

Effect of plant densities and phosphorus levels on the growth and yield of vegetable cowpea (*Vigna unguiculata* (L.) walp)

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Abstract : A field experiment was conducted at College of Horticulture, Venkataramannagudem to study the effect of plant density and phosphorus levels on the growth and yield of vegetable cowpea under irrigated conditions. The study revealed that the crop responded to plant densities as well as phosphorus levels. The biometric characters like number of primary branches per plant (8.52), pod length (21.31 cm), pod girth (12.35 mm), number of pods per plant (37.02), number of seeds per pod (16.85), pod weight per plant (10.93 g) and pod yield per plant (301.85 g) were higher at lower density (37,037 plants/ha) along with 60 kg P₂O₅/ha. The growth and yield characters like plant height (52.47 cm), TDM accumulation (3968.04 kg/ha), days to flowering (34.73 days), days to first picking (44.28 days) and pod yield (152.87 q/ha) were showed better expression in case of high density planting (74,074 plants/ha) along with 60 kg P₂O₅/ha. The interaction effect of plant densities and phosphorus levels were also significant on plant height, total dry matter accumulation and days to flowering, pod length, pod weight per plant, yield per plant and pod yield/ha.

Keywords: Plant density, phosphorus, cowpea, yield

Introduction

Cowpea plays a substantial role by serving as a grain and vegetable crop mainly for the rural people in the East, West, South and Central parts of Africa (Mortomore *et al.*, 1997). According to FAO (2007), cowpea is produced annually on 11.2 m ha ranking 3rd after common bean (*Phaseolus vulgaris* L.) and chickpea (*Cicer arietinum* L.) with Africa taking the lead followed by Asia. It is extensively grown in South India particularly in the states of Karnataka and Tamilnadu.

Cowpea used at all stages of its growth including as a vegetable (Ofori and Stern, 1986). Vegetable cowpea variety Arka Garima is a bush type. Pods are thick, light green, long, round, stringless and highly fleshy. Yield potential of Arka Garima is 18 t/ha. The optimum plant population is an important parameter for increasing the crop productivity and provides the plant with the best environment to express its capacity fully under the given conditions. The optimum plant density with proper geometry and its planting varied with the agro-climatic conditions and growth habit of the plant.

A field experiment was conducted at College of Horticulture, Venkataramannagudem during *kharif* 2010. The experimental site had red sandy loam with pH 6.9, EC of 0.01 dS/m, 0.34 % organic carbon with 712, 32.5, 217.5 kg of N, P₂O₅ and K₂O per ha, respectively. The experiment was laid out in factorial randomized block design with three replications. There were twelve treatment combinations comprised of three plant densities (37,037, 55,555 and 74,074 plants/ha) designated as D₁, D₂ and D₃ and four levels of phosphorus (0, 20, 40 and 60 kg P₂O₅/ha) designated as P₀, P₁, P₂ and P₃. The seeds were treated with captan @ 3g/kg seeds before sowing against wilt. The seeds were dibbled on 29-8-2010 at 60x45, 60x30 and 45x30 cm spacings. During the crop period, the total rainfall received was 419.07 mm. The nitrogen @ 20 kg/ha, potassium @10 kg/ha and phosphorus as per the treatments were applied during the crop period.

A sample of five plants was taken randomly from two central rows in each experimental plot at different intervals. The growth parameters like plant height, number of primary branches, dry matter accumulation, days to flowering and days to first picking were recorded. Similarly the yield and its attributes were recorded. For estimating total dry matter accumulation, each sample was first air dried and later oven dried at 60° C to constant weight. The sum of dry weights of all plant parts was taken as total dry matter accumulation per plant (g).