

2004
**Research Project Report for the Ohio Vegetable
and Small Fruit Research and Development Program**

Project Title: Management of Damping-Off in Vegetable Seedlings

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Objectives of the Research

The goal of this research project was to develop tactics to reduce the incidence of damping-off in greenhouse vegetables. We focused on cabbage, which is particularly susceptible to damping-off. **Objective: Evaluate biorational and reduced risk treatments to prevent or reduce the incidence of damping-off.**

Effect of Rhizoctonia Inoculum Level on Damping-off Incidence

Preliminary experiments were carried out to determine the level of inoculum needed to cause damping-off in cabbage seedlings. Plastic 288-cell trays were cut into four sections, each containing 72 cells, and filled with planting mix amended with prepared inoculum of *R. solani* at 0.06, 0.28 or 0.5 g/100 ml planting medium. Inoculum was prepared by growing cultures of *R. solani* in sterilized soil plus chopped potato medium. The medium was then dried, ground and sieved. Non-inoculated planting medium served as a control. Cabbage seeds (cv. 'Bravo') were sown and trays were watered to saturation and placed in a greenhouse. There were four replicates per treatment, arranged in a randomized complete block design. Emerged seedlings were counted and pre-emergence damping-off determined based on the number of seedlings that did not emerge. Post-emergence damping-off was determined by counting the number of symptomatic seedlings.

Results are shown in Figure 1. The highest level of pre- and post-emergence damping-off was obtained using an inoculum level of 0.5 g/100 ml planting medium. Levels of pre- and post-emergence damping-off were similar, and the total damping-off at this inoculum level reached nearly 50%.

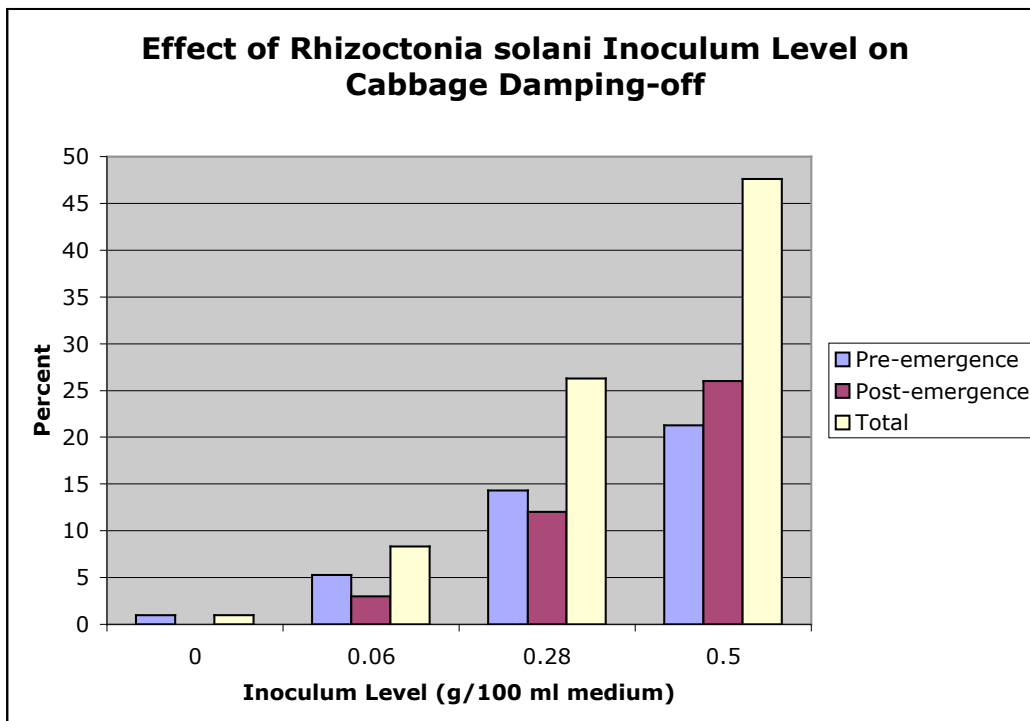


Figure 1.

Efficacy of Various Treatments in Reducing Incidence of Rhizoctonia Damping-off

Seven treatments were evaluated for efficacy against *Rhizoctonia* damping-off in cabbage seedlings: Mycostop (biocontrol agent), Prestop (biocontrol agent), phosphonate (biorational fungicide), Muscador (biofumigant), MG1A2R (biocontrol agent), Wayne 1R (biocontrol agent), and Seacide (fish emulsion). All treatments except Muscador were applied at the time of sowing cabbage ('Bravo') seeds. For the biofumigant Muscador, the product was mixed with *R. solani* inoculum and planting mix 7 days prior to sowing, according to the manufacturer's recommendation. For the Muscador treatment, 666 ml Fafard's superfine germination mix, 5g Muscador, 6.7 ml sterile water, and 3.33g *R. solani* Rs 122 fine inoculum were placed in a plastic bag, shaken, and sealed airtight. A Muscador-only control and a soil-only control were prepared in the same way, omitting *R. solani* inoculum or both inoculum and Muscador, respectively. For the remaining treatments, on the day of sowing, the center 48 cells of 288-cell trays were filled with Rs 122-infested soil using a rate of 0.5g fine inoculum per 100ml Fafard's superfine germination mix. The remaining cells of each flat were filled with non-inoculated Fafard's superfine germination mix. Treatments were applied to the entire flat, with the exception of the Muscador treatments, which were only applied to the center 48 cells of each flat. The center 48 cells of each flat were seeded. All flats were placed in the greenhouse in a randomized block design. Greenhouse temperatures were set to 80F daytime and 70F nighttime. Automatic watering was set up for one pass at 4ft/min. three times daily.

Table 1. Damping-off treatments.

Treatment	Rate
Control, inoculated, non-treated	Water drench
Prestop	1% drench
Mycostop	1% drench
MG1A2R	1 x10 ⁷ cfu/ml
Wayne 1R	1 x10 ⁷ cfu/ml
Seacide	2% drench
Phosphonate	1% drench
Muscador + <i>R. solani</i> inoculum	3.3 g/L planting mix
Muscador only (control)	3.3 g/L planting mix
Control, non-inoculated, non-treated	Water

The Seacide treatment was phytotoxic, at the concentration used, to seedlings of cabbage. Plants were small compared to the control and plant death was significantly higher than in the non-treated control. Pre-emergence damping-off was lowest in the Muscador treatment. Treatments with the least post-emergence damping-off were Muscador and phosphonate, although at the relatively low disease pressure observed in this trial, differences between these treatments and the non-treated control were not statistically significant. However, the trends observed are encouraging, and further studies will be conducted to optimize product rates and confirm activity of these and other products against *Rhizoctonia solani*.

Table 2. Efficacy of various treatments against *Rhizoctonia* damping-off of cabbage.

Treatment	Percent Damping-off		
	Pre-emergence	Post-emergence	Total damping-off
Seacide	7.3 a	29.2 a	36.5 a
Mycostop	6.8 a	14.1 b	20.8 b
Non-treated, inoculated control	6.3 ab	8.3 bc	14.6 bc
Prestop	4.9 abc	3.7 bc	8.3 bcd
Wayne1R	3.6 abc	7.8 bc	11.5 bcd
Phosphonate	3.1 abc	1.6 c	4.7 cd
Mg1A2R	3.1 abc	10.4 bc	13.5 bcd
Non-treated, non-inoculated control	1.0 bc	0.0 c	1.0 cd
Muscador	1.0 bc	0.0 c	1.0 cd
Muscador, non-inoculated	0.0 c	0.0 c	0.0 d