

ABSTRACT

Fertilizer response experiments were carried out to investigate the effect of soil fertility on plant development and grain yield of pigeon pea (Cajanus Cajan (L.) Millsp.). A greenhouse experiment was conducted with Cunupia clay soil, in which the effect of omitting N, P, K, Ca, Mg and S from the treatments on plant growth was investigated. It was shown that the period of rapid vegetative growth coincided with the nutrient stress, especially in treatments without P, Ca and Mg. A dilution of K content was found in the plant tissue during this time of growth and the pattern of K uptake suggested that maximum uptake took place in the early growth stages.

In field experiments on St. Augustine loam, which followed, N fertilizer (NH_4NO_3) was applied as a top-dressing at the rate of 25 kg/ha at 40, 50, 60, 70 and 80 days from seedling emergence. A basal dose of 25 kg N/ha was given at planting. A 46% increase in seed yield was obtained when the N was applied at 40 days; delaying application actually reduced grain yield. When the top-dressing of N at 40 days was varied (0, 20, 40, 60 to 80 kg N/ha), at the same time keeping the basal dose at planting at 20 kg N/ha, it was found that 60 kg N/ha gave a 71% increase in seed-yield. Triacetonol a growth hormone, which was compounded as a sub-treatment in the latter experiment, did not show any effect on the seed yield. Its effects on plant growth and on N content in the plant tissue were

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short-lived. In another experiment different forms of N fertilizer- NaNO_3 , NH_4Cl , $\text{CO}(\text{NH}_2)_2$ and NH_4NO_3 - were applied. It was found that urea performed best, both in terms of plant growth and yield.

In a K-fertilizer experiment, in which K was applied at rates of 0, 20, 40, 60 and 80 kg/ha, it was found that plant growth and yield of pigeon pea increased with increasing K fertilizer up to 60 kg/ha; beyond this level, both plant growth and grain yield decreased.

During these experiments, some plants suffered from a mineral deficiency which was diagnosed in the field and confirmed by means of a sand-culture experiment in the greenhouse to be due to boron (B). Consequently, a micro-nutrient experiment with Zn, B, Mo and Co, was conducted. Zn gave an increase of 26% in seed yield compared to the control. Co and Mo treatments showed an increase of N content in the plant tissue.

In all these experiments, the plant growth, nutrient content and uptake were determined and the results are discussed.

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