# Response of greengram to phosphorus, biofertilizer and inorganic fertilizer

S. Krishnaprabu
Department of Agronomy, Faculty of Agriculture, Annamalai University, Annamalainagar – 608 002, Tamil Nadu.

## Abstract

A field experiment was conducted during summer season of 2015 at Experimental Farm, Annamalai University to study the integrated phosphorus management in greengram, no. of pods plant$^{-1}$, seed yield, no. of root nodules plant$^{-1}$, pod length and nitrogen and phosphorus uptake was higher under treatment $T_{11}$ compared with other treatments.

***Keywords:*** Greengram, Chemical fertilizer, Phosphobacteria, Seed inoculation and biofertilizer.

## Introduction

Greengram is the third most important pulses crop in India covering an area of 3.5 m ha with a total production of 1.49 mt. and the average productivity is 532 kg ha$^{-1}$ (Anon, 2006). In India, Orissa, Andhra Pradesh, Karnataka, Madhya Pradesh and Bihar were the important greengram growing states. P is one of the most needed elements for pulse production, P although not required large quantities, is critical to greengram because of its multiple effects of nutrition. It increases root formation, no. of nodules/plant and in seed yield.

Chemical fertilizers is one of must important inputs for increasing greengram yield. In legumes N requirement is less as compared to P because major portion is supplied by N fixation. Hence, P is the key nutrient for increasing the growth and development of pulses. Application of P to greengram increase the growth significantly (Singh and Hiremath, 1990). The soil application of P can be applied as basal and foliar application in 30 DAS and 45 DAS.

## Materials and Methods

A field experiment was conducted during summer season of 2016 at Experimental Farm, Annamalai Univeristy with soil pH 6.2, 234.8 kg $ha^{-1}$, available N, 14.95 kg available $P_2O_5$ and 258.0 kg in available $K_2O$. The experiment was laid out in RBD design with three replications. The treatment were

$T_1$ – Control

$T_2$ – 25 kg $P_2O_5$ $ha^{-1}$

$T_3$ – 50 kg $P_2O_5$ $ha^{-1}$

$T_4$ – 25 kg $P_2O_5$ $ha^{-1}$

$T_5$ – 50 kg $P_2O_5$ $ha^{-1}$

$T_6$ – 100 kg gypsum $ha^{-1}$ + 50 kg $P_2O_5$ $ha^{-1}$

$T_7$ – 200 kg gypsum $ha^{-1}$ + 25 kg $P_2O_5$ $ha^{-1}$

$T_8$ – 2.5 + FYM $ha^{-1}$ + 25 kg $P_2O_5$ $ha^{-1}$

$T_9$ –5 + FYM $ha^{-1}$ + 25 kg $P_2O_5$ $ha^{-1}$

The gross and net plot sizes were, 5.3 m × 4.4 m and 4.1 m respectively. The minimum and maximum temperature. The plots were in randomized block design with 3 replications with VBN 2 variety. The soil of the experimental plot was clay loam in texture, and pH of 6.2. The phosphorus levels were applied as basal through single superphosphate. All the package of practices were followed as per recommendation.

## Results and Discussion

Number of root nodules, and dry weight of root nodules $plant^{-1}$ were significantly higher under the treatment $T_{11}$ (25 kg $P_2O_5$ $ha^{-1}$ + PSB inoculation). This was due to increase in various metabolic process, such as cell division, cell development and cell enlargement in plant, which increases the root length. Application of PSB release growth promoting substances, which provide favourable environment for rhizobia, which promotes nodule formation. This results is in conformity with Chovatia *et al.* (1993) and Kumar and Chandra (2003).

Nitrogen and phosphorus uptake by seed were recorded with highest values under application of 50 kg $P_2O_5$ $ha^{-1}$ ($T_3$). This might be due to combined application of graded doses of phosphorus with inoculation of PSB. The increased values due to PSB inoculation may be due to increase in P availability through solubilization of phosphate rich compounds. These findings were correlated with Sharma *et al.* (2006). The grain yield was significantly increased with application of 25 kg $P_2O_5$ $ha^{-1}$ + PSB inoculation ($T_{11}$). These findings were similar with Shinde and Bhilau (2003) and Tripathi *et al.* (2008).

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**Table 1.**

| Treatments | No. of root nodules plant$^{-1}$ | No. of pods plant$^{-1}$ | Pod length | Seed yield (kg ha$^{-1}$) | Nitrogen uptake | Phosphorus uptake (kg ha$^{-1}$) |
|---|---|---|---|---|---|---|
| $T_1$ | 16.59 | 14.5 | 5.94 | 579 | 18.81 | 1.13 |
| $T_2$ | 23.85 | 23.4 | 6.09 | 705 | 26.19 | 2.59 |
| $T_3$ | 31.29 | 37.4 | 6.26 | 804 | 31.03 | 3.14 |
| $T_4$ | 20.71 | 22.6 | 5.98 | 694 | 26.42 | 2.64 |
| $T_5$ | 30.01 | 32.4 | 6.44 | 763 | 29.31 | 2.89 |
| $T_6$ | 22.21 | 27.1 | 6.29 | 701 | 26.18 | 2.64 |
| $T_7$ | 31.84 | 32.9 | 6.34 | 784 | 30.28 | 3.09 |
| $T_8$ | 26.96 | 21.4 | 5.78 | 728 | 27.21 | 2.69 |
| $T_9$ | 29.44 | 23.1 | 5.78 | 739 | 28.51 | 2.79 |
| $T_{10}$ | 30.48 | 26.9 | 6.41 | 749 | 30.03 | 2.83 |
| $T_{11}$ | 35.02 | 28.9 | 6.39 | 773 | 30.35 | 2.96 |
| $T_{12}$ | 23.61 | 24.3 | 5.98 | 702 | 25.12 | 2.53 |
| S.Ed | 0.43 | 0.29 | 2.31 | 30.3 | 1.24 | 0.13 |
| CD (P = 0.05) | 0.86 | 0.56 | 5.76 | 60.6 | 2.48 | 0.26 |