



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

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| Name(s) Jacob M. Stelman | Project Number S1913 |
| Project Title Controlling Flowering by Modifying Light Exposure and Root Proximity | |
| Abstract Objectives/Goals The objective of my project was to determine if it is possible to flower a single branch of a plant, while leaving the rest of the plant in a vegetative (non-flowering) state. My hypothesis is if different parts of the plant are exposed to different hours of light, and different proximity to roots and the hormones they create, one branch will flower and another will not. Methods/Materials Two chambers were constructed one on top of the other in a cardboard box and thoroughly light proofed from each other. The lights in each chamber were controlled by timers. The top chamber received 12 hours of light a day (representing the flowering spring season) and the bottom chamber received 18 hours of light a day (representing the vegetative summer season.) Four tomato plants were used as test subjects. A control plant was placed in each chamber. Two study plants were placed so that their bottom branches were in the bottom chamber and their top branches were in the top chamber. One of the study plants grew through a second pot of soil placed around the stem as it entered the top chamber and formed a second root system. Results The control plant in the top chamber flowered completely, and the control plant in the bottom chamber did not flower at all. The study plant with a root system in each chamber flowered in the top chamber, but not in the bottom chamber. An interesting thing occurred in the study plant with only one root system in the bottom chamber. It flowered completely in the top chamber, but a branch on the bottom also had one small flower bud on it. Conclusions/Discussion My results confirmed my hypothesis. This is because leaves detect the season by the hours of light they receive and send a signal to the apical meristem (very top of the plant) to produce auxins (a type of flowering hormone.) Perhaps the auxins produced in the plant with only one root system descended into the lower part of the plant causing it to flower in both chambers. Perhaps this did not happen in the plant with two root systems because cytokinins (a hormone produced in roots of plants) in the second set of roots in the top chamber stopped the auxins from descending into the branches of the plant in the bottom chamber. Farmers using this method they might be able to harvest the flowering top of the plant each year and let the bottom survive in a vegetative state. This may save their annual plants from dying every year. | |
| Summary Statement I researched the ability to flower a single branch of a plant while leaving the rest of the plant in a non-flowering vegetative state. | |
| Help Received My father helped me wire the electricity to the light bulbs on the board in a safe manner. | |