



# Vegetable Crop Update

A newsletter for commercial potato and vegetable growers prepared by the University of Wisconsin-Madison vegetable research and extension specialists

No. 4 – April 17, 2015

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## Calendar of Events

**July 15** – UW-Hancock ARS Field Day, 1:00PM, Hancock, WI  
**July 17** – Rhinelander State Farm Field Day, Lelah Starks Elite Foundation Seed Farm, Rhinelander, WI  
**August 20** – UWEX Langlade County Airport Field Day, Antigo, WI  
**August 25-27** – Wisconsin Farm Technology Days, Statz Bros., Inc. Farm, Sun Prairie, WI

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**Late blight reminders and updates:** The Wisconsin Administrative Code (ATCP 21.15(2)) requires potato cull piles to be fed, disked in or otherwise removed by **May 20**, to prevent late blight.



Nationally, in the past week, there were no new late blight diagnoses reported at <http://www.usablight.org/>. So far in 2015, two FL counties and one CA county have reported late blight. In FL, genotype US-23 was characterized on potato. In the second FL county, the tomato late blight has not yet been characterized. The website provides location (by county) of positive reports of late blight in the U.S. and provides further information on disease characteristics and management.

**Managing Basil Downy Mildew (with contributions from Meg T. McGrath, Vegetable Plant Pathology, Cornell University):** Basil downy mildew caused by the fungus-like pathogen *Peronospora belbahrii* has become more prevalent in the Great Lakes region and throughout the U.S. over the past 8 years. Basil growers have never before been challenged with such a pervasive and uncontrollable disease which has even well-seasoned producers and plant disease specialists left scratching their heads. Why has downy mildew become problematic on basil across the continental U.S.? What can be done to sustain the production of healthy basil in organic and conventional systems?

Wisconsin is not alone in its battle with basil downy mildew. Since about 2007, basil downy mildew has made headlines as a new North American culinary herb disease – with confirmed reports in FL, NC, PA, NJ, NY, MA, NC, KS, MO, and WI (for the first time in 2010). Other

European and South American nations are also dealing with this destructive plant pathogen. In 2014, nearly 40 states reported basil downy mildew from within the continental U.S. (Figure 2). The basil downy mildew pathogen can be transmitted on seed, infected plant parts, and on the wind. This particular downy mildew can affect both ornamental and basil varieties grown as herbs. It is suspected that basil downy mildew has moved geographically on contaminated seed or leaves. The spores of basil downy mildew are produced on leaf underside prolifically and can be aerially dispersed long distances. Symptoms begin as non-descript pale yellow leaves which mimic nitrogen deficiency, but typically progress to well defined yellow, angular lesions on leaf surfaces (Figure 1). As disease develops, the pathogen's dark gray to black spores can be seen on leaf undersides.

The management of basil downy mildew includes planting uninfested or 'clean' basil seed, selecting resistant or tolerant varieties, using adequate plant spacing to promote dry plant canopies, and applying fungicides when environmental conditions favor disease. Currently there are no effective seed treatments for basil downy mildew and hot water seed treatments negatively impact seed quality. Ongoing research in steam treatment of basil seeds may result in a viable, effective approach – stay tuned. It is known that sweet or Italian basil varieties are more susceptible than other basil types. See Table 1 for further listings of basil varieties with tolerance to downy mildew. Minimizing leaf wetness and humidity will aid in downy mildew management as the pathogen is favored by moist conditions. There are a limited number of fungicides with registration for use on basil downy mildew, and few with meaningful efficacy in either organic or conventional systems.

While not a preferred approach for most growers, applying fungicides frequently and starting before first symptoms may be necessary to control downy mildew effectively. Few fungicides are currently labeled for this new disease and fewer offer meaningful control. Actinovate AG and OxiDate are OMRI-listed fungicide labeled for use on herbs and for suppressing foliar diseases including downy mildew. OxiDate is labeled for use outdoors and in greenhouses and can offer some knock down of spores on infected plants – but the treatment does not provide lasting protection. The Actinovate label does not have a statement prohibiting use in greenhouses. There are now several phosphorous acid fungicides, Confine, OxiPhos, Phostrol, Phosphite, ProPhyt, Rampart, FungiPhite, and K-Phite, which include herb downy mildew on the current label. These fungicides were effective in fungicide efficacy experiments with applications started before or after initial symptoms were found. Greenhouse use is not prohibited. Quadris, Equation, and Satori are labeled for use on basil but not specifically for downy mildew; they have the same active ingredient - azoxystrobin, which has been shown to be effective for this downy mildew (greenhouse use not permitted). Ridomil Gold SL is another fungicide with registration on basil, but not specifically for downy mildew, and not for greenhouse use – however – it is highly effective in controlling downy mildew. Other fungicides which are very effective and have relatively new basil downy mildew registrations include: Ranman (cyazofamid) (greenhouse use permitted) and Revus (mandipropamid) (greenhouse use is not prohibited).

To determine when to initiate a fungicide program, or when to harvest early to avoid losses, growers should routinely scout their fields and gardens for symptoms of disease, and should stay informed of disease reports within the region or state to determine when downy mildew is

occurring on basil nearby. 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, to eliminate this source of inoculum. Research is ongoing in the U.S. and worldwide to better understand the pathogenicity, host resistance, spread, and control of basil downy mildew. Advances in resistance breeding and seed treatment technologies will greatly aid in improved disease control and sustainability of basil production in Wisconsin and worldwide.



**Figure 1.** Basil downy mildew symptoms and signs. **A.** Topside of leaf (note yellowing or chlorosis and brown, dead lesions). **B.** Underside of leaf (note patches of gray-purple fuzzy pathogen sporulation). **C.** Portion of whole plant infected with downy mildew (note yellowing and curling of lower leaves, along with brown lesions). **D.** Branched sporangiophore (spore tree) and sporangia (spore) of basil downy mildew under 200X magnification.

Table 1. Resistance responses of basil varieties to downy mildew (Wyeandt, C.A, et al. 2010)

<b>Basil varieties susceptible to downy mildew</b>	
Aroma 2	Italian Large Leaf
Genovese	Magical Michael
Genoveser Martina	Mariden
Nufar	Opal Purple Variegated
Queenette	Poppy Joe's
Superbo	Napoletano
<b>Basil varieties tolerant to downy mildew</b>	
Eleonora	Thai Magic
Amethyst Imp	Mrs. Burns Lemon
Red Rubin	Red Leaf
Sweet Adin	Lemon
Lemon Standard	Lemon Mrs. Burns
Lemona	Lime
<b>Basil varieties resistant to downy mildew</b>	
Spice	Blue Spice
Blue Spice Fil	



Figure 2. States reporting basil downy mildew in 2014 (from McGrath, M.T., personal communication).

References:

- Gevens, A.J. 2014. Vegetable disease update: Onion and basil downy mildew updates. *Wisconsin Crop Manager*, Vegetable Crop Update #17. August 9.
- Gevens, A.J. 2014. Vegetable disease update: Basil downy mildew, Cucurbit powdery mildew. *Wisconsin Crop Manager*, Vegetable Crop Update #14. July 18.
- Wyenandt, C.A., Simon, J.E., McGrath, M.T., Ward, D.L. 2010. Susceptibility of basil cultivars and breeding lines to downy mildew (*Peronospora belbahrii*). *HortScienc* 45(9):1416-1419.
- McGrath, M.T., Wyenandt, C.A., Raid, R.N., Babadoost, M., Wick, R.L. 2010. Occurrence of basil downy mildew in the eastern U.S. in 2009. *Phytopathology* 100:S196.
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