



**CALIFORNIA STATE SCIENCE FAIR  
2002 PROJECT SUMMARY**

<b>Name(s)</b> Colleen A. Lopez	<b>Project Number</b> <b>J0814</b>
<b>Project Title</b> <b>Growing Crops Using Recycled Water and Biological Filtration</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> According to a report released by the United Nations Population Fund, the world's population is approaching the point where there will not be enough fresh water to go around for basic human needs and to irrigate crops. Unfortunately, when irrigating crops, large amounts of water are lost through the soil. As the water flows downward, it also dissolves nutrients in the soil (especially the nitrogen compounds) leaving it depleted and dry. The experimenter hypothesizes that a crop growing system can be designed where the only water loss occurs through evaporation and where fertilizers are added to the soil naturally. Such a system would allow even those areas with limited amounts of water to become fertile farmlands. The objective of this project was to determine if such a system could be built and if it would work as expected.</p> <p><b>Methods/Materials</b> To prove that such a system can be built and that it will work as expected, the experimenter designed what she calls a #bio-channel#. The bio-channel recaptures all unused water and, through biological filtration, adds nitrates to the water providing fertilization. The experimenter built a small-scale model of the bio-channel. She planted Red Apple in the bio-channel and observed the growth and health of the plants. The ammonia, nitrite, and nitrate levels were measured regularly to determine the effectiveness of the biological filter and all water loss was recorded.</p> <p><b>Results</b> Over a 10-week period the bio-channel worked as expected; the plants grew and flourished. The biological filter created more than enough nitrates (indicating additional plants could be supported) and less than one gallon of water was lost per week.</p> <p><b>Conclusions/Discussion</b> The experimenter's hypothesis was supported by the experimental results. The bio-channel worked as expected allowing the Red Apple to grow and flourish. The water loss was minimal and the biological filter created more than enough nitrates indicating that a larger soil bed containing additional plants could be supported. Using this system on a larger scale will hopefully produce similar results.</p>	
<b>Summary Statement</b> My project tried to determine if it was possible to create a crop growing system which would recycle its water and would create its own fertilizers.	
<b>Help Received</b> Parents helped create model and took pictures. Parents & teachers help proofread report.	