



Research Article

## Response of chickpea (GG-1) to nitrogen, phosphorus and sulphur with and without bio-fertilizers under supplementary irrigation in *Bhal* region of Gujarat

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**ABSTRACT :** A field experiment was conducted during *Rabi* Seasons of 2007-08 to 2010-11 on clayey soil to find out response of chickpea to nitrogen, phosphorus, sulphur and bio-fertilizer. Application of 40 kg N ha<sup>-1</sup> gave 8.23 per cent higher yield over 20 kg N ha<sup>-1</sup>. Application of 20 kg S ha<sup>-1</sup> significantly increased the seed yield of chickpea and recorded 5.5 per cent increase in seed yield over no sulphur. Phosphorus and *Rhizobium* application did not show any significant effect on seed yield of chickpea. The most productive and economical level of fertilization was 40 kg N and 20 kg S ha<sup>-1</sup>.

**KEY WORDS :** Chickpea, Phosphorus, Sulphur, Bio-fertilizer, *Rhizobium*

**How to cite this Article :** Jakasaniya, M.S., Patel, G. A. and Shelke, A.V. (2012). Response of chickpea (GG-1) to nitrogen, phosphorus and sulphur with and without bio-fertilizers under supplementary irrigation in *Bhal* region of Gujarat, *Internat. J. Forestry & Crop Improv.*, 3 (2) : 154-156.

**Article Chronical :** Received : 08.10.2012; Revised : 05.11.2012; Accepted : 25.11.2012

### INTRODUCTION

Chickpea (*Cicer arietinum*) is the major food legume of India. Chickpea besides being a rich source of highly digestible dietary protein (17-21%), it is also rich source of Ca, iron, niacin, vitamins B and C. Besides the aforesaid advantages the productivity of chickpea is still very less due to the hungry soils, mainly deficient in nitrogen, phosphorus and sulphur. Among the major nutrients, nitrogen plays a key role for the plant growth. It imparts green colour to leaves, stem and make enable them for efficient photosynthesis. It also plays an important role in plant metabolism by virtue of being an essential constituent of structural cell. Nitrogen also plays a vital role in synthesis of chlorophyll as well as amino acids, which

contribute to the building unit of protein and thus growth of plant. Phosphorus application to legume plays a key role in formation of energy rich phosphate bonds, phospholipids and for development of root system. Sulphur is generally called the fourth major nutrient because crops, in general, require sulphur just slightly less than phosphorus. Sulphur being the constituent of some amino acids, promotes the bio synthesis of protein. Sulphur have their role in growth and development of crop in legumes. Seed inoculation with bio-fertilizers increases the availability of nutrients to plants.

### EXPERIMENTAL METHODS

The field experiment was conducted at Agricultural Research Station, Anand Agricultural University, Arnej during *Rabi* Seasons of 2007-08 to 2010-11. The soil of the experimental field was clayey in texture. The soil was low in available N (123 kg ha<sup>-1</sup>), available P (15 kg ha<sup>-1</sup>) and high in available K (521 kg ha<sup>-1</sup>) and the organic carbon content was 0.35 per cent. The field experiment was laid out in Factorial Randomized Block Design (FRBD) replicated four times with net plot size of 10.8 m<sup>2</sup> (2.7 m x 4 m) consisting of combination of 2 levels nitrogen *viz.*, 20

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