Soil Technologies Corp.
Research and Development Department

Research Report

Title: Effectiveness of Fungastop Against Phytophthora capsici

Location: Fairfield, IA, USA

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Crop: Study conducted in a laboratory setting

Date: 2016

Abstract: This field trial aimed to evaluate the effectiveness of Fungastop, a fungicide, against *Phytophthora capsici*, a destructive plant pathogen known to cause Phytophthora blight in a wide range of crops. Phytophthora blight poses a significant threat to agricultural productivity worldwide. Through in vitro assays, it was demonstrated that Fungastop inhibited the growth of *P. capsici*, significantly reducing its spread over a four-day period. The treated plates exhibited reduced pathogen proliferation compared to untreated controls. This research suggests the efficacy of Fungastop in managing Phytophthora blight, providing insights into its application for disease control in agricultural settings.

Effectiveness of Fungastop against *Phytophthora capsici*
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Background

Phytophthora is a genus of Oomycete plant pathogens. The Oomycota include more than 500 species, including downy molds and water molds. Despite some similarities, Oomycetes are not true fungi, and instead belong to the Kingdom Chromista. Species of *Phytophthora* are known to attack a wide variety of plants, and in tropical regions are responsible for significant losses in tropical crops via root rots, collar rots, stem cankers, leaf blight, and fruit rot. *Phytophthora capsici* is a species that causes Phytophthora blight. *P. capsici* causes damage to crops like pumpkin, squash, watermelon, and cucumber, among many others.

P. capsici produces sexual spores called oospores as well as asexual spores called zoospores which form inside sporangia. Oospores from *P. capsici* can survive between crops in the soil for several years even without a host plant. Once they infect a plant, oospores go on to produce sporangia and zoospores. The zoospores are normally released in water and can stay alive for several hours, infecting more plant tissues.

Method

In vitro assays were used to test whether Fungastop could inhibit the growth of this pathogen in a laboratory environment. *P. capsici* was isolated from *Fragaria chiloensis* (Chilean strawberry) and a pure culture was grown in the lab for use in Petri dish assays.

Low-nutrient potato dextrose agar (PDA) was used for this test. The agar was prepared using 12.5g potato dextrose and 12g agar to 1,000 mL of distilled water. Ten drops of blue dye were added to provide color contrast and make growth of the pathogen more visible. The nutrient medium was poured into 25 x 100 mm Petri dishes and then autoclaved to reduce any contamination. No antibiotics were added to the medium.

A sterilized inoculation loop was used to transfer sporangia, oospores (sexual spores) and hyphal fragments from an established colony of *P. capsici* onto Petri dishes for the experiment. The spores were placed on the right side of each Petri dish. The inoculation loop was sterilized between each pass to reduce contamination.

One Petri dish was treated with a line of Fungastop diluted to field-rate strength of 0.5%. The line of Fungastop was placed down the middle of the Petri dish using a sterile inoculation loop. The control dish was not treated. Both Petri dishes were then kept at 22° C in the laboratory for a total of 4 days to observe whether there were any differences in growth patterns between the

control and test plates. Photographs were taken after two days and then again after four days' time had passed.

Results

Fungastop was effective at slowing growth of *P. capsici* on the Petri dish assays. The following photos illustrate results after two and four days' time. Even after four days had passed, the Petri dish treated with Fungastop was not completely covered with the pathogen.

2 Day Results

P. capsici on low nutrient agar plates. Control on right. Field strength Fungastop was used on left plate. Inoculated 11/12 and photo on 11/14.

P. capsici on low-nutrient agar plate with field rate Fungastop applied. Inoculated 11/12 and photographed 11/14. The pathogen has not yet crossed the midline of the Petri dish.

P. capsici on low-nutrient agar. Control plate. Inoculated 11/12 and photographed 11/14. This photo illustrates that the pathogen has begun to cross the middle of the Petri dish.

4 Day Results

Results were more apparent after four days' time had passed, as illustrated below. In this case the untreated Petri dish shows the pathogen having crossed over to cover the entire plate.

P. capsici on low-nutrient agar plates. Plate treated with field-rate Fungastop on left. Inoculated 11/12 photographed 11/16

P. capsici on low-nutrient agar plate. Treated with field-rate FungaStop. Inoculated 11/12 photographed 11/16. This photo shows more developed growth. Still, the pathogen has not completely covered the Petri dish.

P. capsici control on low-nutrient agar plate. Inoculated 11/12 and photographed 11/16. This photo illustrates more noticeable growth as the pathogen has covered the entire Petri dish.

Conclusion

These results illustrate that Fungastop is effective at slowing the growth of *P. capsici* in a laboratory environment. After two days' time the Petri dish which had been treated with Fungastop showed less overall growth as compared to the control. After four days' time had passed, the Petri dish treated with Fungastop had significantly less growth than did the control, illustrating the inhibitory effects of the treatment.