Improving food security using compounds released from fungal spores

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Introduction

It is projected that food productivity must increase by 70% to feed an additional 2.3 billion people by 2050.

A possible solution to this problem is to minimize the severity of arable crop diseases.

A particularly devastating disease is 'Spot Blotch' which is responsible for losses of 15-20% of wheat production in South Asia annually.

My research investigates the use of compounds produced by fungal spores to minimize to severity of Spot Blotch. (Figure 1)

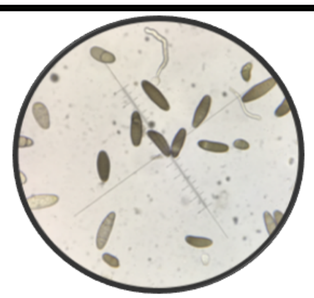

Figure 1. *B. sorokiniana* spores under X100 magnification.

Methods

Spores removed from a growing colony of *Trichoderma harzianum* T22 fungus (Fungus A) were suspended overnight in 10 or 100 ml of water (T22-1 and T22-2). 1 g of Trianum-P, a commercially available formulation containing T22 spores, was also suspended in 5 and 10 ml of water over night.

Compounds produced by the spores were removed from the spore mixtures using ethyl acetate.

0.01 ml of compounds extracted with ethyl acetate was applied to the Spot Blotch-causing fungus, *Bipolaris sorokiniana* (Fungus B) and incubated for 48 hours at 28°C.

The maximum colony diameter of the Spot Blotch-causing fungus was recorded for each of the compound-ethyl acetate mixtures.

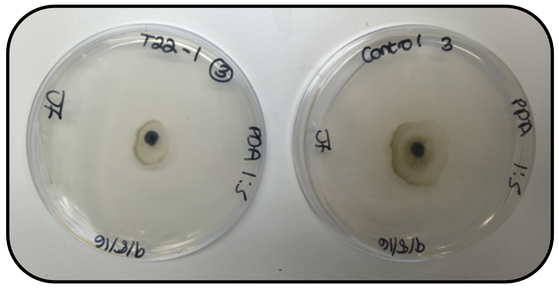

Figure 2. *B. sorokiniana* colony with T22-1 treatment applied and a control *B. sorokiniana* colony after 48 hours.

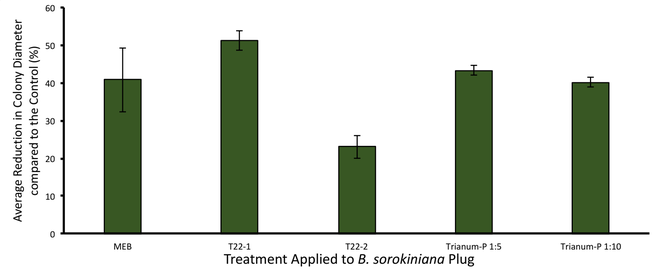

Figure 3. Mean reduction in *B. sorokiniana* colony diameter compared to the control when different treatments were applied after 48 hours.

Results

Compound extracted with ethyl acetate from spores from a growing colony of Fungus A at 1:10 and 1:100 concentrations, caused a significant reduction in the maximum colony diameter of Fungus B after 48 hours (Figure 2). The 1:10 concentration treatment reduced Fungus B's colony size by over half (51.3%) compared to the control, whereas the 1:100 concentration reduced Fungus B's colony size by approximately a third (31%). (Figure 3)

Compound extracted from Trianum-P in 5 ml and 10ml suspensions caused a reduction in the maximum colony diameter of Fungus B after 48 hours.

The 5 ml suspension reduced Fungus B's colony size by 43% compared to the control, whereas the 10 ml suspension reduced Fungus B's colony size by 40%.

Conclusion

The treatment that resulted in the largest reduction in colony diameter of Fungus B was by extract from cultivated Fungus A spores at a 1:10 concentration, followed by compounds extracted from Trianum-P in 5 ml and 10 ml of water. The least effective treatment was compound from cultivated spores in a 1:100 concentration.

This suggests that the effect of the extracted compounds on the maximum colony diameter is concentration dependent.

A lot more work and research is needed in this area, but I feel these results provide evidence that compounds produced by Fungus A may be able to contribute to reducing the severity of spot blotch disease of cereal crops.

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