PHYTOPHTHORA BLIGHT: A NEW DISEASE OF SNAP BEANS IN NY

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A relatively new disease to snap beans has been found in the Northeast - Phytophthora blight caused by the pathogen *Phytophthora capsici*. It is a well known pathogen of solanaceous (bell pepper, hot pepper, eggplant and tomato) and cucurbit crops (cantaloupe, cucumber, gourd, honeydew melon, pumpkin, muskmelon, summer squash, watermelon, winter squash and zucchini), and recently has been documented on legume crops (snap bean, lima bean). Phytophthora blight was reported on snap beans in 2003 in Michigan, in 2008 on Long Island, in 2009 in Connecticut, and 2010 in a commercial field in the western region of upstate New York.

While there is no 'silver bullet' for the control of Phytophthora blight, the best management strategy is to keep the pathogen off of a farm. The spores (known as sporangia) of *P. capsici* do not move long distances in the wind, but rather move in water, soil and in culled fruit. Perhaps the most common method of disease spread is by growers discarding Phytophthora blight diseased culled fruit into a field. Some growers have also realized (after the fact) that they were spreading Phytophthora blight from field-to-field on soil stuck in tractor tires. Promoting good drainage to keep plants out of standing water is critical. In order to survive the winter in Northern climates, Phytophthora blight must make overwintering spores known as oospores. These spores are only made when two mating types of the pathogen are present. In 2006, 2007, and 2008, we collected over 250 samples from farms across New York State that were affected by Phytophthora blight. We recovered both mating types of *P. capsici* from all growing regions in the state, indicating that overwintering spores are being produced that can remain viable in fields for years. Because of the wide host range of this pathogen, and the fact that the overwintering spores can survive in soil for more than a decade, keeping Phytophthora blight out of fields is the best strategy for control. If a field does have Phytophthora blight, rotation is important to reduce the number of overwintering spores in the soil.

We also tested the pathogen isolates for resistance to the fungicide mefenoxam (Ridomil). Fungicide resistance was common in isolates from the eastern part of the state (Long Island and the Capital District), so this chemical will no longer be an effective management tool for blight in these regions. In the western part of the state, all isolates we collected were still susceptible to mefenoxam. However, it has been demonstrated that resistance to mefenoxam can develop relatively quickly in fields where this chemical is applied regularly. Therefore it is important to rotate mefenoxam with other chemistries to delay the development of resistance, and be on the look-out for fields where mefenoxam is no longer effectively controlling Phytophthora blight. Furthermore, because of the pathogen's demonstrated ability to develop resistance, it is especially prudent for growers to use a good resistance management program and rotate fungicide chemistries to delay the development of resistance.

In addition to moving in soil, *P. capsici* spores are extremely adapted to moving in water (it is a water mold). The spores will move wherever water moves, including draining into surface irrigation sources like streams or ponds, from which they can be spread throughout entire fields, or from one farm to another within a watershed. This pathogen will produce swimming

spores when it is in water, and they are attracted to plant roots as they move through water. We currently have a project to test surface irrigation water for plant pathogens including *P. capsici*. The project started in 2010, and 20 irrigation sites were tested monthly last summer. These included streams, ponds and even the Erie Canal. The project is in cooperation with food scientists that are testing for human pathogens, and samples from 2010 are still being analyzed. One exciting component of the project is that we are also testing possible methods to decontaminate water.

**We have developed a website which has fact sheets that can be downloaded, lots of images, research updates, and management strategies. The URL for the site is http://phytophthora.pppmb.cals.cornell.edu/

Very little information is available regarding the epidemiology and control of Phytophthora blight on snap or dry beans, and no fungicides are registered on snap beans for foliar/pod blights caused by *P. capsici*. To the untrained eye, pod rot caused by *P. capsic*i can be misdiagnosed as disease caused by a *Pythium* species or by *S. sclerotiorum* (white mold). Unlike white or gray mold, snap bean pods infected with *P. capsici* will be covered by a very diffuse white mycelium, and the infected areas will shrivel and become desiccated. Most processors do not articulate which specific diseases are on the snap beans at harvest, and only record that the load of beans has "mold". Growers who incorrectly spray for white mold when the problem is Phytophthora blight will be unsuccessful controlling the disease.

During the growing season of 2010, two trials were conducted with the following objectives:

1. To determine the reaction of snap bean varieties to infection by *P. capsici*.
2. To initiate studies with fungicides that may suppress or control *P. capsici* on snap beans.

Ten fungicides and one biocontrol were evaluated for control of Phytophthora blight in snap beans. The trial was located at the Phytophthora blight farm at the Geneva Agricultural Experiment Station. The plants were inoculated with the pathogen to insure that there was sufficient disease to obtain a clear evaluation of the efficacy of the treatments. At the end of the trial, 21.7% of the pods were infected in the control treatment. We found that all 13 treatments significantly reduced disease incidence compared to the control. Because none of these treatments are registered for use on snap beans to specifically control Phytophthora blight, we are not including a table of the data in this report. The good news is that all the materials provided some level of disease control, and we now have data to justify registration should a crisis situation develop.

We also evaluated the susceptibility of snap bean varieties to Phytophthora blight. Nine cultivars primarily used for processing and 7 cultivars used primarily for fresh market were inoculated and evaluated for development of Phytophthora blight. Processor imposed thresholds for rejection of snap beans at the processing plant ranges from 3 to 6% pods with mold. The processing cultivars exhibiting the lowest disease incidence were Bronco, Summit, Caprice and Tapia. The fresh market cultivar Valentino exhibited a very high level of disease incidence.

Cultivars used primarily for processing	Infected pods (%)	Marketable yield (t/A)	Total yield (t/A)
Hystyle	7.3 ab	5.8 a	5.8 a
Titan	10.5 a	6.7 a	6.8 a
Huntington	3.9 bc	7.1 a	7.1 a
Bronco	2.1 c	5.9 a	6.0 a
Summit	0.6 c	7.7 a	7.7 a
Caprice	1.6 c	6.4 a	6.5 a
Spartacus	3.3 bc	6.4 a	6.4 a
Tapia	0.6 c	7.5 a	7.6 a
Goldmine	2.9 bc	6.7 a	6.8 a
LSD ($P \leq 0.05$)	4.7	ns	ns
Cultivars used primarily for fresh market	Infected pods (%)	Marketable yield (t/A)	Total yield (t/A)
Hickok	2.3 b	6.3 a	6.3 a
Lewis	2.3 b	5.9 ab	6.2 a
Valentino	26.5 a	4.2 c	4.5 b
Pike	4.2 b	5.6 abc	5.6 ab
Banga	2.6 b	4.1 c	4.2 b
Kylian	1.6 b	5.6 abc	5.7 ab
Masai	2.7 b	4.7 bc	4.8 ab
LSD ($P \leq 0.05$)	8.7	1.5	1.6

Means in the same column with different letters differ significantly according to LSD ($P \leq 0.05$).

Color photos of the disease on snap beans can be found at this website:
http://www.nysaes.cornell.edu/pp/faculty/dillard/alert-beans.html