CALIFORNIA SCIENCE & ENGINEERING FAIR
2018 PROJECT SUMMARY

Name(s)
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Project Number
38544

Project Title
Fertilizer vs. Fungi, Part II: How Nitrogen Fertilizers Affect Beneficial Mycorrhizal Fungi

Abstract

Objectives/Goals
The objective of this study was to determine whether exposure to nitrogen fertilizer will decrease the number of beneficial mycorrhizal fungi that grow into the root systems of California grassland plants. The fungi assist their host plants in water and nutrient uptake and provide protection from pathogens.

Methods/Materials
Collected experimental and control soil samples, extracted and rinsed plant roots, stained plant roots using 2.5% potassium hydroxide, 1% hydrochloric acid, an acidic glycerol/trypan blue mixture, and acidic glycerol. Made permanent slides and counted the fungi using a compound light microscope. Extracted nitrate from soil using 2.5% potassium chloride, then performed nitrate tests using cadmium powder and a nitrate testing kit.

Results
I counted beneficial mycorrhizal fungi for plant roots with and without exposure to nitrogen fertilizer. The plant roots not exposed to fertilizer showed more mycorrhizal fungi than those exposed to fertilizer. Nitrate levels in the soil with and without added nitrogen fertilizer were tested. The soil with fertilizer added had a higher level of nitrate than the soil without fertilizer added.

Conclusions/Discussion
The plant roots exposed to nitrogen fertilizer had fewer beneficial mycorrhizal fungi than those not exposed to nitrogen fertilizer. I concluded that nitrogen fertilizers can lower the number of beneficial mycorrhizal fungi in plant root systems. This indicates a potential harmful side effect of the use of chemical fertilizers.

Summary Statement
I found that the addition of nitrogen fertilizer can lower the number of beneficial fungi in plant root systems.

Help Received
Dr. Kathleen Treseder of the University of California, Irvine, allowed me to work in her laboratory, provided all the materials and equipment, and explained all the procedures.