Field Evaluation of Biofungicides to Control Diseases of Green Beans

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Overview

• Botrytis (*Botrytis cinerea*) and Rhizoctonia (*Rhizoctonia solani*) are two fungal diseases that proliferate in southwestern BC and infect a broad range of crops including green beans
• Both Botrytis and Rhizoctonia overwinter in the soil and in decaying plant debris making them difficult diseases to manage
• Currently, organic growers mainly rely on cultural controls to manage these pathogens
• Biofungicides could provide additional disease control tools
• The long-term objectives of this work are to improve the pest management options for organic green bean production

Botrytis (Grey mould)

• On beans, *Botrytis cinerea* infections start on either immature or decaying flowers or via wounds
• As the disease progresses pods become infected resulting in a visible grey mould
• Can lead to rejection of an entire crop by processing companies
• Heavy losses for September harvested crops due to the favourable environmental conditions and high disease pressure

Management

• Rotate beans with less susceptible crops (e.g. corn and cereals)
• Increase plant spacing and orient rows with prevailing winds
• Select fields with good drainage
• Use varieties with high pod placement for better air flow (e.g. Savannah)
• Serenade (*Bacillus subtilis)* is the only currently fungicide allowed in organic production for the control of Botrytis on beans

Botrytis-infection of bean pods results in reduced yield

Rhizoctonia

• Causes damping off of seedlings and root rot; potential for yield loss
• Reddish brown lesions on roots
• Plants become stunted, crop stand and vigour reduced
• In favourable conditions (cold and wet soil) up to 100% of plants can be infected

Management

• Rotate with less susceptible crops (e.g.corn)
• Plant in warm, well drained soil
• Avoid planting in compacted soil
• Avoid stress to the crop (e.g. drought, lack of nutrients) especially until the crop is well established

Severe (left) and superficial (right) Rhizoctonia lesions

Biofungicides screening trials

Objective

• In field evaluation of biofungicides (foliar and seed treatments) for disease control in organic green beans

Methodology

• Both trials were conducted in three commercial bean fields

Application of foliar treatments with a backpack sprayer

Foliar-applied products trial

1)Serenade (*Bacillus subtilis)*
2)Actinovate (*Streptomyces lydicus*)
3)Influence (garlic extract)
4)Regalia (*Reynoutria sachalinensis*)
5) Water Control

• Foliar treatments began one week before flowering stage and were sprayed every five to seven days for a total of seven applications

Seed treatment trial

1) Heads Up (Saponins of *Chenopodium quinoa*)
2) Untreated Control
• The seed treatment was applied the day of planting and seeds were planted by hand.

Results and Next Steps

• Actinovate, Regalia and Influence treated plots had fewer beans with Botrytis, but these differences were not statistically significant (Fig. 1)
• Fewer plants had severe Rhizoctonia infections in the Actinovate and Regalia plots, but again these differences were not statistically significant (Fig. 1)
• Seed treatment did not reduce Botrytis or Rhizoctonia (Fig. 2)
• In contrast, in 2011 trials we observed a significant reduction of Rhizoctonia severity when bean seeds were treated with Heads Up
• Further testing of the most promising foliar treatments from this study is recommended

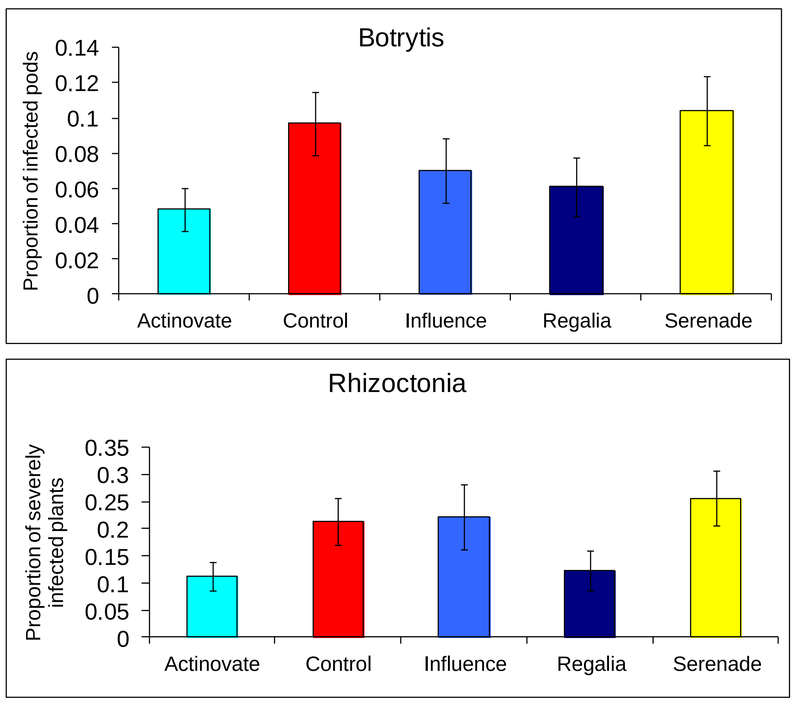

Figure 1. Effect of foliar fungicides on the proportion (mean ± s.e) of bean pods infected with *Botrytis cinerea* (top) and bean plants with severe *Rhizoctonia solani* lesions (bottom) at harvest. All data are from Field 3 which had the highest disease pressure. Eight plots/treatment.

Figure 2. Effect of bean seed treatment on the proportion (mean ± s.e) of bean pods infected with *Botrytis cinerea* (top) and *Rhizoctonia solani* (bottom) at harvest. Botrytis data are from all three fields (30 plots/treatment) and Rhizoctonia data are from Field 3 (10 plots/treatment).