



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Madison P. Meredith	Project Number S1114
Project Title Ground Water Preservation: Using a Water-Based Microbial Mix as a Nitrate Sequestration Agent in Agriculture	
Objectives/Goals Ground water pollution is a growing concern, not only nationally but globally as well. Many activities of developed and developing countries, with regard to agriculture, have contributed to nitrate contamination of ground water through the expanded use of nitrogen fertilizers. However, even though nitrogen fertilizers have an adverse impact on ground water quality, it continues to be used nationally and globally because it has turned into one of the most effective tools for increasing agricultural production. This study seeks to find the feasibility of using a water based microbial mix that will sequester nitrogen fertilizers to reduce contamination in the ground water.	
Abstract Methods/Materials Twenty-four plastic, ten centimeter (cm), pots with a single hole in the bottom were separated into Group A (12 pots) and Group B (12 pots). Groups A and B were placed on a 55 x 25 cm wire shelf. Twenty-four plastic 500 milliliter (ml) cylinders were separated into two equal groups, Group C (12 cylinders) and Group D (12 cylinders). Group C cylinders were placed under Group A pots; Group D cylinders were placed under Group B pots. The environment of Groups A and B resembled a crop field. Group A and Group B received equal soil per pot, one beta vulgaris plant per pot and sunlight per pot. Also, during the watering process that occurred every four days, Group A and Group B were each given 720 ml of nitrates and 720 ml of water. In addition, Group B received 480 ml of the water based microbial mix. Core soil samples were taken, every four days for a total of twenty days, and sent to the Valley Technical Agriculture Lab.	
Results Data revealed that the average amount of excess nitrates for Group A was 5.76 parts per million (ppm), and the average amount of excess nitrates for Group B was 3.90 ppm. The data was also converted to find the pounds of nitrogen per acre foot (lbs N/ac-ft), resulting in Group A having 23.04 lbs N/ac-ft, Group B having 15.60 lbs N/ac-ft. After using the efficiency formula, the efficiency of the nitrogen in Group A was 41.67%, the efficiency of the combination of nitrogen and the water-based microbial mix in Group B was 61.54%.	
Conclusions/Discussion The use of a water-based microbial mix to sequester nitrogen fertilizers to reduce nitrate contamination in groundwater has proved feasible by increasing nitrogen efficiency by 19.87%, and reducing the amount of excess lbs N/ac-ft by 7.44 lbs.	
Summary Statement A study on a water-based microbial mix and its feasibility to sequester nitrogen fertilizers in agriculture.	
Help Received Consulted with Professor Craig Britton at Porterville College on the subject of nitrogen in agriculture.	