The Effects of Varying Methods of Gibberellic Acid Exposure on the Growth and Development of Wild-Type and PKL1-1 Mutant Arabidopsis thaliana

Weinstein, Rachel

Gibberellic acid is a phytohormone that when applied to plants, is known to promote growth. In an effort to maximize the efficacy of this hormone, gibberellic acid was applied to Arabidopsis thaliana plants either through the more traditional method of an aqueous spray, or through infusion into the growth media. Three concentrations of the hormone for each of the two treatment methods noted above were tested. To determine the best method of application as well as the most effective concentration, the root and shoot lengths of the plants were measured, qualitative observations were made, and extensive statistical analysis was conducted. To further extend the study, the technique developed in the first phase of the experiment (most effective method and concentration) was used in applying gibberellic acid to A. thaliana plants that have a PKL1-1 gene mutation causing a dwarfed phenotype. The aim of this extension was to rescue the phenotype of the mutant plants, a goal which previous scientists had been unable to fully accomplish. Results of phase one suggested that gibberellic acid, when applied at a range of 50-100 mg/L into the growth media, can significantly increase both the root and shoot growth of A. thaliana plants. In phase two, this novel method of application completely reversed the effects of the mutation, even increasing the plant growth of the mutants beyond the growth of the wild-type plants in some trials. A potential genetic model for these results was then proposed. This new procedure for gibberellic acid application can be useful in the agriculture industry, as it is an organic method of increasing plant growth. The research also suggests that altering minor factors in the application of a hormone can have a notable impact on the data.

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