

PASSAKORN PHOBPHIMAI: DEVELOPMENT OF DATE PALM SEX

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Early sex determination in dioecious crops like *Cannabis sativa* L. (cannabis) and *Phoenix dactylifera* L. (date palm) is vital for efficient agriculture, as females are often more valuable. Traditional methods delay identification and wasting resources. This research developed reliable, cost-effective, field-use molecular tools for early sex determination in Thai cannabis. A simplified, rapid DNA extraction method suitable for field use was developed. The MADC2 Polymerase Chain Reaction (PCR) marker was validated for reliably differentiating male (390 bp amplicon) from female (560 bp and 870 bp amplicons) plants. For date palm, a novel Loop-mediated Isothermal Amplification (LAMP) assay targeting the male-specific GPAT3 sequence was developed. Visual detection using phenol red provides a clear orange-to-yellow color change upon positive amplification at a constant temperature of 65°C within 60-70 minutes. This LAMP assay eliminates complex equipment. A stable, lyophilized LAMP kit using trehalose as a cryoprotectant was also developed. This user-friendly kit demonstrated excellent stability for at least six months, facilitating easy transport and field deployment. This research successfully provides accessible and robust molecular tools for early sex determination of cannabis and date palm. The validated PCR markers for cannabis and the novel, field-ready LAMP kit for date palm empower farmers and breeders with timely information, significantly enhancing resource management, reducing economic risks, and promoting sustainable and profitable cultivation practices.

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