

ABSTRACT

The effects of tillage, nitrogen and moisture status on the growth and yield of cowpea (*Vigna unguiculata* (L.) Walp.)

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Studies were carried out on St. Augustine loam and Cunupia clay loam to assess the effects of tillage, N, rhizobial inoculation and moisture status on year-round cowpea production.

In wet season studies no yield variations due to tillage were observed. However, ploughing decreased bulk density in the 0-15 cm layer. No-till plots had higher moisture than till plots in the 0-15 cm layer. Watertable levels were raised to within 30 cm of the soil surface and restricted crop growth. Application of 5 tonnes ha⁻¹ of mulch improved cowpea growth and yield on till plots. Application of inoculum or N, the latter at 20 or 40 kg ha⁻¹, did not cause any consistent significant increases in either vegetative growth or yield.

Waterlogging of cowpea in excess of 3 days reduced growth and yield and delayed the time to maturity. Senescence of leaves and nodules, root kill and the formation of adventitious roots resulted from waterlogging.

Application of irrigation at 4 day intervals gave the highest water use and dry matter production. Dry cowpea seed yields, however were similar to cowpea irrigated at 8 day intervals. No-till resulted in the better water use. Adequate moisture, and shallow planting improved cowpea emergence. How-

ever, emergence was reduced at moisture contents above field capacity and was inversely proportional to planting depth. Temperatures below 25°C and above 40°C adversely affected water uptake germination and emergence rates. Emergence was better on till plots during the wet season. The reverse was true in the dry season.

The results show that the no-till soil management system gives as good a yield as the till system. However, for no-till to be used on a wide scale further developments are required for residue management, weed control, crop establishment, nutrient balance and rhizobial inoculation, timing of planting and irrigation application to maximise water use on these soils.