

Nodulation and nitrogen fixation of Leucaena

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Poor growth of Leucaena leucocephala in some areas has been attributed to the absence of root nodules. Since rhizobia that nodulate this legume effectively are few or absent in many tropical soils, inoculation may be necessary.

To obtain appropriate inoculants for leucaena, the most effective strains were selected from 42 isolates purified from nodules of L. leucocephala, Tephrosia vogelii, Sesbania grandiflora, S. punctata, S. rostrata, Acacia albida and Vigna unguiculata grown in soils collected at IITA and at Fashola in Nigeria. The symbiotic effectiveness of the isolates was assessed in Leonard jars under aseptic conditions and in pots containing soil. Two rhizobial strains produced the highest shoot dry weight, having an effect equal to that of 70 ppm urea N.

These two strains were tested in the field at IITA and Fashola, and their influence on nodulation, nitrogen fixation and growth of leucaena was compared to the effects of urea (150 kg N/ha) and soil N without inoculation. To identify strains and compare the competitive ability of inoculant strains with that of indigenous rhizobia, nodules were typed using the enzyme linked immunosorbent assay (ELISA) technique for Rhizobium Le II and the intrinsic resistance of IRC 1045 to 500 ug/ml of streptomycin.

At IITA only inoculated plants nodulated, and all the nodules were produced by the inoculant strains. At Fashola nodules were found in all the treatments. In the uninoculated and N fertilized plots, the nodules were due partly (69 %) to Rhizobium Le II used in a 1982 inoculation trial at this site. The high percentage (about 75 %) of nodules containing introduced strains were poor competitors. Also, strain Le II performed better at this location than IRC 1045 on the basis of nodule number, nodule mass, plant height and acetylene reduction assay; but dry matter and total N of the plants inoculated with this elite strain were superior only to those of uninoculated plants. The amount of N fixed biologically was estimated at IITA by the difference method, in which the uninoculated leucaena served as the nonfixing control; it fixed between 224 and 274 kg N/ha, representing 52 and 61 % of the total N in the plant.