CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)

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Project Number

S1503

Project Title

Effects of Three Essential Oils on the Growth of the Fungus Alternaria solani

Abstract

Objectives/Goals

The objective is to see if the natural essential oils of Carum copticom, Zataria multiflora, and Satureja hortensis are able to inhibit the growth of the fungus Alternaria solani, which would allow them to replace the chemical fungicides being used against the early blight of tomato disease, caused by Alternaria solani fungus.

Methods/Materials

200 and 400ppm of each essential oil were dissolved in acetone and added to separate 100ml flasks holding the liquid PDA for the experimental groups. For the control groups, no essential oil was added. 32 Petri-dishes were labeled, and the liquid PDA of each treatment was poured into corresponding Petri-dishes. 5mm pieces of the cultivated fungus were placed on the PDA of the 32 Petri-dishes. Four replications were prepared for each treatment.

Results

The 200ppm of the Carum copticom treatment had no growth at all in 3 of 4 replications. In the 4th replication, the 5mm primary inoculum grew only 1mm. The 400ppm of Carum copticom had no growth at all in any of the 4 replications. The 200ppm of Zataria multiflora treatment grew 55.6% of the corresponding control group. The growth of the fungus under 400ppm of Zataria multiflora grew 45.6% of its corresponding control group. The 200ppm of Satureja hortensis treatment had almost no growth inhibition, with its growth being 95.47% of the corresponding control group. Ironically, 400ppm of the Satureja hortensis treatment grew 150.6% of the corresponding control group.

Conclusions/Discussion

Since Carum copticom was able to stop 99.5% of the growth in 200ppm and 100% of the growth in 400 ppm of the Alternaria solani fungus, it can potentially replace the chemical fungicides being used against the early blight of tomato disease caused by this fungus. This would be greatly beneficial since it is an all-natural way to battle something which is currently being fought against with chemical fungicides. Some of these fungicides have been deemed as skin irritants, toxic if inhaled, and even deadly. Chlorothalonil, one of the fungicides previously used, was given to two species of frogs in a study in the expected environmental concentration, resulting in 87% mortality in 24 hours. These essential oils practically have no side effects. Tomatoes are a major part of the human diet, grown throughout the world, and largely susceptible to the Alternaria solani fungus and therefore the early blight of tomato disease.

Summary Statement

Three essential oils were tested to see if they would inhibit the growth of the Alternaria solani fungus and thus able to replace the chemical fungicides used against the early blight of tomato disease, the disease caused by this fungus.

Help Received

used laboratory of Azad University, Isfahan/Khorasgan Branch in Isfahan, Iran; supervised by Prof. Dr. Ebrahim Behdad; two lab assistants helped teach some of the procedures so that I could do them on my own during the research; English teacher Mrs. Tawny Billings helped edit the format of the research