

ABSTRACT

Shifa W. Utomo. 24020221140079. “**Biocontrol and Growth-Promoting of Endophytic Fungi Isolated from Red Bean (*Phaseolus vulgaris*) Roots Against *Fusarium oxysporum***”. Under guidance of Dr. rer. nat. Anto Budiharjo, S. Si., M. Biotech and Dr. Lilia Costa Carvalhais as thesis supervisors.

Red bean (*Phaseolus vulgaris* L.) is an important leguminous crop cultivated in tropical and subtropical regions due to its high nutritional value and economic potential. However, productivity is often constrained by soil-borne pathogens, *Fusarium oxysporum*, which causes root rot and vascular wilt, leading to severe yield losses. Conventional control methods, such as chemical fungicides, have proven effective but raise concerns regarding environmental safety, human health, and sustainability. Therefore, biological approaches, including the use of endophytic fungi with Plant Growth-Promoting Fungi (PGPF) traits, have gained increasing attention as eco-friendly alternatives. This research was designed to isolate potential fungal endophytes from red bean roots as biocontrol agents against *F. oxysporum* as well as their plant growth-promoting properties. The research methodology involved isolation and purification of fungal endophytes from red bean roots, macroscopic and microscopic characterization of fungal isolates, antagonism test in dual culture, PGPF potential test, including phosphate solubilization and indole-3-acetic acid (IAA) production, and molecular identification using universal ITS primers. Isolation of endophytic fungi from red bean root tissues; nine isolates, consisting of six isolates identified as *Penicillium* sp., one isolate of *Fusarium* sp., and two isolate of *Talaromyces* sp. The highest antagonistic activity was exhibited by four isolates; RBA2, RBA6, RBA7, and RBA11. Isolate RBA7 capable of solubilizing phosphate and producing indole-3-acetic acid (IAA). Isolate RBA7 was identified as *Talaromyces domesticus*, with the highest sequence similarity to *Talaromyces domestiucs* NRRL 58121, with a percent identity of 99.41%.

Keywords: *Phaseolus vulgaris*, endophytic fungi, *Fusarium oxysporum*, biocontrol PGPF.