Updates on Phytophthora Blight
and
New Materials Tested for White and Gray Mold Control on Snap Beans

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PHYTOPHTHORA BLIGHT

Last year we reported on a relatively new disease to snap beans - 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 and 2011 in commercial fields 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. 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. 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. In addition to movement with soil, *P. capsici* spores are extremely adapted to moving in water (it is a water mold). Promoting good drainage to keep plants out of standing water is critical. 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 are concerned that severe flooding this year may have introduced *P. capsici* to fields that previously have not had the pathogen.

Amara Dunn, a graduate student in Chris Smart's Lab, has developed a Phytophthora blight website with images, research updates and management strategies. The URL for the site is: http://phytophthora.pppmb.cals.cornell.edu/index.html

2011 variety trial. Eight snap bean, 3 dry bean, and 3 soybean varieties were evaluated for susceptibility to Phytophthora blight at the Geneva Experiment Station Phytophthora blight farm. All snap and dry bean varieties were susceptible to Phytophthora blight. Soybean varieties were included in the trial as requested by producers who were concerned about the susceptibility of rotation crops. All of the soybean varieties tested were resistant to the disease. The lowest disease incidence among snap beans on the final rating date was in Summit, and there were no significant differences in disease incidence among dry bean cultivars on the final rating date. Among snap bean cultivars, AUDPC (Area Under the Disease Progress Curve) was greatest in Valentino and lowest in Cartagena and Summit. Among dry bean cultivars, AUDPC was greatest in Cranberry and lowest in Black Velvet.

Plants affected by *Phytophthora capsici* (%)					
Snap Bean Cultivars	30 - Jun	22 - Jul	15 - Aug	02 - Sep	AUDPC
Caprice ……………………........	1.3 a[z]	0.0 b	53.8 cd	100.0 a	2097.5 bc
Cartagena ……………………..…	0.0 a	2.4 ab	35.0 d	95.0 a	1685.0 cd
Huntington …………..………..	2.5 a	2.5 ab	91.3 ab	100.0 a	2997.5 a
Inspiration ………..…………..	5.0 a	1.3 b	95.0 a	100.0 a	3080.0 a
Masai ……………...…………	1.3 a	6.3 a	70.0 bc	96.3 a	2571.3 ab
Prevail …………….…………..	0.0 a	1.3 b	83.8 ab	100.0 a	2772.5 a
Summit ………..………….…...	0.0 a	1.3 b	37.5 d	68.8 b	1473.8 d
Valentino ……………….…….	0.0 a	0.0 b	100.0 a	100.0 a	3100.0 a
LSD ($P \leq 0.05$)	ns	4.9	22.7	13.0	603.8
Dry Bean Cultivars	30 - Jun	22 - Jul	15 - Aug	02 - Sep	AUDPC
Black Velvet ……………..........	0.0 a	0.0 a	21.3 b	60.0 a	1007.5 b
Cranberry ……………………..…	0.0 a	0.0 a	87.5 a	98.8 a	2813.8 a
T39 …...……………..………..	0.0 a	0.0 a	36.3 b	66.3 a	1393.8 b
LSD ($P \leq 0.05$)	ns	ns	33.9	ns	426.1
Soybean Cultivars	30 - Jun	22 - Jul	15 - Aug	02 - Sep	AUDPC
91Y90 ……..……………........	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a
92Y31 ……………….………….	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a
92Y51 ……………...………..	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a
LSD ($P \leq 0.05$)	ns	ns	ns	ns	ns

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

2011 IR-4 fungicide trial. NOTE THAT THE TEST FUNGICIDES ARE NOT REGISTERED FOR THIS PURPOSE. We participated in a trial with the IR-4 program, to help gather efficacy data for use in obtaining minor use registrations for fungicides that eventually could be used by snap bean producers to control Phytophthora blight. Phytophthora blight incidence was high (39.6%) on pods in the control treatments. Stem lesions rapidly enlarged, resulting in accelerated plant death. All fungicide treatments significantly reduced incidence of Phytophthora blight on snap bean pods. Phytophthora blight incidence was lowest in the Revus and Presidio treatments, but the values were not statistically significant between treatments. All treatments resulted in statistically greater yields than the control. Phytotoxicity was not observed in any treatment.

