



**CALIFORNIA STATE SCIENCE FAIR  
2017 PROJECT SUMMARY**

<b>Name(s)</b> <b>Suchitra Dara; Sumanth Dara</b>	<b>Project Number</b> <b>S1903</b>
<b>Project Title</b> <b>Antagonizing a Plant Pathogen with Beneficial Microbes to Promote Sustainable Agriculture</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Evaluate the effect of the biopesticides based on a plant extract, beneficial bacteria, and entomopathogenic fungi, on cotton plants infected with the fungal plant pathogen, <i>Fusarium oxysporum</i> f.sp. <i>vasinfectum</i> (FOV). Plants# health ratings will be measured on a scale of 0 to 5. If the plants inoculated with the biopesticides in addition to the FOV pathogen have a higher rating than those inoculated only with the pathogen, using the beneficial fungi will improve the health of crops, thus providing additional incentive to use biopesticides.</p> <p><b>Methods/Materials</b> Pima cotton seeds were planted into trays separated and labeled by treatment and regimen. Each treatment consisted of 16 plants and was replicated four times. Seeds planted in healthy and FOV4 infested potting mix represented negative and positive controls, respectively. Treatment solutions prepared based on the label rates for soil and foliar applications. Treatments were administered by adding 10 ml of the solution in respective treatments. Trays were placed in a greenhouse and watered every day for five minutes at noon. At 3, 4, and 5 weeks after planting, health of the plants was measured on a 0-5 scale. Data were analyzed using the ANOVA model, and significant means were separated using the LSD test.</p> <p><b>Results</b> In general, treatments helped reduce the severity of the disease. Plants in the negative control treatment displayed no signs of infection and maintained a very high health rating (approximately 4.8 out of 5). Plants in positive control (pathogen alone) demonstrated severe symptoms of disease # that included yellowing, necrosis, and wilting # throughout the observation period.</p> <p><b>Conclusions/Discussion</b> The presence of FOV 4 significantly affected the plant health. Treating the potting mix with the beneficial fungi and biopesticides had a positive impact on reducing the severity of FOV 4 in cotton seedlings. Multiple applications or higher rates of treatments are more effective. Entomopathogenic fungi-based BotaniGard, Pfr-97, and Met52 were among the best treatments antagonizing FOV 4. Biopesticides are commonly perceived to be less effective than chemical pesticides, but by conducting studies like this, we can determine the proper application rate and frequency to improve their efficacy.</p>	
<b>Summary Statement</b> We are using beneficial microbes to protect plants from disease.	
<b>Help Received</b> Neil Hudson, San Joaquin Valley Quality Cotton, Tim Anderson, Dow AgroSciences	