

Optimization of DNA Extraction from *Plectranthus amboinicus* Using FTA Cards and the TransDirect Plant Tissue PCR Kit

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Structured Abstract

Background: *Plectranthus amboinicus*, a medicinal plant known for its rich content of bioactive compound. However, its high levels of secondary metabolites pose challenges for DNA extraction often resulting in low DNA yield and purity. These limitations can interfere with molecular studies such as PCR and sequencing. Traditional DNA extraction methods like CTAB are effective but labor-intensive and time consuming. As alternatives, rapid DNA extraction methods such as FTA cards and Transdirect Plant Tissue PCR Kit. This study aimed to evaluate and optimize DNA extraction protocols for *P. amboinicus* using both FTA cards and a Transdirect Plant Tissue PCR kit, addressing in order to overcome the common difficulties encountered with this species.

Methods:

DNA was extracted from *P. amboinicus* leaves using two primary approaches: FTA cards (Whatman and QIA FTA) with two techniques, print and smash-elute methods, and the TransDirect Plant Tissue PCR Kit. DNA quality and quantity were assessed via spectrophotometry (A_{260}/A_{280} ratio) and agarose gel electrophoresis. Initial extractions using both methods showed limited DNA visibility or purity. Therefore, optimization steps were implemented for the TransDirect protocol. These included mechanical tissue disruption (cutting and grinding), extended incubation periods, and the application of heat during extraction to improve DNA recovery.

Results:

FTA card extractions showed wide variability in DNA yield, ranging from 3.73 to 215.43 ng/ μ L, with inconsistent purity levels, generally below the ideal A_{260}/A_{280} ratio of 1.8. Although the TransDirect kit initially produced high DNA concentrations and acceptable purity based on spectrophotometry, no clear bands were visible on agarose gels, indicating possible DNA degradation. After optimization, the TransDirect kit yielded distinct DNA smears on gels, confirming successful extraction of genomic DNA.

Conclusion: Both FTA cards and the TransDirect Plant Tissue PCR Kit can be used for DNA extraction from *P. amboinicus*, but optimization is critical for reliable results. The modified TransDirect protocol incorporating grinding, longer incubation, and heat treatment proved to be the most effective. This study also provides the first reported evaluation of FTA card-based DNA extraction for *P. amboinicus*, offering useful insights for future molecular work involving this plant.

Keywords: DNA extraction, *P. amboinicus*, FTA cards, Transdirect Plant Tissue PCR Kit, optimization

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