the planting and how the diagnosis was made. Reports are also valuable of locations where downy mildew is not found on basil. There is a spot for indicating if a report is of downy mildew being present or absent.

Another activity in 2009 is sentinel plots with basil located throughout the eastern US. This formal monitoring activity is being conducted as an add-on to the *ipm*PIPE cucurbit downy mildew monitoring program. For this program, sentinel plots with various cucurbit crop types are set-up throughout the eastern USA, from FL and TX to NY and WI, as well as southern Canada, and routinely examined for symptoms of downy mildew. There were 83 sentinel plots in 2008. Basil is being grown at many of the sentinel plots in 2009.

Using seed not infested with the basil downy mildew pathogen and applying fungicides are the management practices for downy mildew. Variety evaluations have not been conducted yet to determine if there are inherent differences among varieties; no genetic resistance has been detected yet. Genovese basil seems very susceptible while Nufar basil appears to be least susceptible, but this is based on observations; they have not been compared yet in replicated experiments to assess whether they are significantly different from other basil. Experiments are being conducted this year. Nufar has pointy leaves with serrated edges. Few fungicides are currently labeled for this new disease. There are two phosphorous acid

fungicides, ProPhyt and K-Phite, that have downy mildew under herbs on the current label. These fungicides were effective in fungicide efficacy experiments with applications started before or after initial symptoms were found. Actinovate AG is an OMRI-listed fungicide that is labeled for use on herbs and for suppressing foliar diseases including downy mildew. Amistar is labeled for use on basil but not specifically for downy mildew; it is effective. Other fungicides are expected to be labeled for this use in the future. Applying fungicides frequently and preferably starting before first symptoms are considered necessary to control downy mildew effectively. Practices that minimize leaf wetness can contribute to control; these include planting where there is good air movement with rows parallel to the prevailing wind direction, maximizing plant spacing, and using drip irrigation.



Photo Credit Cornell University – Gray-brown sporulation of basil downy mildew on undersides of infected basil leaves

To determine when to initiate a fungicide program and also when it is warranted to consider harvesting early to avoid losses to downy mildew, growers should not only routinely check the on-line spreadsheet to determine when downy mildew is occurring on basil nearby, but also regularly inspect their crop for symptoms. The cucurbit downy mildew forecasting web site (<http://cdm.ipmpipe.org>) might be useful for predicting when conditions are favorable for basil downy mildew since both pathogens likely have similar requirements for successful wind dispersal long distances (e.g. overcast skies) and subsequent infection (e.g. wet leaves). Summer is not a time to forget about this disease: unlike most other downy mildew pathogens, e.g. the ones affecting lettuce and cruciferous crops, which stop developing in summer, the basil downy mildew pathogen seems to develop best under moderate to warm temperatures while also tolerating cool temperatures.

Basil crops should be disked under or otherwise destroyed as soon as possible after last harvest or when abandoned because of disease.

Please Note: The specific directions on fungicide labels must be adhered to -- they supersede these recommendations, if there is a conflict. Any reference to commercial products, trade or brand names is for information only; no endorsement is intended. ☀

How to take your sample:

Blueberries - Sample at least 40 leaves from 10-20 plants during **first week of harvest**

Strawberries - Sample at least 40 fully expanded leaves from 10-20 plants **after renovation**.

Brambles - Sample at least 60 leaves from 10-20 non- fruiting canes in **early-mid August**.

Grapes - Sample 50-75 of the youngest fully-expanded leaves from 10-20 vines at **bloom time OR veraison** (make sure to specify your timing in the comments box on the tissue testing form). For the bloom time sampling, use the petiole from the leaf opposite the first blossom/cluster. Separate petioles (leaf stems) from leaves, and send only the petioles for analysis.

Tree fruits - Sample 5 leaves from each of 10 trees from **late July - early August**. Select shoots at eye-level from around the outside of the tree (avoid water shoots or suckers). Collect leaves from the mid-portion of new shoot growth.

Other fruits - Collect the youngest fully-expanded leaves during **late July - early August**.

