

Biofumigation for soil-borne disease management in flower bulb culture

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Introduction

Effects of biofumigation against *Pythium* root rot were investigated. Only one specific fungicide (metalaxyl) with variable effects is available for application in flower bulb culture. Using only one fungicide leads to a high risk for resistance development.

Biofumigation is an alternative method, suppressing soil borne diseases by biocidal compounds, released from Brassicaceous green manure crops after cell disruption. In previous experiments, biofumigation was tested against several pathogens in bulb crops with variable results. Reduction of *Pythium* root rot was observed in hyacinth.



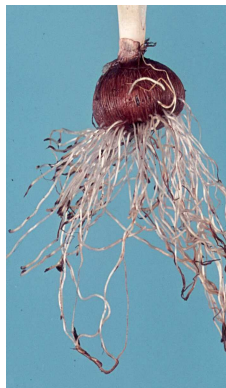
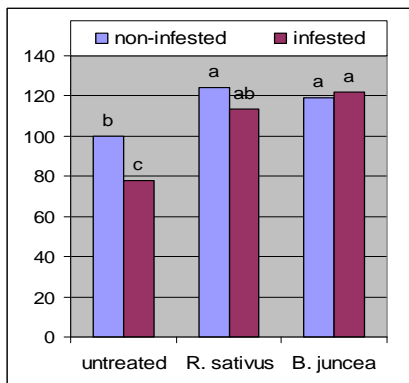
Materials and Methods

In a field experiment, *Brassica juncea* ISCI20 and *Raphanus sativus* were grown and incorporated in soil infested or not with *Pythium*. Effects on bulb yield of *Crocus vernus* 'Flower Record' were compared to untreated (fallow).

Discussion

Multiple mechanisms may contribute to the observed effects, including increase of disease suppression and crop resistance. Whether or not biofumigation occurs is difficult to verify from yield data.

Mechanisms and potential effects of biofumigation crops on the soil microflora, pathogens and crop stand.



Effect of *B. juncea* and *R. sativus* on the relative bulb yield of crocus in soil infested or not with *Pythium*.

Mechanisms	Positive effects	Negative effects
Host for pathogens		Increase pathogens
Crop residues = food for soil microflora	Increase disease suppression	Increase pathogens
Green manure	Increase crop stand, resistance	
Biofumigation	Decrease pathogens	Decrease soil microflora, disease suppression

Results

- Incorporation of *B. juncea* and *R. sativus* resulted in increase of bulb yield compared to untreated soil.
 - Yield losses caused by *Pythium* root rot were reduced.
- Based on these results, participatory experiments were performed with bulb growers on naturally infested fields.
- Little *Pythium* infection occurred.
 - Growth and incorporation of the crops was manageable. Watering after incorporation requires extra attention.

Conclusion

Positive results are obtained with field application of biofumigation crops against soil borne diseases like *Pythium*. The biofumigation mechanism may contribute to other general mechanisms involved with incorporation of crop residues which affect crop yield.