



**CALIFORNIA STATE SCIENCE FAIR  
2017 PROJECT SUMMARY**

<b>Name(s)</b> <b>Vedha Santhosh</b>	<b>Project Number</b> <b>S1119</b>
<b>Project Title</b> <b>The Effect of Using Biodegradable Coagulants on Domestic Wastewater Treatment to Promote Water Conservation</b>	
<b>Objectives/Goals</b> The objective of my study was to determine the optimal biodegradable coagulant and the optimum pH for clarification and repurposing of graywater for domestic irrigation.	
<b>Abstract</b>	
<b>Methods/Materials</b> -Household Graywater -Aluminum Sulfate (Alum) -Corn Starch -Tapioca Starch -Corn Maltodextrin -Tapioca Maltodextrin -Total Dissolved Solids Meter -pH Meter -Pea Plants I use coagulation (removal of colloidal substances from water) to determine the optimal biodegradable coagulant and pH for repurposing of graywater. Coagulation is widely used to treat industrial/domestic graywater to remove suspended particles from water. My method tests effectiveness of biodegradable coagulants against the industrial coagulant, aluminum sulfate (alum). Untreated graywater and tap water are controls. Treated graywater solutions are used to water pea plants (sensitive to pH) and optimal coagulant is determined based on plant height and health.	
<b>Results</b> Tapioca starch and tapioca maltodextrin were the best biodegradable coagulants. The pea plants watered with graywater treated with tapioca starch and tapioca maltodextrin grew the most (21 cm and 18.5 cm over 1 month respectively) and were the healthiest (strong stalks, no breakages) while the plants watered with alum-treated graywater grew the shortest (6.16 cm over 1 month).	
<b>Conclusions/Discussion</b> Biodegradable coagulants were the most effective in repurposing graywater for sustainable irrigation of plants. Alum, the leading industrial coagulant, is expensive. Alum-treated water seems clean - however, I proved that this alum-treated water isn't healthy to plants. Untreated graywater kills essential microbes in soil, preventing nutrient cycling and harming soil, which inhibits growth and reduces yield.	
<b>Summary Statement</b> Long term drought management can be achieved by repurposing graywater through coagulation using the optimal biodegradable coagulants, tapioca starch and tapioca maltodextrin, as opposed to the currently used industrial option, alum.	
<b>Help Received</b> My project was conducted entirely at my home without any assistance from teachers, institutions, or any other facilities.	