International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2018; 6(3): 1660-1662

Received: 27-03-2018
Accepted: 28-04-2018

TR Kachave
Department of Soil Science and Agricultural Chemistry, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

HK Kausadikar
Department of Soil Science and Agricultural Chemistry, College of Agril. Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

MG Deshmukh
Department of Soil Science and Agricultural Chemistry, College of Agril. Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

Correspondence
TR Kachave
Department of Soil Science and Agricultural Chemistry, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

Effect of specialty fertilizer on growth, yield and quality of chickpea

TR Kachave, HK Kausadikar, MG Deshmukh

Abstract
A field experiment was planned and conducted during *rabi* 2010-11 to evaluate the "Effect of speciality fertilizer on growth, yield and quality of chickpea". The field experiment was conducted at the departmental research farm of Vasantrao Naik Marathwada Agricultural University, Parbhani. The experiment was laid out in randomized block design with three replications. There were eight treatments comprising of K levels and zinc viz; T_1- Only Recommended Dose of Fertilizer (RDF) through soil (25:50:0 NPK kg ha^{-1}), T_2- RDF + water spray, T_3 –RDF + 1% Starter (2 sprays) and 1% Booster (2 sprays), T_4- RDF + 1.5% Starter (2 sprays) and 1.5% Booster (2 sprays), T_5- RDF + 2% Starter (2 sprays) and 2% Booster (2 sprays), T_6- RDF + 1% MS Govt. The results emerged out clearly indicated that application of RDF + 1.5% Starter and 1.5% Booster (2 sprays each) in their graded doses increased biological yield 45.88 q ha^{-1} of chickpea. The grain yield of chickpea significantly of 14.74 q ha^{-1} and dry matter yield 31.14 q ha^{-1}.

Keywords: Chickpea, Foliar spray, Yield

Introduction
Chickpea (*Cicer arientinum* L.) is an important pulse crop of the semi-arid tropics, particularly in rainfed ecology of Indian subcontinent. It is the main source of dietary protein for majority of Indian population and its average production is much below the potential. Average productivity of chickpea in India (823 kg ha^{-1}) and Maharashtra (614 kg ha^{-1}) is very low. Low productivity of Chickpea in India is mainly attributed to improper and inadequate nutritional supply to plant. In the region of Marathwada, it is observed that in the recommended fertilizer schedule of pulses particularly green gram, black gram, chickpea and red gram do not have potassium and zinc is important limiting nutrient elements in pulse production. Foliar fertilization is the most efficient way to increase yield and plant health. Tests have shown that foliar feeding can increase yield from 12% to 25% when compared to conventional fertilization. When fertilizers are foliar applied more than 90% of the fertilizer is utilized by plant. When similar amount is applied to the soil only 10% is utilized. Foliar feeding is an effective method for correcting soil deficiencies and overcoming the soil's inability to transfer nutrients to the plant under low moisture conditions.

Materials and methods
A field experiment was carried out during *rabi* 2010-11 using chickpea (var. *Vijay*) at the departmental research farm of Vasantrao Naik Marathwada Agricultural University, Parbhani. The experiment was laid out in randomized block design with three replications. There were six treatments comprising of K levels and zinc *viz*; T_1- Only RDF through soil (25:50:0 NPK kg ha^{-1}), T_2- RDF + water spray, T_3 –RDF + 1% Starter (2 sprays) and 1% Booster (2 sprays), T_4- RDF + 1.5% Starter (2 sprays) and 1.5% Booster (2 sprays), T_5- RDF + 2% Starter (2 sprays) and 2% Booster (2 sprays), T_6- RDF + 1% MS Govt. (All fertilizers were applied at the time of sowing below the seeds.) The experimental soil was fine, smecticcalcareous, Iso-hyperthermic typic haplusterts. It was alkaline in reaction (pH 8.4), safe in soluble salt concentration (EC 0.182 dSm^{-1}) and low in organic carbon content (0.290 %). The free calcium carbonate was 4.70 %. Potassium permanganate oxidisable available N (152.8 kg ha^{-1}), Olsen`s available P (3.41 kg ha^{-1}), 1M ammonium acetate exchangeable available K (676.6 kg ha^{-1}) and available S (5.93 mg ha^{-1}) at the commencement of the experiment. Growth and yield contributions characters were recorded at different growth stages. In each plot, 5 random plants were selected to be record biometric observations on growth and yield attributes. Five

plants uprooted from the observation unit for recording the dry matter studies and after removing the roots, plant samples were kept in well labeled brown paper bag. First the samples are dried in shade and after that kept in oven at 65˚C±2˚C, and then weight of dry matter was taken and expressed on per plant basis. All the data were subjected to analysis of variance.

