INOCULATION EFFICIENCY OF *VIGNA UNGUICULATA* AND *GLYCINE MAX* IN MAHAWELI SYSTEM C

By

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ABSTRACT

The presence of indigenous rhizobial strains and their efficiency in comparison with known rhizobial inoculant strains were investigated. Data were collected from field trials conducted (jointly with Weerawardane, 1985) at Girandurukotte Regional Agricultural Research Centre. In maha, five treatment combinations: 1) low inorganic N; 2) inoculation; 3) inoculation plus low inorganic N; 4) inoculation plus low inorganic N plus mulch; and finally, 5) a high inorganic N treatment were assigned to soyabean (Glycine max (L) Merr). Cowpea (Vigna unguiculata (L) Walp. aggreg.) treatments were the same except that the low N was replaced by an uninoculated control. In yala, these same treatment combinations were irrigated at 25, 50 and 75% depletion of available soil moisture. The leaf area, dry matter accumulation and plant nitrogen uptake were measured. The nodule number, effective nodule number and nodule dry weight were recorded at around five weeks after planting when nitrogenase activity by acetylene reduction assay was also determined. Nodule samples were also taken at this same time for isolation and strain identification by using the intrinsic antibiotic resistance of rhizobia.

The soyabean and cowpea yields increased by 38% and 10% with inoculation in maha. In yala decreased yields from inoculation varied from 0-27% for soyabean and 10-20% for cowpea (P=0.05). In maha, for both soyabean and cowpea, inoculation was almost equal to applying the higher N fertiliser level (46 kg/ha) for soyabean and 23kg/ha for cowpea. In the driest (75%) treatment, yields increased with nitrogen fertiliser application rates but decreased in the wetter (25% and 50%) treatments (P=0.05). Yield was related to leaf area index (LAI) at 58

days after planting (DAP) with an optimum LAI of 3.0 for soyabean and 3.8 for cowpea. The LAI was almost double in yala, due to greater light intensity and hence vegetative growth. The nitrogen uptake of plants 58 DAP was higher in both seasons in inoculated plots with soyabean but not with cowpea. Yields were inversely related to nitrogen uptake of plants. Inoculation of soyabean increased all nodule parameters in both seasons; but for cowpea only in yala.

The rhizobia were identified as inoculant or indigenous strains by discriminatory analysis of "finger prints" obtained from their sensitivity to antibiotics. The soyabean inoculant strains were found to be better competitors than the indigenous and were also found to be able to survive the range of climatic edaphic conditions presented. There was, however, considerable contamination of the uninoculated plots by the inoculant strains in maha soyabeans.

The cowpea inoculant strains also proved to be better competitors than the indigenous in maha. In yala, however, even the inoculated plots had more indigenous strains suggesting that the cowpea inoculant strains were not tolerant of the harsher yala environment although they were isolated from among the most efficient and effective cowpea infecting rhizobia in Sri Lanka.