

ABSTRACT

Lestari Milatul Khusnia. 2402012342019. Isolation and Detection of *nod* and *nif* Genes In Rhizobial Biofertilizer Candidates for Black Soybean (*Glycine max* (L.) Merr). Under the guidance of Anto Budiharjo and Panlada Tittabutr.

Black soybean (*Glycine max* (L.) Merr) is a leguminous crop with increasing demand worldwide. Nitrogen (N) availability is often a major limiting factor for plant productivity, leading to increased use of chemical fertilizer that may cause environmental impacts. Rhizobia are symbiotic bacteria that play an important role in biological nitrogen fixation in legumes have potential to be utilized as biofertilizers. This study aimed to isolate and characterize rhizobial isolates based on macroscopic and microscopic observations. Rhizobia were isolated from black soybean nodules cultivated on organic farmland in Cicapur Village, Banjarsari District, Ciamis Regency, West Java Province, Indonesia. The obtained isolates were analyzed using BOX-PCR and molecular identification through detection of *nod* and *nif* genes as well as sequencing of the *16S rRNA* gene. The isolates were tested for their effects on plant growth as well as their potential as plant growth promoters. Gene detection and 16S rRNA sequencing results showed five potential isolates, namely BS1, BS3, BS4, BS7, and BS8. Isolate BS1 is related to *Herbaspirillum seropedicae* and BS3 to *Bacillus siamensis*. Isolates BS4, BS7, and BS8 are related to *Ensifer adhaerens*. Inoculation of isolates BS4, BS7, and BS8 affected plant growth. Isolate BS4 was able to form nodules and showed the most positive effect. The three rhizobia isolates demonstrated the ability to produce IAA, but did not show activity in free-living nitrogen fixation tests. Isolate BS7 has the ability to solubilize phosphate. Overall, this study shows that rhizobia influence the growth of black soybean plants.

Keyword: black soybean, plant growth promoting traits, biofertilizer, *nod* gene, *nif* gene.