

ABSTRACT

Nur Utami, 24020122140126. **Exploration of Inulinolytic Fungi from Potato Tuber (*Solanum tuberosum*) and Molecular Identification Using DNA Barcoding** (Supervised by Susiana Purwantisari and Dwi Retno Fatmawati).

*Potato tubers (*Solanum tuberosum*) contain high starch ($\pm 74\text{--}78\%$) and inulin ($\pm 7\%$), making them suitable substrates for inulinolytic fungi. Exploration of inulinolytic fungi from potato tubers as alternative substrates, along with their integration into molecular identification, remains limited. This study aimed to explore inulinolytic fungi from potato tubers, analyze inulinase enzyme activity based on variations in pH and temperature, and perform molecular identification using DNA barcoding of the Internal Transcribed Spacer (ITS) region. Fungi were isolated on Potato Dextrose Agar (PDA) medium, followed by screening using Inulin Screening Medium (ISM). Selected isolates were identified morphologically (macroscopic and microscopic), tested for inulinase enzyme activity using the Dinitrosalicylic (DNS) method, and analyzed molecularly through PCR, sequencing, and BLAST analysis against the GenBank database. The experimental design used a Completely Randomized Design (CRD) with three replications, combining pH (3, 4, and 5) and temperature (45 °C and 50 °C). Isolation yielded three fungal isolates: I-13, I-14, and I-15, but only one isolate (I-13) showed positive inulinolytic activity. Isolate I-13 exhibited the highest inulinase activity of ± 0.769 IU/mL at pH 5 and 50 °C on the 4th day of incubation. Statistical analysis of isolate I-13 showed that pH and temperature significantly affected enzyme activity ($p < 0.05$). Amplification of the ITS1 and ITS4 regions of isolate I-13 produced a DNA fragment of ± 500 bp. BLAST confirmed isolate I-13 as *Fusarium oxysporum*. This study demonstrates that potato tubers can be utilized as substrates for *Fusarium oxysporum* isolates producing inulinase, with measurable enzyme activity under conditions of pH 5 and 50 °C. The findings open opportunities for the use of local isolates in inulinase enzyme production for functional food biotechnology applications.*

Keywords: *Potato tuber (*Solanum tuberosum* L.), Inulinolytic fungi, Inulinase, *Fusarium oxysporum*, ITS ((Internal Transcribed Spacer).*