B-121 Competitive effects of coconut/nitrogen fixing tree based system for soil moisture uptake

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A study was carried out to investigate the root distribution pattern of nitrogen fixing tree (NFT) species (*Calliandra calothyrsus, Leucaena leucocephala, Acacia auriculiformis* and *Gliricidia sepium* Jacq) in gravelly soil and their competitive effect with coconut for moisture uptake. NFT species were established in 1990 between coconut rows at a distance of 2.0 x 0.9 m in double rows, 3 m away from coconut palms. For root measurements, soil core samples of 1000 cm^3 were taken at various distances from the bole of the adult palm towards NFTs upto a depth of 1.5 m. Results of root distribution of NFT species showed that root growth and proliferation of *Calliandra* in A horizon was predominantly higher than that of *Leucaena, Acacia* and *Gliricidia* species. In contrast, *Gliricidia* and *Acacia* produced more root biomass and penetrated into B horizon compared to other species, whilst *Leucaena* produced the least.

Investigation of the competitive effect of NFT species with coconut for soil moisture uptake using neutron scattering method revealed that roots of NFT species and coconut effectively extracted soil moisture from 1m distance away from coconut palm. However, coconut roots were more responsible to extract soil moisture from 1 m distance away from palm. Among species *Gliricidia* and *Acacia* extracted significantly more moisture ($p<0.001$) from soil profile compared to *Calliandra* and *Leucaena* respectively and their extraction was confined to the distance of 2 m away from coconut palm. As expected, moisture extraction by NFT species was positively correlated with their root growth and distribution. However, results clearly showed that 4 years old NFT species do not significantly reduce water regime in the effective root zone of coconut provided existing planting space. It is suggested that the above NFT species do not compete with coconut for soil moisture.