

Full Length Research Paper

Nodulation efficacy of *Bradyrhizobium japonicum* inoculant strain WB74 on soybean (*Glycine max* L. Merrill) is affected by several limiting factors

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Lack of indigenous soil rhizobia that colonize and nodulate soybean (*Glycine max* L. Merrill) roots is a common problem of South African soils. *Bradyrhizobium japonicum* strain WB74 has long been used as an effective commercial inoculant strain for soybean since its introduction in 1998. This paper investigates the major limiting factors involved in the nodulation efficiency of *B. japonicum* WB74 that affect soybean growth and yield in South Africa. Methods including analysis of soil physicochemical properties, farmers' management practices and quality control tests of locally manufactured inoculant products were employed. Inoculant's strain verification was conducted using phylogenetic analysis of the 16S ribosomal RNA of the *Bradyrhizobium* strains in each of the inoculant product. The major findings of this study is that nodulation failure of introduced *B. japonicum* is caused by a combination of several limiting factors such as acidic nature of the soils as well as poor soil nutrition status especially that of phosphorous. Nodulation failure was also prominent in the soybean farms where there was no proper soil management practice. Results of the viability and shelf life studies also indicate that nodulation failure is caused by using sub-standard soybean inoculants products available on the market.

Key words: *Bradyrhizobium japonicum* WB74, inoculants, nodulation, quality control.
