Transient Expression of Flowering Locus T1 in Arabidopsis thaliana via Cell-Penetrating Peptides

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In most perennials, the flowering process is prolonged due to the extensive growth period, causing time gaps in plant research and cultivation. The purpose of the study is to assess the efficiency of utilizing a peptide-based delivery system for introducing genes, specifically Flowering Locus T1 (FT1), which induces the flowering process. For testing, leaves from thirty-six Arabidopsis thaliana plants were inoculated with Agrobacteria as the control and cell-penetrating peptides (CPPs) with FT1 as the test. The ratio of DNA to peptides (N/P) was varied at 0.5, 1, 2, and 5 ocular densities to find the most efficient value. Real Time-qPCR quantified the amplification of mRNA in samples from the inoculated leaves. The experimental groups showed an increase in expression, particularly the R9-Tat2 peptide at the 1.0 N/P ratio with a fold change of 2.257. This specific peptide had a higher amount of arginine and lysine, which allowed for more of the FT1 DNA to bind. On average, the 2.0 N/P ratio had the greatest fold change, as this amount of peptide was likely the best amount to prevent over-binding and under-binding. The results support that these peptides are more effectual than the Agrobacteria method to present exogenous genes into plant cells without stable transformation. The transient integration and expression of the FT1 initiates the flowering cascade to mature the plants faster than normal without adding stress. Using this method can be useful for accelerated growth in various herbaceous species that are valuable for pharmaceutical, agricultural, and environmental value.

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