TISSUE TESTING FOR FRUIT CROPS

For annual crops like vegetables, soil testing is valuable. First, soil pH has a dramatic impact on the availability of nutrients for plant uptake. Knowing the soil pH and what is needed to get it into the right ballpark for plant growth is a key first step in growing healthy plants. Second, soil tests reveal the amount of plant nutrients held in the soil, which is correlated to the amount that plants will be able to access and utilize. Using soil tests to monitor changes over time, you can refine your nutrient management program to be as efficient as possible.

Soil testing is still useful for perennial fruit crop growers because of the importance of pH management. This is particularly true for new plantings. However, research has shown that leaf tissue tests, which directly measure the plants' nutrient status, are more reliable than soil tests at predicting whether long-lived perennial crops are accessing the nutrients they need. Tissue testing is also the only way to confirm nutrient deficiencies/toxicities in problem areas in a field.

For new fruit plantings:

Soil test and adjust pH the year before planting.

Soil test during planting year and fertilize according to soil test results, adjust pH if needed.

For established fruit plantings (in the ground 2 + years):

Soil test every 2-3 years to ensure pH is on target.

Tissue test every 3 years to ensure the fertility program is meeting crop needs.

It is almost time to take tissue tests for fruit crops (grapes, raspberries, blueberries, and tree fruits). UNH Cooperative Extension offers tissue testing plus fertilizer recommendations for \$26.00 per sample. You can get forms by checking "Commercial Fruit" and "Tissue" at our web site: <http://extension.unh.edu/Agric/AGPDTS/SoilTest.htm>. The last page of the form provides information on handling samples and filling out the forms. You may drop off forms, checks, & samples in paper bags or you can mail directly to UNHCE/ Dept. of Biological Sciences in Durham.

If you have any questions on leaf sampling or if you need additional forms, please contact your local UNHCE educator or call Suzanne Hebert in the Dept. of Biological Sciences at UNH at (603)862-3200.

Other sampling tips:

- Sample different varieties separately. Samples should represent plants that are planted on the same soil type and are of the same age, variety and root-stock.
- Samples should be from trees/bushes/vines that are maintained under the same cultural practices, i.e. fertilizer, irrigation and pruning practices. If you mark the sampled trees or bushes with flagging or with latex paint, you can collect leaves from the same trees/bushes each year and see the effects of your fertilization.
- If you are using tissue tests to diagnose a problem area, make sure to send in two samples – one from a healthy area and one from the problem area.
- Do not sample immediately after spraying or foliar feeding (these materials can affect results). Rinse leaves or petioles with water, pat dry, and place in a paper bag to dry before sending for analysis. ☀

At A Glance UNH Cooperative Extension Vegetable & Fruit Resources

Soil Testing Call 862- 3200 or visit:
<http://extension.unh.edu/Agric/AGPDTS/SoilTest.htm>

Plant Diagnostic Lab Call 862-3841 or visit:
<http://extension.unh.edu/Agric/AGPDTS/PlantH.htm>

Arthropod Identification Call 862-3200 or visit:
<http://extension.unh.edu/Agric/AGPDTS/ArthroID.htm>

Fruit Pest Phone Update (seasonal): 603-862-3763

UPCOMING MEETINGS AND EVENTS

Tues Jun 23. UMass Twilight Meeting. Pleasant Valley Farm, Methuen MA. 5:00pm. The meeting will focus on *Phytophthora capsici* management, drip irrigation systems, GAP/food safety and all-season lettuce production. For info, contact UMass Extension Vegetable Program at 413-545-3696. **V**.

Fri Jun 26. GAP Training for Wholesale Vegetable Growers. Unitarian Universalist Church, Concord NH. 1:00-5:30pm. This meeting will introduce the basics of USDA/FDA's GAP (Good Agricultural Practices) Certification Program for wholesale fruit and vegetable growers. For info, contact Becky Grube at beckygrube@unh.edu or 603-862-3203. **SF, TF, V**.

Tues Jun 30. Commercial Strawberry Production using Organic Methods. Wood's Market Garden, 93 Wood Ln, Brandon VT. 5:00-7:00pm. Cosponsored by NOFA-VT, VT Vegetable & Berry Growers Association and UVM Extension. Free to VV&BGA Members and VOF Certified Farmers, Others \$10 for NOFA members, \$15 for non-members. For info, please contact NOFA VT at 80-434-4122 or info@nofavt.org. **SF, O**.

