



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Robin K. Yam	Project Number 23191
Project Title The Effects of Chemical Fertilizer vs. Legumes	
Objectives/Goals The objective of my project is to reduce the amount of harmful nitrogen due to chemical fertilizers in the runoff water of golf courses. This can be achieved by using legumes to fixate nitrogen that will be beneficial to grass but not harmful to the environment. Abstract Methods/Materials To conduct my project, five crates of rye grass were planted in boxes lined with filter fabric and filled with purchased soil. Three types of legume seed mixtures containing crimson clover, white dutch clover, and lupine were planted in three of the crates along with the grass. One crate was just grass for the control and one crate was grass fertilized with chemicals. All of the grasses were watered the same amount and were all under the same amount of sunlight. Measurements of length and width were taken of random grass blades from each crate. After watering, runoff was collected in a plastic tray and tested with a home garden nitrogen testing kit to determine the amount of nitrogen in the runoff water. Results The results of the various T-tests and the nitrogen tests showed that the grass fertilized with chemicals did produce taller and thicker grass blades than the grass grown with legumes. The runoff water from the grass fertilized by chemicals had a surplus of harmful nitrogen whereas the runoff water from the grass/legume mixtures and from the control showed no nitrogen. An expert golfer evaluated the grasses and stated that although the grass grown with chemical fertilizer looked best, the grass/legume mixtures were fine for the rough of a golf course, an area that takes up almost 50% of a 18 hole golf course and is not used very often by good golfers. Conclusions/Discussion The grass fertilized with chemicals displayed a taller and thicker grass blade than the grass with legume mixtures. However, the nitrogen test showed that the chemically fertilized grass had a surplus amount of harmful nitrogen whereas the grass/legume mixture and the control showed none. Although the quality of the grass/legume mixture may not be preferable for the putting greens and tees of a golf course, the legume mixture would be suitable for the rough. Making this change to legumes in the rough areas would reduce the fertilizing demands and consequently reduce the nitrogen runoff from a golf course by about half while still being of acceptable quality to the notoriously picky golfer.	
Summary Statement In order to reduce harmful nitrogen runoff in our waterways, legume plants were used to fixate nitrogen as an alternative to chemical fertilizers on golf courses.	
Help Received My mom and dad helped me get materials and my science teacher helped me edit my paper. A golfer friend of my dad's came over to evaluate the grass quality.	