



**CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY**

Name(s) Zoe R. Fairlie	Project Number S1299
Project Title Fertilizing with a Conscience	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Serious environmental consequences, like eutrophication, occur from the runoff from industrial fertilizers. The purpose of this experiment is to observe the advantages and disadvantages of different fertilizer types. These include cover crops, industrial, and natural fertilizers. For this project I examine four important questions: What are the advantages and disadvantages of using natural or chemical fertilizers? Which fertilizer causes the most plant growth? Which fertilizer causes the highest nitrogen content in the runoff? Which fertilizer runoff causes the most growth or death of algae?</p> <p>Methods/Materials I used several procedures, but made a mistake in my first procedure. For this procedure, I acquired all of the materials and set up 4 pots with top soil and the respective fertilizers. I allowed for plant growth over the course of two weeks. I did a nitrate test on the runoff for all 4 pots. I set aside some of the runoff in beakers and put 3 algae tablets in the runoff from each of the different fertilizer types and recorded algae growth. Using the first procedure I found that all four tests showed very high levels of nitrates in the runoff. I decided to redo the experiment using soil with less nitrates. It's very difficult to measure growth of algae on the surface of water. I took a high quality digital photo of each beaker. I then conducted RGB pixel test to estimate percentage of surface is algae using Photoshop.</p> <p>Results From my procedures, I found that the cover crop had the least algae growth and nitrate runoff. I also found that the plants using the cover crop grew as well as the plants using Miracle Grow. The cover crop had less runoff than the control because the nitrates in the nodules from the cover crop allow for absorption of nitrates.</p> <p>Conclusions/Discussion Cover crops may be a good substitute for industrial fertilizers. Surprisingly, this fertilization method caused increased growth over Miracle Grow. Cover crops have the least nitrates (in ppm) in the runoff, as well as the least amount of algae growth. This is extremely important, because if less algae growth occurs in waterways, then less eutrophication will result. It would be interesting to do a larger scale version of this experiment using more industrial agriculture techniques.</p>	
Summary Statement My experiment tests the effects of different fertilizers on plant growth and algae growth from runoff.	
Help Received My teacher helped me get nitrate tests.	