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Optimizing protocol for a rapid and cost effective DNA isolation for Marker Assisted Selection pipeline

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Abstract

Grapevine is a plant that holds significant socioeconomic importance due to its production of grapes for fresh consumption, wines, and juices. However, climate changes and susceptibility to diseases pose a threat to the quality and yield of these products. The breeding of new genotypes that are resistant/tolerant to biotic and abiotic stresses is essential to overcome the impact of climate changes. In this regard, Marker-assisted selection (MAS), which uses DNA markers, is a crucial tool in breeding programs. The efficiency and economy of this method depend on finding rapid DNA isolation methods. In this study, we compared four different DNA extraction methods to choose the one that quickly isolates DNA from many young vine leaves samples in a single run. The methods used involved Lithium chloride, carboxyl coated magnetic beads, cetyltrimethylammonium bromide (CTAB), and a commercial kit called Red&extract. The results showed that the CTAB method was the best in terms of reliability of the procedure, yield of the extracted DNA, low quantity of inhibitors, and speed of the procedure. Improving the MAS technique will help identify plants containing genes involved in different types of stress and deepen the study of the resistance genes pyramided.

Keywords: *Vitis vinifera*, Marker Assisted Selection, DNA isolation, breeding.