



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

Name(s) David He	Project Number S1804
Project Title Effect of Genetic Modification of DMR6 in Solanum lycopersicum	
<p style="text-align: center;">Abstract</p> <p>Objectives The objective of this study is to determine the effects of modification of DMR6 in tomato fitness and abiotic stress response.</p> <p>Methods Plant trays, dsRNA, qPCR kit, soil, tomato seeds dsRNA interference was utilized to silence the DMR-6 gene in a group of 3-day-old Solanum lycopersicum seedlings, while another group was used as a control. Both were split into five groups at 18 days. Two groups were grown as normal, while one group received three times more water, one group received no water, and one group was subjected to 4 degrees Celsius. Height, leaf color, and leaf quantity were measured every three days until 18 days, after which they were measured every 12 hours. qPCR was utilized to quantify dsRNA efficacy.</p> <p>Results Results show significantly higher plant heights for groups 1, 2, and 5, with significantly higher leaf quantities in group 2 ($P < 0.05$). The average heights and average amount of plant leaves in the experimental groups were both lower than in the control groups for every condition except at low temperature, which exhibited precisely the opposite results. In addition, the groups placed under stresses showed more visible circadian rhythms, while the treated plants showed more visible circadian rhythms than wild-type plants under the same condition with the exception of group 4, whose treated plants showed less visible circadian rhythms.</p> <p>Conclusions This study reflects undiscovered effects of the DMR6 gene in plants, not just for regulating height, but leaf growth, circadian rhythms, cold resistance, and possibly chlorophyll production. More importantly, however, this is an integral step in determination of effects of genetic modification on plant fitness. With sufficient data like this, it may even be possible to predict these effects and compare them in order to work towards an optimal solution for crop yield.</p>	
Summary Statement I found that genetic modification of DMR6 in tomato plants generally caused lower plant height and leaf quantities, along with increased strength of circadian rhythms.	
Help Received Professor Jose Pruneda Paz of UCSD gave resources for qPCR and allowed lab space to perform it, guiding me through the procedure. However, my project was completely independent from his research, and the rest of the project was my idea.	