



**CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY**

Name(s) Aadil M. Rehan	Project Number S1913
Project Title Avocado "Root Rot" Part Deux: A Multilateral Approach to Mitigating the Recurrence of Phytophthora cinnamomi	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The water mold <i>Phytophthora cinnamomi</i> has been wreaking havoc on California avocado crops for decades. It infects the roots of avocado trees, resulting in an eventual death. 2 years ago, I developed a remedy that forced the pathogen into dormancy and thermally lysed the spores using a solarization bed. Although the problem seemed resolved, in December of 2016, some trees showed signs of recurrence of the pathogen. After having soil and plant tissue tested, it seemed that the spores had gone dormant inside the plant tissue of the roots themselves. I had to devise a new strategy to combat it. My current hypothesis is that it takes a multifaceted, systemic approach to drive off this pathogen entirely. This builds on the fact that my method of targeting only the roots proved to be unsuccessful in the long term.</p> <p>Methods/Materials I am using a four-part approach to tackle this problem. The first aspect is the use of root-on-root grafts with <i>Phytophthora</i>-resistant rootstock to existing root systems. This will ensure that new roots that grow will be resistant to <i>P. cinnamomi</i>. The second aspect involves the use of foliar spray supplements, which create a concentration gradient, allowing the nutrients to travel throughout the tree. They provide nutrition while the roots heal from their grafts. The third aspect of my solution is the introduction of mycorrhizae. They compete with <i>P. cinnamomi</i> for resources and boost immunity to infection. The fourth aspect involves the use of purslane along with other companion plants due to their abilities as pest repellents, pollinator attractants, and their ability to retain the water in the soil. After the root graft, the functionally defined soil amendment (with mycorrhizae) is spread about 4 to 6 inches deep. The foliar spray is applied to the underside of the leaves. These methods, when used in conjunction, should mitigate the infection.</p> <p>Results My experimental group consisted of 12 trees that were tested, and 12 untreated trees as my control. After 13 weeks of data collection, the results are promising. Both groups show new growth, but the test group shows considerably more, and the controls show root rot symptoms.</p> <p>Conclusions/Discussion While testing will continue until fruit growth, current soil and tissue tests yield negative results for the presence of <i>Phytophthora cinnamomi</i>. This indicates that my experiment was successful, and that the hypothesis was supported.</p>	
Summary Statement Based off of past research, the goal of this project was to develop a sustainable and comprehensive method to combat the recurrence of <i>Phytophthora cinnamomi</i> infection that will remain effective in the long term.	
Help Received Based on the formulations that I provided, MBI Growcells created the functional soil amendment and foliar spray. I purchased some of my materials from various gardening stores, and my father supervised me for safety wherever necessary.	