BIOLOGICAL CONTROL OF SCLEROTINIA DISEASES (*SCLEROTINIA SCLEROTIORUM*) OF BEAN AND CANOLA BY *CONIOTHYRIUM MINITANS*.

McLaren, D.L. [1]*, Huang, H.-C. [2], Conner, R.L.[3], McAndrew, D.W.[3], Irvine, R.B.[1]
[1] Agriculture and Agri-Food Canada, Brandon, Manitoba R7A 5Y3, Canada;[2] Agriculture and Agri-Food Canada, Lethbridge, Alberta T1J 4B1, Canada; [3] Agriculture and Agri-Food Canada, Morden, Manitoba R6M 1Y5, Canada.*(dmclaren@agr.gc.ca)

Introduction

White mould of bean (*Phaseolus vulgaris*) and sclerotinia stem rot of canola (*Brassica napus*), caused by *Sclerotinia sclerotiorum*, are destructive diseases of these crops and have caused significant economic losses in the United States and Canada. Spraying chemical fungicides to protect canola and bean blossoms can be effective in controlling sclerotinia disease but proper timing and effective coverage of crop canopy are necessary to obtain adequate disease control. These conditions can be difficult to achieve and application of chemical fungicides does not reduce the numbers of ascospores released from soil-borne sclerotia. There is increasing concern that pesticide residues in water and soil may be harmful to the environment and therefore it is important to explore alternative methods to chemical control of sclerotinia diseases. The fungus *Coniothyrium minitans* is a mycoparasite capable of attacking *S. sclerotiorum* under natural conditions. The objective of these studies was to evaluate the potential of application type (foliar and/or soil) and application timing of *C. minitans* for the control of white mould of dry bean and sclerotinia stem rot of canola under Canadian prairie conditions.

Materials and Methods

Biocontrol of sclerotinia diseases was evaluated in two provinces, Manitoba and Alberta during 2001-04 (bean) and 2004 (canola). The treatments at each site in each year included applications of fungicide (vinclozolin or boscalid), biological control agent (BCA) and an untreated control. Two seeding rates and two cultivars (Envoy and NW63) were incorporated into the 2004 bean trials at two locations. Canola tests involved one cultivar only. The fungicide and biocontrol were applied at the recommended crop development stages and in 2004, biocontrol treatments included a spring soil treatment and a foliar spray at 30-50% bloom. Severity and incidence of sclerotinia were assessed at maturity and plot yields were determined.

Results and Discussion

The incidence of white mould of bean was reduced with the application of *C. minitans* and the fungicide in most trials. In 2002 at Brandon, *C. minitans* reduced the proportion of plants infected by an average of 32%. The BCA applied as a single or split application resulted in greater yields and fewer sclerotia per kg of seed than in the untreated control . White mould incidence and severity for all of the *C. minitans* treatments and the fungicide treatments were lower than the control of *S. sclerotiorum* at Lethbridge in 2004 (Figure 1). This trend was evident with both seeding rates of NW63 and Envoy at Brandon. The combined treatment of *C. minitans* foliar spray plus soil application resulted in the highest seed yields at Lethbridge (cv. NW63). Seed yields for NW63 (low seeding rate) and Envoy at Morden were highest with the *C. minitans* combination treatment when compared to all BCA treatments, but were not as high as those obtained with the fungicide spray applications. The *C. minitans* foliar spray(s) produced the highest yields of all treatments at Brandon. *C. minitans* significantly reduced the number of sclerotia of *S. sclerotiorum* in harvested seed and was consistently recovered from sclerotia

produced on diseased bean plants. A numerical trend towards reduction of white mould severity with the low compared to the high seeding rate was evident at Morden and Brandon in untreated control plots but these differences were not significant. In canola, application of the BCA as a spore suspension to the soil and later to the foliage at the early flowering stage was as effective as fungicide spray in reducing sclerotinia stem rot at the Lethbridge site. These two treatments resulted in the highest seed yields and lowest recovery of sclerotia from seed. At Morden, application of the BCA as a foliar spray and application of the fungicide spray were the most effective treatments in reducing incidence of stem rot compared to the untreated control and resulted in the highest average yields and lowest recovery of sclerotia from seed. A similar trend was observed at Brandon (Figure 2). These studies suggest that *C. minitans* is a promising agent for the management of *S. sclerotiorum* in bean and other susceptible crops such as canola.

Acknowledgements

Funding for this research was provided by the Improving Farming Systems and Practices (IFSP) Pesticide Risk Reduction Program and the Alberta Pulse Growers Commission. We would also like to thank Tom Henderson, Scott Erickson and Lyle Halstead for technical support.

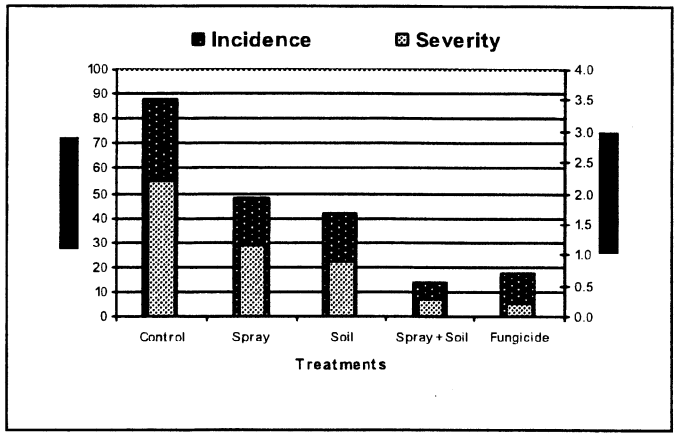

Figure 1. Impact of *C. minitans* and fungicide on incidence and severity

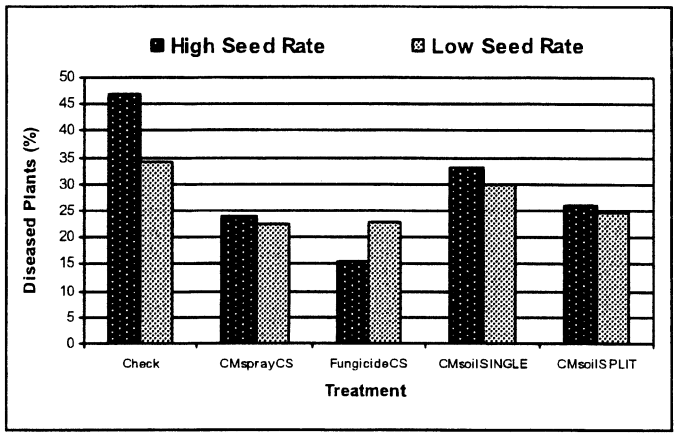

Figure 2. Impact of *C. minitans* and fungicide on sclerotinia stem rot of canola