CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

Lekha Pillarisetti

Project Number

35610

Project Title

Impact of Plants Grown from Genetically Modified Seeds on Soil Fertility

Abstract

Objectives/Goals

CA ballot proposal 37 of 2014 triggered my interest in use of GM products, especially their environmental after effects. I set out to analyze impact of plants grown from genetically modified seeds on soil fertility as measured by changes in microorganisms at their root soil.

Methods/Materials

96 pots of soil samples were used to grow 4 different seed types (natural Corn, natural Soy, Bt-Corn and Bt-Soy - the last two were genetically modified using Bacillus thuringiensis) in 2 different soil types (backyard and potting). Over 25 days, collected root soil samples before and after plant growth and before and after use of herbicide. Soil samples were put in petri dishes with agar and cultured at 75-85 degrees (F). After 8 days, counted microorganism growth in terms of CFU (Colony Forming Units) using magnifying glass and a fine graph paper. I also measured plant growth with varying water use in both GM and Non-GM plants.

Results

There were four main findings: (1) GM Seeds show 155% higher growth than non-GM seeds which was as I expected (2) GM seed based plant root soil has 22% lower microorganism counts than non-GM based plant. This was the most important observation. (3) Root soil of GM seed based plants is 35% more herbicide resistant (4) GM seed based plants have a 17% higher survival rate in drought-like water conditions.

Conclusions/Discussion

Soil used for GM seeds modified using insecticide resistant gene degrades significantly and shows a large loss of microorganisms compared to soil used for natural seeds. This is similar to horizontal gene transfer that occurs from plant debris to soil. As expected, GM plants do show higher short term yield, but could potentially result in lower soil fertility. With many projections showing that by 2050, the arable land per person to be a third of what it is today, it is important to understand this impact on soil. Also root soil used for GM seeds becomes more herbicide resistant which is the Bt gene property transferred from root to soil. This could potentially cause growth of super weeds.

Summary Statement

My project analyses the long term impact on soil fertility from plants grown from genetically modified seeds due to possible horizontal gene transfer from their roots to the soil around them.

Help Received

Prof Wai-Pan Chan of UC Berkeley kindled my interest in microbiology. My parents helped me to gather supplies, provided exclusive sterile work area at home, stay on track at various stages of the project. My teacher, Ms Patel, guided me on ways to make my presentation more effective.