Result and Discussion

Plant height, Number of branches and Number of pods

The presented data in table 1. Revealed that the plant height, number of branches and number of pods at harvesting stage was varied from 28.70 to 36.34 cm, 18.95 to 25.67 and 42.24 to 68.45 respectively. The maximum plant height, number of branches and number of pods were observed in the treatment T_4 (RDF + 1.5% Starter and 1.5% Booster -2 sprays each), treatment which was followed by T_5 (RDF + 2% Starter and 2% Booster -2 sprays each), T_6 (RDF + 1% multi micronutrient grade II -4 sprays) and T_3 (RDF + 1% Starter and 1% Booster 2 sprays each) and minimum was in the treatment T_1 (RDF only). However, treatment T_4, T_5, T_6 and T_3 treatments were at par with each other but significantly superior over T_2 (4 water Sprays) and T_1 (RDF only). Similar result was reported by Sritharan *et al* (2005) [5] in black gram crop with foliar application of 2% urea at Coimbatore. Similar result was also found by Venkatesh and Basu (2011) [6] in chickpea crop on Inceptisol by using 2% urea at 75 DAS.

Table 1: Effect of foliar application of speciality fertilizer on plant height, number of Branches plant^{-1} and number of pods plant^{-1}

T. No.	Treatment Details	Plant height (cm) at 90 DAS	Number of Branches plant^{-1} At 90 DAS	Number of pods plant^{-1} At 90 DAS
T1	Only RDF through soil (25:50:0 NPK kg ha^{-1})	28.70	18.95	42.24
T2	RDF + water spray (4 sprays)	31.48	21.25	46.78
T3	RDF + 1% Starter & 1% Booster (2 sprays each)	35.32	23.25	62.65
T4	RDF + 1.5% Starter & 1.5% Booster (2 sprays each)	36.34	25.67	68.45
T5	RDF + 2% Starter & 2% Booster (2 sprays each)	35.76	24.68	65.35
T6	RDF + 1% MS Govt. Notified multi micronutrient grade-II(4 sprays)	35.48	23.96	63.35
	SE ±	1.14	0.78	1.98
	CD (0.05)	3.37	2.31	5.86

Pod yield and Biomass yield

The data presented in table 2. Revealed that the influence of speciality fertilizer on grain yield and biomass yield of chickpea. The grain yield and biomass yield (q ha^{-1}) was in the range of 10.35 to 14.74 and 18.72 to 31.14. It was observed in the treatment T_4 (RDF + 1.5% Starter and 1.5% Booster -2 sprays each) which was followed by T_5 (RDF + 2% Starter and 2% Booster-2 sprays each), T_6 (RDF + 1% multi micronutrient grade II -4 sprays) and T_3 (RDF + 1% Starter and 1% Booster 2 sprays each) and minimum was in the treatment T_1 (RDF only). These findings might be due to involvement of nutrients in variety of physiological and biochemical processes, culminating in more dry matter production. More than one foliar spray of different nutrients mixture at various growth stages improved straw yield. Increase in grain yield is the direct result of improvement in yield components. Grain size, number of grains per pod and test weight had positive correlation with grain yield might be the direct effect of improvement in grain yield.

Similar findings were reported by Palaniappan *et al* (1999) [3] for Chilli and Tomato crops by using foliar application of speciality fertilizers (100% NK + 2 sprays of polyfeed + 3 sprays of Multi–K) in Andhra Pradesh and Narayanamma *et al* (2006) [2] in Brinjal crop by using water soluble fertilizers containing NPK 15:15:30.

