**Optimization of basal and foliar nutrition on kabuli gram (*Cicer kabulium* L.) cultivars**


## ABSTRACT

A field experiment was conducted at Mahatma Gandhi Chitrakoot Gramodaya Vishwavidyalaya, Chitrakoot, Satna (M.P.) during *rabi* 2014-15 and 2015-16 with a view to find out the suitable kabuli variety of chickpea and their nutrient management through basal and foliar feeding. Treatment consisted three kabuli chickpea varieties (Subhra, Ujjwal and Kripa) and four nutrient management practices (100% NPK basal + water spray, 50% NPK basal + 2% DAP spray at 30 DAS, 50% NPK basal + 2% DAP spray at 30 & 50 DAS and 75% NPK basal + 2% DAP spray at 30 DAS). Yield attributes of chickpea viz. number of pods per plant and seed weight/plant were statistically at par in all varieties while seeds/pod was higher in Ujjwal and 1000- seed weight in Kripa. The grain yield (1313 kg/ha), straw yield (2670 kg/ha) and net returns of Rs. 73518 were maximum under Subhra variety of kabuli chickpea. Among the nutrient management, the yield contributing characters such as number of pods/plant, seeds/pod, 1000- seed weight, seed yield per plant, grain yield (1183 kg/ha) and straw yield (2405 kg/ha) were found significantly superior in 100% NPK basal + water spray followed by 75% NPK basal + 2% DAP spray at 30 DAS. The net returns of Rs. 62847 and B:C ratio of 4.8 were recorded maximum under Subhara (3.72) and 50% NPK basal + 2% DAP spray at 30 DAS.



**Key words:** Cultivar, DAP, Basal, Foliar spray, Benefit: Cost ratio.



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## Introduction

Chickpea is a premium pulse crop of India, it is cultivated over an area of 9.93 m/ha producing 9.63 m tonnes with an average productivity of 960 kg/ha. The desi chickpea contributed to around 80% and the kabuli chickpea around 20% of the total production. Kabuli chickpea receives better price in the market because of special demand of standard meters for the preparation of the attractive and delicious dishes. The area under cultivation of kabuli gram is increasing recently and very less work on agronomic aspects of this has been done. Thus there is a need to develop high yielding bold types of Kabuli chickpea. Nutrient management is the important factor for obtaining maximum productivity. Nitrogen,

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phosphorous and potassium are the important nutrients which contribute more to proper growth and yield of crops. Method of fertilisation plays an important role in supplying the nutrient to the plants because efficiency of fertilizers applied in soil being low due to various losses and fixation, under this condition, foliar application seems to be promising for ensuring efficiency of applied nutrients. Foliar spray enables plant to absorb the applied nutrients from the solution through their leaf surface. The information is meagre on this aspect on the sink Swelr soils of Madhya Pradesh. Thus present investigation was under taken.

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## Material and Methods

The field experiment was carried out at Mahatma Gandhi Chitrakoot Gramodaya Vishwavidyalaya, Chitrakoot, Satna (MP) during *rabi* season of 2014-15 and 2015-16. The soil of the experimental plot was sandy loam in texture having low organic carbon (0.243 %), low in available nitrogen (120.16 $kgha^{-1}$), medium in available phosphorus (20.11 $kgha^{-1}$), medium in available potassium (142 kg $ha^{-1}$) and neutral in soil pH (7.48). Crop received 25 mm rainfall during crop growth period. Treatment consisted three cultivar of kabuli chickpea viz. Subra, Ujwal and Kripa and four nutrient management practices viz. 100% NPK basal + water spray, 50% NPK basal + 2% DAP spray at 30 DAS, 50 % NPK basal + 2 % DAP spray at 30 and 50 DAS and 75 % NPK basal + 2 % DAP spray at 30 DAS. Thus 12 treatment combinations were tested in a three replicated split plot design in which three cultivars of chickpea was kept in main plot and 4 nutrient management in sub plot. The crop (cultivar Subra, Ujjwal and Kripa) was shown on Nov.10, 2014, and Nov.6, 2015 at a spacing of 30 cm rows. After 20 days thinning, extra plants were removed and maintained plant spacing of 5 cm. Crop was fertilized as per treatment 20:60:20 kg NPK/ ha (100% basal), 10:30:10 kg NPK/ ha (50 % basal), 15: 45: 15 kg NPK/ha (75% basal). Foliar spray of 2 % DAP at 30 DAS and 50 DAS Was done by using knapsack sprayer. The basal dose was applied at sowing in furrows. The crop was irrigated twice at 35 and 70 days after sowing. Two manual weeding were done on 30 and 60 days after sowing. The crop was harvested on March 14, 2016. The economic parameters like cost of cultivations, net returns and benefit: cost ratio were worked out by using prevailing market price of input and output.

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## Results and discussion

**Varietal Performance:** The yield attributes such as number of pods and seed weight per plant were statistically equal in all the varieties. While, number of seeds per pod were

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significantly higher in Ujjwal (1.53) and 1000- seed weight in kripa (423.78 g) than remaining varieties. Subhra variety produced significantly superior grain yield (1313 kg/ha), straw yield (2669 kg/ha) and harvest index (32.96 %) than both other varieties (Table 1). It was might be due to genetic constitution and architecture of varieties. Variation due to varieties on chickpea varieties were also found and reported by Goel *et al*. (2010) and Dahiya *et al.* (1993).

