



**CALIFORNIA STATE SCIENCE FAIR  
2015 PROJECT SUMMARY**

<b>Name(s)</b> <b>Esther E. Koh</b>	<b>Project Number</b> <b>S1806</b>
<b>Project Title</b> <b>The Core Properties of Propagated Stem Cuttings that Germinated in Water</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The aim of this project was to discover the similar characteristics propagated stem cuttings had which allowed them to have a higher advantage of germinating. Because the genetic makeup of most fruits and cultivars is highly heterozygous, the unique characteristics of plants grown through seeds will be lost or will revert to less desirable forms. However, through propagation in carefully controlled environments, most cultivated plants continue to exist and be commercially available today. I sought out to find these common properties that proved to be essential in developing a new adventitious root system in stem cuttings.</p> <p><b>Methods/Materials</b> To observe which characteristics of plants allow them to germinate in water when cloned, three stem cuttings from 16 different plant types (48 in total) were used to test for the various stems, age groups, and rooting systems. Some of the stock plants used were the ficus benamina, graptosedum, tomato vine, sweet potato, portulacaria afra, etc. These cuttings were propagated in water for 55 days in controlled conditions, and observations were recorded every 5 days. Factors (such as callus, auxin, and carbohydrate) that possibly contributed to this probability were tested. Levels of auxin synergists were determined by the amount of leaves, while carbohydrate content was found by the stem's firmness.</p> <p><b>Results</b> There was no relation between stem type and root initialization. However, the age of the parent plant had a great effect on the success of a stem cutting. Of the age groups tested, 61% of the germinated cuttings came from the youngest stock plants. The favorable cutting material also contained high amounts of carbohydrate and auxin synergists. The similar direction the adventitious roots emerged from was also noted in the germinated cuttings.</p> <p><b>Conclusions/Discussion</b> In the absence of synthetic rooting hormones, the likelihood of a stem cutting germinating depended upon certain attributes such as the anatomical patterns of adventitious roots, age of the stock plant, amount of carbohydrates, and especially auxin. Propagated cuttings taken during the juvenile stage, contained high amounts of carbohydrate and auxin, grew adventitious roots corresponding to the primary rays from which they originate, and had this unknown substance in the cells which established favorable rooting conditions had a much greater likelihood of developing a new root system.</p>	
<b>Summary Statement</b> The similar characteristics of the germinated stem cuttings that were advantageous towards root initiation, such as the amount of auxin and root formation, were found that helped preserve the desirable characteristics of various cultivars.	
<b>Help Received</b> Special thanks towards my dad for letting me take cuttings from his garden.	