

Rapid Detection of Viable *Escherichia Coli* O157 from Herbal Raw Materials by Loop-Mediate Isothermal Amplification Assay

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The safety of natural medicines has come under scrutiny due to the possible hazard posed by the well-known gastrointestinal bacterium *Escherichia coli* O157 in herbal raw materials. Conventional detection techniques frequently fall short because they are time-consuming and insensitive to living cells, which makes it more difficult to give clients the accurate and timely protection they require. This project aims to develop the loop-mediated isothermal amplification (LAMP) approach for the quick and precise detection of live *E. coli* O157 in herbal raw materials in response to the above-highlighted difficulties. Due to its well-known ability to seriously compromise human health, *E. coli* O157 requires improvements in detection techniques to enhance consumer safety. The LAMP technique, shown here, overcomes the drawbacks of conventional methods with its quick one-hour reaction time and reduced operating temperature (66°C). This study describes the creation of an assay that uses LAMP targeted malB gene with GenBank accession no. CP016358 which encodes Maltoprotein to identify DNA of the *E. coli* O157 in herbal raw materials quickly. In contrast to laborious and unreliable conventional methods, this LAMP assay exhibited remarkable sensitivity and specificity, effectively detecting *E. coli* O157 DNA at minimal concentrations. The LAMP assay was validated using overnight grown pure *E. coli* culture (cell density of 3–4 x 10⁹/ml) and *E. coli* culture spiked two herbal samples with 0.01 and 0.1 µl, demonstrating the technique's significant high sensitivity and specificity for *E. coli* O157 over the traditional staining procedure (p=0.001) and comparable with PCR screening. Further, the LAMP method demonstrated its advantage with a hands-on time of 1 hour and a relatively low-cost of 0.72\$ per small-scale sample processing, contrasting with the 3 hours required by the PCR assay with a cost of 3.9\$ per sample. The LAMP assay is a vital instrument for ensuring the security of herbal raw materials and safeguarding customers' health, as it provides a rapid and economical approach. The results of this investigation underscore the potential of LAMP as a groundbreaking method for the quick and accurate detection of *E. coli* O157 in herbal raw materials.

Keywords: *Escherichia coli* O157; Food safety; Herbal raw materials; Loop-Mediated Isothermal Amplification (LAMP); Rapid detection