Thurs Jul 2. New Hampshire Vegetable & Berry Twilight Meeting. Picadilly Farm, Winchester NH. 5:30-7:30pm. This meeting will focus on developing integrated pest management (IPM) plans for organic diversified vegetable producers, CSA marketing, and more. For info, contact Carl Majewski at carl.majewski@unh.edu or 603-352-4550. **V, O, PAT**.

Mon Jul 6. New Hampshire Grape/Vineyard Twilight Meeting. Haunting Whisper Vineyards, Danbury NH. 5:30-9:00pm. Cold-hardy grape varieties, grape disease management options, and crop insurance options for grape growers. For info, contact Amy Ouellette at amy.ouellette@unh.edu or 603-225-5505. **SF, PAT**.

Tues Jul 7. Farm to Restaurant Twilight Meeting. Monadnock Berries, West Hill Rd., Troy NH. 6:30-8:30pm. This meeting will focus on providing producers with information on marketing to local businesses, and on giving area businesses and restaurants a view of farm production in NH. For info, contact Carl Majewski at carl.majewski@unh.edu or 603-352-4550. **SF, V**.

Wed Jul 8. New Hampshire Tree Fruit Twilight Meeting. Brookdale Fruit Farm, Rte 130, Hollis NH. 5:30-8:00pm. Features Tracy Leskey and Starker Wright from the USDA-ARS Appalachian Fruit Research Station in Kearneysville, WV. For info, contact George Hamilton at george.hamilton@unh.edu or 603-641-6060. **TF, PAT**.

Thurs Jul 16. University of Massachusetts Crops Research & Education Center Field Day, South Deerfield, MA. 4:00-8:00pm. Topics and demonstrations will include zone tillage in sweet corn, organic beetle management in cucurbits and eggplant, energy crops and specialty ethnic crops. For info, contact Ruth Hazzard at 413-545-3696. **V**.

Mon Jul 20. New Hampshire Vegetable & Berry Twilight Meeting. Springledge Farm, New London NH. 5:30-8pm. Diversified production at Springledge includes vegetable, small fruit, and greenhouse crops, season extension, and biological control strategies. For info, contact Amy Ouellette at amy.ouellette@unh.edu or 603-225-5505. **SF, V, PAT**.

Tues Jun 21. Organic Weed Control and Cultivation. Intervale Community Farm, 128 Intervale Rd., Burlington VT. 5-7pm. Cosponsored by NOFA-VT, VT Vegetable & Berry Growers Association and UVM Extension. Free to VV&BGA Members and VOF Certified Farmers, Others \$10 for NOFA members, \$15 for non-members. For info, please contact NOFA VT at 80-434-4122 or info@nofavt.org.

Tues Aug 13. The OrganicA Project: Organic Apple Production. UVM Hort Farm, 65 Green Mountain Drive Burlington VT. 2:00-5:00pm. Cosponsored by NOFA-VT and the OrganicA project. \$10 for NOFA members, \$15 for non-members. For info, please contact NOFA VT at 80-434-4122 or info@nofavt.org.

Thurs Aug 20. New Hampshire Vegetable & Berry Twilight Meeting, Blueberry Bay Farm, Stratham NH. 5:15-7:30pm. Emphasis will be on pesticide-free growing of mixed vegetables, raspberries, and blueberries. For info, please contact Nada Haddad at nada.haddad@unh.edu or 603-679-5616. **V, SF, O, PAT**.

Wed Sep 2. New Hampshire Vegetable & Berry Twilight Meeting. UNH Woodman Horticultural Research Farm, Durham NH. 5:30-7:30 pm. Ag Experiment Station Research on Horticultural crops. For info, please contact Becky Grube at beckygrube@unh.edu or 603-862-3203. **V, SF, TF, PAT**.

Wed Sep 2. Soil and Soil Health. Wellspring Farm CSA, 182 LaFirira Pl, Marshfield VT. 5-7 pm. Sponsored by NOFA-VT. \$10 for NOFA members, \$15 for non-members. For info, please contact NOFA VT at 80-434-4122 or info@nofavt.org.

Meeting topics: F = flower, G = grains, O = certified organic, SF = small fruit, TF = tree fruit, V = vegetable, AC = all crops. PAT = pesticide applicator recertification credits available, CCA = certified crop advisor credits available

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