Investigation into Arabidopsis thaliana Circadian Systems

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Circadian clocks are biological systems found in nearly all living species. In plants, they are responsible for water, nutrient and light intake and usage. Based on numerous studies, there are specific proteins in the plant that are responsible for maintaining the plant's well being; if a plant's genes could be manipulated to alter protein expression it is speculated that their circadian clock could be altered as well, leading to an optimization of the functions carried out by it. This experiment focused specifically on the optimization of watering routines. Consisting of two main components, this experiment included an investigation into how watering at specific times of the day can maximize plant growth (7 am, 12 pm, or 7 pm), additionally, what gene (CCA1-OX, elf 3-2, prr 6,7,9) is most responsible for water intake. Drought and poor climate have caused a great need for sustainable farming in several developing countries across the world. If a plant's genetic code can be modified to optimize the expression of a specific protein that is found to correlate with increased effective water intake, the plant may therefore be more effective at resisting drought. NASA has also expressed interest in plant circadian system research for its potential uses in extra-terrestrial agriculture. Additionally, this experiment could be applicable to modern irrigation techniques, allowing for more efficient water usage in farming, reducing costs and improving yield.

Awards Won: