





Twenty pots were used for each soil sample. Plants showing stunted growth were recorded, 40 days after sowing. The young quadrifoliates from 10 stunted plants were collected and homogenised in 0.05 M phosphate buffer (pH 7.0). Mechanical inoculations were carried out by rubbing the extract on young primary leaves of groundnut (cv. 55-437), common bean (*Phaseolus vulgaris* L., cv. Top crop) and cowpea (*Vigna unguiculata* (L) Walp., cv. C-152). Four plants of each species were inoculated and resulting symptoms were recorded. Mechanical inoculations were repeated thrice on different dates. Young quadrifoliates collected from stunted groundnut plants were fixed in 3% glutaraldehyde prepared in 0.1 M phosphate buffer (pH 7.3) for 1 h and processed for electron microscopy as described by Reddy et al. (1983).

#### *Soil mites and other pests*

Soil samples and groundnut roots collected from study fields showing severe variation in crop growth were scanned using a stereomicroscope ( $\times 70$ ) for the presence of mites and other soil pests. Soil residues collected from various sieves during the extraction of nematodes also were examined for the presence of soil pests.

#### *Effect of nutrients, carbofuran and FYM*

A trial was laid out at Sadoré with the following treatments:

Complete: this treatment supplemented 40 N, 80 P<sub>2</sub>O<sub>5</sub>, 40 S, 120, Ca, 30 mg, 0.6 B, 2.2 Zn, 20 Fe, 0.2 Mo ha<sup>-1</sup> and carbofuran at the rate of 6 kg ha<sup>-1</sup> a.i.; complete - N; complete - P; complete - S; complete - Ca; complete - Mg; complete - B; complete - Zn; complete - Cu; complete - Fe; complete - Mo; complete - carbofuran; complete + farm yard manure (FYM); complete + carbofuran; FYM alone and Control.

Treatments were applied by hand on small furrows 5 cm deep on the flat or ridges.

Field plots (10.8 m<sup>2</sup>) were treated with the different treatments at land preparation. The trial planted on 4 July 1987 was laid out as balanced lattice design with five replications.

#### *Effect of carbofuran*

Effects of soil treatment with carbofuran, were investigated under irrigated conditions during the 1987 and 1988 rainy seasons. Supplementary water was provided by irrigation when necessary. Plots (6 m<sup>2</sup> in 1987, and 10 m<sup>2</sup> in the 1988) were treated with different rates of carbofuran (2, 4, 6, 8, and 10 kg a.i. ha<sup>-1</sup> in 1987 and 3, 6, 9, 12, and 15 kg a.i. ha<sup>-1</sup> in 1988) at land preparation. Untreated plots served as control. Plots were replicated four times and were arranged in Randomized Block Design. Plant growth and yields were recorded.

#### *Effects of FYM and carbofuran*

The effects of FYM (10 t ha<sup>-1</sup>) and carbofuran (10 kg a.i. ha<sup>-1</sup>) on growth and yield of groundnut were investigated under rainy and irrigated conditions during the 1987 and 1988 rainy seasons. Field plots (16 m<sup>2</sup> each) were treated with either FYM or carbofuran, or both, at land preparation. Untreated plots served as control. No additional fertilizer was added to the plots. Plots were arranged in Randomized Block Design with six replications in the 1987 irrigated trial or in a latin square design with four replications in other trials. Plant growth and yields were recorded. Field plots that were treated with FYM and/or carbofuran during the 1987 rainy season were sown with groundnut to investigate the residual effects of these treatments on crop growth variability and on yield during the 1988 dry season. No additional fertilizer was added to the plots.

#### *Effects of soil application of pesticides*

Effects of soil application of aldicarb (4 kg a.i. ha<sup>-1</sup>) and carbofuran (6 kg a.i. ha<sup>-1</sup>) and dibromochloropropane (DBCP) (20 L in 85 L of water ha<sup>-1</sup>), on growth and yield of groundnut were investigated under rainfed and irrigated conditions during the 1987 and 1988 rainy seasons. Dazomet (300 kg ha<sup>-1</sup>) and isazophos (6 kg a.i. ha<sup>-1</sup>) were tested only in the 1987 and 1988 rainy season, respectively. Carbofuran, aldicarb and isazophos were applied by hand to field plots (8 m<sup>2</sup> in 1987 and 10 m<sup>2</sup> in 1988) on









