Influence of *Alternaria spp*. on susceptibility of canola and mustard to *Pythium spp*., *Fusarium spp.* and *Rhizoctonia solani*

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Abstract

Seed exudates have been shown to inhibit the growth of some fungi responsible for seed rot and seedling blight in canola and mustard. *Alternaria brassicae*, *A. alternata* and *A. raphani* can all be found on seed of canola and mustard. Previous work indicates deep infections of *Alternaria brassicae* and *A. raphani* significantly reduce seed germination while *A. alternata* had no direct effect on germination. The objective of this study is to determine the effect of seed exudates on seed rot and seedling blight caused by *Rhizoctonia solani*, *Fusarium spp.* and P*ythium spp.* and determine if seed borne *Alternaria* is synergistic to these pathogens by breaking down defensive compounds in the seed exudates. Seed will be inoculated with *Alternaria alternata*. to create superficial surface infection. Susceptibility to *Pythium*, *Fusarium* and *Rhizoctonia* of artificially infected seed lots and naturally infected seed lots will be tested on water agar, blotter test and pot test. Seed exudates will also be obtained from seed lots after surface sterilization and bioassays of the ability of these exudates to support growth of pathogenic fungi and beneficial bacteria will be assessed

Introduction

Seed germination is a very dynamic process during which numerous compounds can be released by the seed into the environment. These compounds can inhibit or enhance the establishment of pathogens and beneficial microorganisms. Glucosinolates in canola meal have been demonstrated to inhibit development of disease in cabbage (Chung et al 2002). Proteins inhibitory to fungal growth have been isolated from seed in other radish (Terras et al 1995). *Alternarnia brassicaceae* have been demonstrated to break down defense mechanism the leaves of *Brassica napus*. (Doughty et al 1996). *Alternaria raphani* and *Alternaria brassica* have both been shown to decrease germination of seed on blotter, *Alternaria alternata* however does not reduce germination of *Brassica rapa* on blotter (Rude et al 1999).

It is hypothesized that *Alternaria spp.* could break down defensive compounds resulting in deleterious effects in the seed or seedling. Selection of beneficial rhizobacteria requires they enhance or at minimum do not interfere with plant defense mechanisms. As well early colonization is critical to an effective rhizobacterial strain. Composition of seed exudates may influence establishment of potentially beneficial rhizobacterial strains by serving as a source of nutrients. One component of canola seed

exudates is seed mucilage. Mucilage is made up of carbohydrate, protein and mineral and varies with variety and seed production environment (Eskin 1992).

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Methods:

Seeds of canola and mustard were inoculated with mycelium harvested from a 5-day-old colony of *Alternaria alternata*. Comparisons of uninfected seedlings and Alternaria infected seedlings were made on uninoculated blotters and on blotters inoculated with *Pythium ultimum* and blotters with *Fusarium oxysporum.*

Results:

Artificial infection with *Alternaria alternata* did not affect germination of canola seed on blotter (plate 1). When *Pythium ultimum* was present on the blotter greater death occurred in the *alternaria* infected seed as compared to the uninfected seed (plate 2). On the *Fusarium oxysporum* inoculated blotters reduced height was noted as compared to the unifected seed (plate 3).

Results are shown below

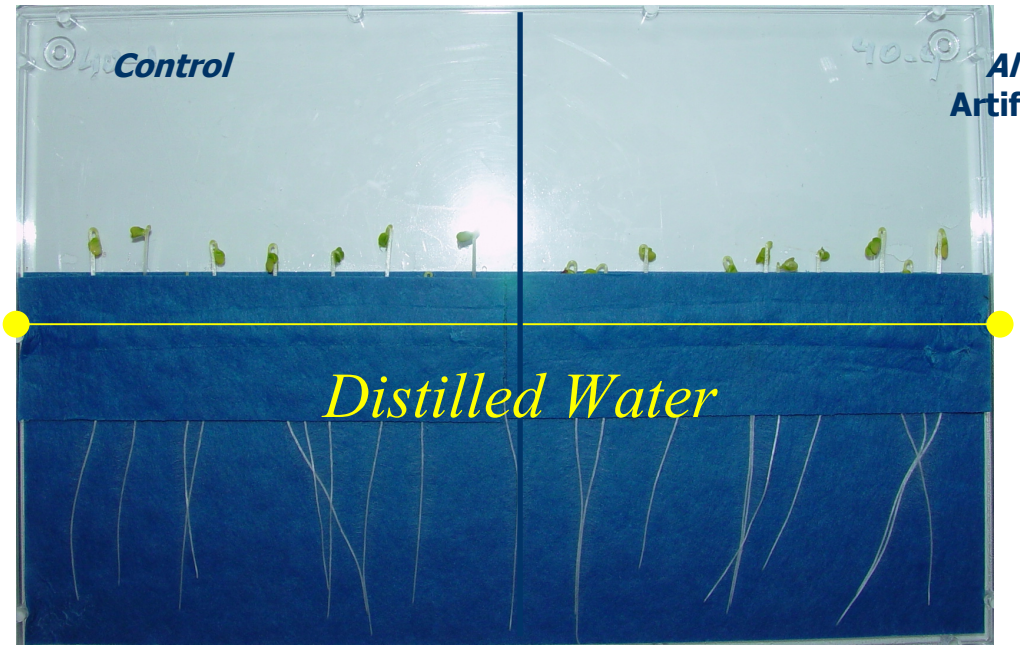

Plate 1: Influence of *Alternaria alternata* infection on Germination of Canola on a blotter without pathogens

Alternaria alternata
Artificially infected seed

Plate 2: Influence of *Alternaria alternata* infection on Germination of Canola on a blotter inoculated with *Pythium ultimum*

Alternaria alternata
Artificially infected seed

Plate 2: Influence of *Alternaria alternata* infection on Germination of *Brassica junceae* on a blotter inoculated with *Fusarium oxysporum*

Conclusions

Disease levels due to *Pythium ultimum* and *Fusarium oxysporum* were higher in seeds artificially infected A*lternaria alternata*. Seedling death due to *Pythium* was increased in the presence of *A. alternata* on canola. Vigour of seedlings in the presence of *F. oxysporum* was decreased in the presence of *A. alternata*. These results demonstrate that *A. altenata* can interfere with plant defense mechanisms on blotter. The significance of this effect has not been confirmed in soil or field situation. Blotter inoculation with *F. oxysporum* and *P. ultimum* could serve as a screen to assess potential deleterious effects or enhancements of seedling defense mechanisms in screening of rhizobacterial disease control agents.

References

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