# CALIFORNIA STATE SCIENCE FAIR
# 2014 PROJECT SUMMARY

**Name(s)**

**Madison P. Meredith**

**Project Number**

**S1907**

**Project Title**

## The Effect of Microorganism Additives on Nitrogen Efficiency Related to Plant Growth

**Abstract**

**Objectives/Goals**

Conventional fertilizers may cause issues from low nitrogen uptake from plants. The increase of available, yet unused, nitrogen in the soil may also cause adverse effects to the nitrogen process, impeding the soil system. This study was performed to determine if growth rates and amount of nitrogen in soil and water, similar to what can be found using today's practices, can be effected by the addition of microorganisms found in worm feces.

**Methods/Materials**

A hundred and thirty-five plastic, 30.48 centimeter (cm) pots were separated into three equal groups, Treatment 1 (T1), grower standard soil/UN-32, Treatment 2 (T2), grower standard soil/microbial mix/UN-32, and Treatment 3 (T3), untreated grower standard soil/control group. The three treatments were put into a randomized block design in a greenhouse, and tested for 6 weeks. All three treatments received one Swiss chard transplant, same height, mass, and age. Water samples were taken after week 3 and 6, soil, root and green biomass samples were taken after week 6.

**Results**

Root and green biomass data proved that Treatment 1, grower standard soil/normal nitrogen, had almost equal performance with Treatment 2, soil/irrigation microbial mix. Water analysis proved treatment 1 to have the most amount of Total Kjeldahl Nitrogen/Nitrogen. When comparing the soil and water data for Treatment 1; approximately 60% of the nitrogen applied entered the plant or stayed in the soil. Treatment 2 released approximately 13% of the nitrogen applied, receiving or capturing around 87%. The addition of the microorganism additives supported a 27% decrease in the amount of nitrogen lost from the system.

**Conclusions/Discussion**

The addition of microorganism additives did have an effect on the growth of the plant, while improving the uptake of the plant. Treatment 2 received 27% more of the nitrogen applied than Treatment 1. With the leftover nitrogen in the soil, it could be projected that in a normal 6 week growth season, the nitrogen would then be available to replace the need for 10 applications. Economically, with the use of the microorganism additive, the price per 10 acres for irrigation and fertilizer is $12.50 more than without the mix. In turn, the revenue received from crop will increase, due to it being larger and healthier. The farmer will also save money from the lesser need for artificial nitrogen.

**Summary Statement**

The addition of a liquid microorganism additive during irrigation increased nitrogen efficiency in agricultural crops by 27% percent and increased growth rates; while also providing a long term, inexpensive solution to soil infertility.

**Help Received**

Used lab equipment at Research For Hire under the supervision of John Corkins; Compared project with student and professor at California Polytehnical State University.