**Effect of Nutrient Management:** Application of 100 % NPK at basal + water spray produced significantly superior yield attributes viz; number of pods per plant, number of seeds per pod, 1000- seed weight and seed weight per plant over remaining treatments (Table 1). The seed yield (1183 kg/ha), straw yield (2405 kg/ ha) and harvest index (32.88 %) were found significantly higher under 100 % NPK at basal + water spray followed by 75 % NPK at basal + 2 % DAP spray at 30 DAS (seed yield 1133 kg/ha, straw yield 2402 kg/ha and harvest index 32.16 %). Better yield attributes and yield of chickpea under higher basal dose of NPK (100 % and 75 %) were might be due to fulfill the nutritional requirement of chickpea resulted better growth and development and ultimately superior yield of crop. This results collaborated with findings supported by Ganga *et al*. (2014), Singh *et al*. (2012) Elamin and Madhavi (2015).

**Economics:** Net returns (73518 Rs/ha) was recorded conspicuous higher under Subhra variety of chickpea followed by Ujjwal (Table 2). However, significantly higher benefit : cost ratio(3.72) was recorded in Subhra variety.It was due to higher seed and straw yields with same cost of cultivation.

Application of 50% NPK at basal + 2 % DAP spray at 30 DAS, gave numerically higher net returns (Rs 62847) and significantly superior benefit cost ratio (4.8). It was due to lowest cost of cultivation compared to 100 % NPK basal. Similar findings had been reported by Singh *et al*. (2012) and Yadav and Choudhary (2012).

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**Table 1: Effect of cultivar and nutrient management on yield attributes, yield and harvest index of Kabuli gram. (Pooled data of two years)**

| Yield attributes | | | | | Yield | | |
|---|---|---|---|---|---|---|---|
| **Treatment** | **Pods/plant** | **Seeds/plant** | **1000-seed wieght (g)** | **Seed wieght/plant (g)** | **Seed (kg/ha)** | **Straw (kg/ha)** | **H. I. (%)** |
| **Cultivar** | | | | | | | |
| Subhra | 18.41 | 1.45 | 317.04 | 13.68 | 1313 | 2670 | 32.96 |
| Ujjwal | 18.60 | 1.53 | 281.85 | 13.72 | 1111 | 2381 | 31.87 |
| Kripa | 18.51 | 1.10 | 423.78 | 13.73 | 893 | 1972 | 31.14 |
| SEm ± | 0.11 | 0.02 | 13.70 | 0.05 | 8.4 | 12.5 | 0.05 |

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|---|---|---|---|---|---|---|---|
| CD (P=0.05) | NS | 0.09 | 55.26 | NS | 33.7 | 50.2 | 0.21 |
| **Nutrient management** | | | | | | | |
| 100 % NPK at basal + WS | 20.36 | 1.47 | 351.00 | 14.09 | 1183 | 2405 | 32.88 |
| 50 % NPK at basal + 2 % DAP spray at 30 DAS | 16.95 | 1.24 | 346.11 | 13.31 | 1017 | 2242 | 31.10 |
| 50 % NPK at basal + 2 % DAP spray at 30 & 50 DAS | 17.95 | 1.40 | 317.06 | 13.62 | 1090 | 2325 | 31.82 |
| 75 % NPK at basal + 2 % DAP spray at 30 DAS | 18.75 | 1.33 | 349.39 | 13.82 | 1133 | 2402 | 32.16 |
| SEm ± | 0.18 | 0.02 | 15.09 | 0.04 | 11.2 | 16.7 | 0.04 |
| CD (P= 0.05) | 0.53 | 0.09 | NS | 0.14 | 33.5 | 50.1 | 0.14 |

**N.S.: Non significant**

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**Table 2: Effect of cultivar and nutrient management on economics of Kabuli gram. (Pooled data of two year)**

| **Treatment** | Cost of cultivation (Rs/ha) | Gross returns (Rs/ha) | Net returns (Rs/ha) | B:C ratio |
|---|---|---|---|---|
| **Cultivar** | | | | |
| Subhra | 30332 | 103850 | 73518 | 3.72 |
| Ujjwal | 30332 | 88706 | 58374 | 3.16 |
| Kripa | 30332 | 70970 | 40555 | 2.54 |

| | | | | |
|---|---|---|---|---|
| SEm± | - | 667 | 2781 | 0.01 |
| CD (P=0.05) | - | 2688 | NS | 0.05 |
| **Nutrient management** | | | | |
| 100 % NPK at basal + WS | 35451 | 93583 | 58131 | 2.63 |
| 50 % NPK at basal + 2 % DAP spray at 30 DAS | 16815 | 79440 | 62847 | 4.80 |
| 50 % NPK at basal + 2 % DAP spray at 30 & 50 DAS | 34224 | 86396 | 52060 | 2.52 |
| 75 % NPK at basal + 2 % DAP spray at 30 DAS | 34838 | 90617 | 55779 | 2.60 |
| SEm± | - | 987 | 2481 | 0.02 |
| CD (P= 0.05) | - | 2956 | NS | 0.07 |

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