

## Response of *Glycine max* to Inoculation with Rhizobial Strains Isolated from Crop Wild Relatives of *Vigna* Spp., *Crotalaria* Spp. and *Mimosa* Spp.

C.S. Hettiarachchi<sup>†</sup>, P.S. Kumar, C.L. Abayasekara,  
S.A. Kulasooriya, E.M.H.G.S. Ekanayake and R.K.G.K. Kumara

Department of Botany, Faculty of Science, University of Peradeniya, Sri Lanka  
<sup>†</sup>shantha00@gmail.com

**Abstract:** Inoculation of grain legumes with rhizobia has been recorded to have a great potential in maximizing biological N<sub>2</sub> fixation in these crops. *Glycine max* (soybean) is one of the most important grain legumes in the rain fed farming systems in dry and intermediate zones of Sri Lanka. Rhizobia of wild non-edible legumes have higher tolerance to prevailing adverse conditions. The main objective of the current study was to test the ability of certain rhizobial isolates from wild legumes which could overcome competition by indigenous strains and effectively nodulate *G. max* in order to use them as rhizobial inoculants. Rhizobial strains from wild legumes (C10, M5, VDI, and VW2) which were previously selected as effective were used in all experiments. Physiological and biochemical characterization of rhizobia was done by assessing their growth in media with different pHs (5, 7 and 9), salt concentrations (0.5%, 1%, and 2%) and sugars (Lactose, Sucrose and Maltose). A field test was conducted with the above four strains, using a Randomized Complete Block Design (RCBD) with three replicate blocks per treatment. Seeds were mixed with coir based inoculants prior to sowing. Three plants from each plot were harvested after 8 weeks and a nodule count was taken. These plants were oven dried and weighed. Yield and yield component data were recorded in the remaining plants. C10, M5 and VW2 grew at basic pHs. All the strains showed moderate tolerance to salinity except M5 which showed a high tolerance to 0.5% and 1% NaCl. VW2 showed a higher ability to use all carbohydrates while M5 showed moderate ability. Inoculation with all four strains showed increases in nodulation compared to the uninoculated N<sup>+</sup> and N<sup>-</sup> controls. Dry matter production with C10, VDI and VW2 were significantly higher which was similar to the N fertilizer application. The highest Average Number of Pods was observed with VDI. Strain C10 gave the highest value for number of seeds per pod which is significantly higher than the other treatments. With respect to 100 seed weight strains C10 and VDI gave significantly higher values than the uninoculated controls. All the inoculated treatments gave higher values for seed yield than the uninoculated treatments whereas strains C10 and VDI gave significantly higher values. Strains C10, VDI and VW2 appear to be capable of overcoming competition by indigenous rhizobia and suitable to be used as inoculants for *G. max*.

**Keywords:** Rhizobial inoculants, *Glycine max*, *Crotalaria* spp., *Mimosa* spp.