

SCREENING OF WOODY AND SHRUB LEGUMES FOR AGRO-FORESTRY SYSTEMS BASED ON BIOMASS PRODUCTION, N YIELD AND BIOLOGICAL N₂ FIXING CAPACITY

W D L Gunaratne, A P Heenkenda, K V S Premakumara and W M S R Bandara
Department of Export Agriculture, Research Station,
Matale.

A field study was carried out to identify the suitable tree species for agroforestry systems based on their biomass production, N yield and N₂-fixing capacity at the Export Agriculture Research Station, Matale for a period of 9 months. ¹⁵N isotope dilution method was used for the assessment of the proportion of N₂ derived through fixation (Pfix). *Gliricidia sepium* (gliricidia), *Calliandra calothyrsus* (calliandra), *Leucaena leucocephala* (leucaena), *Erythrina subumbrance* (Erythrina), *Albizia falcataria* (Albicia) and *Acacia mangium* (acacia) were used as N₂-fixing species and *Senna siamea* (siamea), *Senna spectabilis* (Spectabilis), both are non-nodulating legumes, and *Michaelia champaca* (michalia) were used as non N₂-fixing reference species.

Total dry matter yield of non N₂-fixing reference crop spectabilis was significantly (p<0.05) higher than all the species. Among the fixing species, *Calliandra* produced the highest biomass though the value is not significantly (p>=0.05) different from gliricidia, leucaena and siamea. Acacia and michalia recorded the lowest yields.

Highest leaf, twigs and root N% was found in erythrina and the highest trunk N% was associated with gliricidia. Leaf N% of spectabilis was less than that of gliricidia and erythrina but total N yield of spectabilis was the highest due to high biomass production. Among the six fixing species highest N yield was found with calliandra and the value is over two fold higher than that for gliricidia. Acacia and michalia recorded the lowest n yields.

Highest Pfix values for whole plant was found with albizia followed by gliricidia, calliandra, erythrina, leucaena and acacia. The trend is common for the values based on all the three reference crops. Total N₂-fixing capacity of calliandra recorded the highest value followed by leucaena, gliricidia, albizia, erythrina, and acacia. N₂-fixing values calculated based on siamea and spectabilis revealed N-fixing species calliandra, leucaena and gliricidia have the capacity to fix 19.51-23.11, 15.77-19.79 and 13.10-14.42g N plant⁻¹. The values equivalent to 195-231, 158-198 and 131-144kg of N ha⁻¹).

S. spectabilis, *C. calothyrsus*, *L. leucocephala* and *G. sepium* produced higher biomass and higher N yields over the others. Total N fixing capacity of *C. calothyrsus*, *L. leucocephala* and *G. sepium* were superior to the other species. However, where maintenance of soil N status is considered further studies are recommended to evaluate the litter quality and N transferring ability before a firm recommendation is made.