Table 2: Effect of speciality fertilizers on grain yield and dry matter yield of chickpea

T. No.	Treatment Details	Grain yield (q ha^{-1})	Dry matter Yield (q ha^{-1})
T1	Only RDF through soil (25:50:0 NPK kg ha^{-1})	10.35	18.72
T2	RDF + water spray (4 sprays)	11.46	23.87
T3	RDF + 1% Starter & 1% Booster (2 sprays each)	13.65	28.97
T4	RDF + 1.5% Starter & 1.5% Booster (2 sprays each)	14.74	31.14
T5	RDF + 2% Starter & 2% Booster(2 sprays each)	14.32	30.67
T6	RDF + 1% MS Govt. Notified multi micronutrient grade-II (4sprays)	13.85	28.94
	SE ±	0.37	0.74
	CD (0.05)	1.16	2.21

Table 3: Effect speciality fertilizer on quality parameters of chickpea

T. No.	Treatment Details	Test weight (gm 100 seeds^{-1})	Protein in grain (%)
T1	Only RDF through soil (25:50:0 NPK kg ha^{-1})	13.67	17.4
T2	RDF + water spray(4 sprays)	14.78	17.2
T3	RDF + 1% Starter & 1% Booster(2 sprays each)	16.32	18.6
T4	RDF + 1.5% Starter & 1.5% Booster (2 sprays each)	17.57	20.0
T5	RDF + 2% Starter & 2% Booster(2 sprays each)	17.22	19.6
T6	RDF + 1% MS Govt. Notified multi micronutrient grade-II (4sprays)	16.82	19.0
	SE ±	0.49	0.16
	CD (0.05)	1.48	0.49

Quality parameters

The data presented in Table 3. revealed that test weight (100 seed weight) was in the range of 13.67 to 16.82 and maximum test weight was observed in the treatment T_4 (RDF + 1.5% Starter and 1.5% Booster -2 sprays each) which was followed by T_5 (RDF + 2% Starter and 2% Booster -2 sprays each), T_6 (RDF + 1% multi micronutrient grade II -4 sprays) and T3 (RDF + 1% Starter and 1% Booster 2 sprays each) and minimum was in the treatment T_1(RDF only). Nitrogen helps in the transport of photosynthates to seed. This may be the reason for increased 100 seed weight. Maximum protein content was observed in the T_4 (RDF + 1.5% Starter and 1.5% Booster -2 sprays each) which was followed by T_5 (RDF + 2% Starter and 2% Booster-2 sprays each), T_6 (RDF + 1% multi micronutrient grade II-4sprays) and T_3 (RDF + 1% Starter and 1% Booster 2 sprays each) and minimum was in the treatment T1 (RDF only).

Increased in protein content may be due to most important role of nitrogen fertilizer in plant is mainly in its presence in the nucleic acid protein structure. In addition, nitrogen is also found in chlorophyll molecule. Chlorophyll enables plant to transfer energy from sunlight by photosynthesis to assimilate (chemical energy form). Therefore, the nitrogen supply to the plant will influence the amount of protein. Setty *et al*. (1992) [4] in Chickpea crop by using 0.5% DAP during *rabi* season and Choudhary and Yadav (2011) [1] in Cowpea crop by using 2% DAP spray.

Conclusion

It can be concluded that the application of RDF + 1.5% Starter and 1.5% Booster (2 sprays each) increased biological yield 45.88 q ha^{-1} of chickpea. Foliar application of 1.5% Starter + 1.5% Booster along with recommended dose of fertilizer was found superior for maximum yield of chickpea, quality of produce and to restore fertility of the Vertisol.

References

1. Choudhary GL, Yadav LR. Effect of fertility levels and foliar nutrition on cowpea productivity. J Food Legume. 2011; 24(1):67-68.
2. Narayanamma M, Chiranjeevi CH, Riazuddin Ahmed. Effect of foliar application of micronutrients on growth yield and nutrient content of cabbage in AP. Veg. Sci. 2006; 33(2):94-95.
3. Palaniappan SP, Jeyabal A, Chellian S. Response of tomato and chilli to foliar application of speciallity fertilizers. Veg. Sci. 1999; 26(2):198-200.
4. Setty RA, Channabasavanna SA, Patil SA. Response of gram to foliar application of diammonium phosphate and single superphosphate. Indian J of Agron. 1992; 37(4):828-829.
5. Sritharan N, Aravazhi A, Vanangammudi M. Effect of foliar spray of nutrients and plant growth regulators for yield maximization in blackgram. Madras Agric. J 2005; 92(4, 6):301-307.
6. Venkateshn MS, Basu PS. Effect of foliar application of urea on growth, yield and quality of chickpea under rianfed condition. J of Food Legume. 2011; 24(2):110-112.