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A Nucleic Acid Extraction Method for High-Viscosity Floricultural Samples

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Abstract : With the recent advances in gene editing technologies allowing the rewriting of genetic sequences, additional market growth in the global floriculture market beyond previous trends is anticipated through increasingly sophisticated plant breeding techniques. As a prerequisite for gene editing, the gene sequence of the target plant must first be identified. This necessitates the genetic analysis of plants with unknown gene sequences, the extraction of RNA, and comprehensive expression analysis. Consequently, a technology capable of consistently and effectively extracting high-purity DNA and RNA from plants is of paramount importance. Although model plants, such as Arabidopsis and tobacco, have established methods for DNA and RNA extraction, floricultural species such as roses present unique challenges. Different techniques to extract DNA and RNA from various floricultural species were investigated. Upon sampling and grinding the petals of several floricultural species, it was observed that nucleic acid extraction from the ground petal solutions of low viscosity was straightforward; solutions of high viscosity presented a significant challenge. It is postulated that the presence of substantial quantities of polysaccharides and polyphenols in the plant tissue was responsible for the inhibition of nucleic acid extraction. Consequently, attempts were made to extract high-purity DNA and RNA by improving the CTAB method and combining it with commercially available nucleic acid extraction kits. The quality of the total extracted DNA and RNA was evaluated using standard methods. Finally, the effectiveness of the extraction method was assessed by determining whether it was possible to create a library that could be applied as a suitable template for a next-generation sequencer. In conclusion, a method was developed for consistent and accurate nucleic acid extraction from high-viscosity floricultural samples. These results demonstrate improved techniques for DNA and RNA extraction from flowers, help facilitate gene editing of floricultural species and expand the boundaries of research and commercial opportunities.

Keywords : floriculture, gene editing, next-generation sequencing, nucleic acid extraction
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