Treatment, rate/A	Infected pods (%)	Marketable yield (t/A)	Total yield (t/A)
Untreated Control	39.6 a	1.5 c	2.0 c
Ranman, 80.5 ml + Silwet, 61.2 ml	5.6 b	2.9 ab	3.0 ab
Revus, 8 fl oz	1.4 b	3.3 a	3.3 a
Presidio, 4 fl oz	1.8 b	3.3 a	3.3 a
Ridomil Gold Copper, 2.5 lb	8.7 b	2.5 b	2.6 b
LSD ($P \leq 0.05$)	11.7	0.7	0.6

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

WHITE AND GRAY MOLD

<u>Fungicide trial in 2011. NOTE THAT SEVERAL OF THE TEST FUNGICIDES ARE NOT REGISTERED FOR THIS PURPOSE. ALWAYS FOLLOW LABEL INSTRUCTIONS.</u>

The variety Gold Mine was seeded on June 20 in a trial conducted at the Agricultural Experiment Station in Geneva, NY. The treatments were arranged in a randomized complete block design. The fungicides were applied using a CO_2 backpack single row sprayer calibrated to deliver 68 gal per acre at 50 psi, with three 8002 flat fan nozzles. The sprayer was configured with one nozzle over the top of the row and a 9-in drop nozzle on each side of the row angled into the canopy. Fungicide sprays were applied on July 27 at 34% bloom and on August 4 at 100% bloom to pin pod stage. The same CO_2 sprayer configuration was used to inoculate the plants with spores of white and gray mold to insure that the fungicides would be challenged. Following the spore applications, Aluminet (double faced aluminum coated shade cloth with a 40% shade factor) was placed over the entire plot until harvest. The shade cloth was used to keep the plants cool and maintain moisture in the plant canopy to encourage disease development. Snap bean pods in 10 ft of row were hand harvested and evaluated August 29-31 and September 1. Pods were categorized as healthy, infected with gray mold or white mold, counted and weighed. Disease incidence and yield was calculated.

Disease incidence was low for gray mold (2.1%) and moderatefor white mold incidence (15.8%) on the pods in the control plotsl. Gray mold pod incidence was statistically less than the control in 6 of the 14 treatments. All treatments significantly reduced white mold incidence as compared to the inoculated control except Inspire and Inspire Super. The Topsin, Endura, Cannonball, Propulse and Rovral treatments achieved excellent control (less than 3% incidence) of white mold on pods. Quadris resulted in a statistically higher marketable yield than the control. No treatments provided significantly greater total yield than the control. No phytotoxicity was observed in any of the treatments.

Treatment, rate/A	Gray mold (%)	White mold (%)	Marketable yield (t/A)	Total yield (t/A)
Untreated Control	2.1 bc[z]	15.8 a	4.0 bcde	4.4 abcde
Topsin 4.5FL, 20 fl oz	5.1 a	0.5 c	4.6 abcd	4.9 ab
Endura 70 WDG, 11 oz + 0.125 v/v NIS	0.3 d	0.8 c	4.7 abc	4.8 abc
Proline 480 SC, 5.7 fl oz + 0.125 v/v NIS	0.9 cd	3.0 bc	3.9 cde	4.0 cde
Propulse 400, 8.6 fl oz + 0.125 v/v NIS	1.0 bcd	0.3 c	4.5 abcd	4.6 abcde
Propulse 400, 10.3 fl oz + 0.125 v/v NIS	0.9 cd	1.1 bc	4.0 bcd	4.1 bcde
Quadris F, 15.4 fl oz	2.2 b	5.3 bc	4.9 a	5.1 a
Cannonball WP, 7 oz	0.6 d	2.7 bc	3.9 de	4.0 de
Inspire, 7 fl oz	5.4 a	20.6 a	3.3 e	3.9 e
Inspire Super, 20 fl oz	4.3 a	19.6 a	4.1 abcd	4.6 abcd
Fontelis SC (formerly DPX-LEM17), 30 fl oz	0.6 d	4.8 bc	4.5 abcd	4.6 abcd
Q8Y78, 24 fl oz	0.2 d	4.0 bc	4.4 abcd	4.6 abcde
Rovral 4F, 2 pt	0.8 d	1.5 bc	4.8 ab	4.9 ab
Aproach, 12 fl oz + 0.125 v/v NIS	0.7 d	4.6 bc	4.5 abcd	4.7 abcd
Bravo WS, 3 pt ….	1.7 bcd	6.5 b	4.2 abcd	4.5 abcde
LSD ($P \leq 0.05$)	1.2	5.6	0.8	0.8

[z] Means in the same column with different letters differ significantly according to Fisher's Protected LSD ($P \leq 0.05$).