The Pharma Innovation Journal 2021; 10(12): 1580-1883

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; 10(12): 1580-1583

www.thepharmajournal.com
Received: 11-09-2021
Accepted: 23-10-2021

Pratiksha J Karpe
M.Sc. Scholar, Department of Agronomy, College of Agriculture, Latur, VNMKV, Parbhani, Maharashtra, India

Niranjan R Chavan
M.Sc. Scholar, Department of Agronomy, College of Agriculture, Latur, VNMKV, Parbhani, Maharashtra, India

Sharad S Jadhav
M.Sc. Scholar, Department of Agronomy, College of Agriculture, VNMKV, Parbhani, Maharashtra, India

Ashwini A Ingle
M.Sc. Scholar, Department of Agronomy, College of Agriculture, Latur, VNMKV, Parbhani, Maharashtra, India

Corresponding Author:
Pratiksha J Karpe
M.Sc. Scholar, Department of Agronomy, College of Agriculture, Latur, VNMKV, Parbhani, Maharashtra, India

Influence of different fertilizer levels and humic acid application on seed yield and economics of Chickpea (*Cicer arietinum* L.)

Pratiksha J Karpe, Niranjan R Chavan, Sharad S Jadhav and Ashwini A Ingle

Abstract
An agronomic investigation was conducted during *rabi* 2020-21 at Experimental Farm, Department of Agronomy, College of Agriculture, Latur, to study the influence of different fertilizer levels and humic acid application on seed yield and economics of Chickpea (*Cicer arietinum* L.). The experimental site was clayey in texture, slightly alkaline in reaction, soil was low in available nitrogen, medium in available phosphorous and high in available potassium. Soil was well drained, with good moisture retention capacity. The experiment was laid out in Factorial Randomized Block Design (FRBD) with nine treatment combinations, consisting of two factors i.e. different fertilizer levels and humic acid application through soil, which included three levels each of different fertilizer levels and humic acid application. The different fertilizer levels were 75% RDF (F_1), 100% RDF (F_2) and 125% RDF (F_3) whereas, humic acid levels were 1 kg humic acid ha^{-1} (H_1), 2 kg humic acid ha^{-1} (H_2) and 3 kg humic acid ha^{-1} (H_3). The gross plot size of each experimental unit was 5.4 m × 4.5 m and net plot size was 4.8 m × 3.9 m. Sowing was done on 08th November, 2020 by dibbling method at spacing 30 cm x 10 cm. The crop was harvested on 23rd February, 2021. The result of the experiment revealed that higher seed yield (3051 kg ha^{-1}), gross monetary returns (₹ 149499 ha^{-1}), net monetary returns (₹ 102424 ha^{-1}) and B:C ratio (3.18) was observed with the application of 125% RDF (F_3). Higher seed yield (3025 kg ha^{-1}), gross monetary returns (₹ 148225 kg ha^{-1}), net monetary returns (₹ 100427 kg ha^{-1}) and B:C ratio (3.10) was observed with the application of 3 kg ha^{-1} humic acid (H_3).

Keywords: Chickpea, RDF, humic acid, seed yield, economics, FRBD

1. Introduction

Chickpea, an annual legume belongs to family *Leguminaceae* (*Fabaceae*), subfamily Faboideae. Chickpea is commonly known as Gram or Bengal gram, Garbanzo bean, Egyptian pea. Chickpea's center of origin is South-Western Asia. Chickpea being a cool season legume crop, is grown widely in different countries as a food source. Chickpea crop starts fixing atmospheric nitrogen after 30 days of sowing. Chickpea is deep rooted (50-60 cm), hardy, dryland crop which grows and matures in conditions that would not be favourable for most crops. It's deep tap root system allows it to withstand drought conditions.

Chickpea is healthy source of carbohydrates for the people with insulin sensitivity or diabetes since it is very high in dietary fiber. A cup of chickpeas provides one-third of an adult's daily protein needs. Chickpea is good source of fiber. Fiber helps to keep the digestive tract healthy and promotes regularity. Chickpea is consumed as whole seed, dal, fried, boiled and salted. Sprouted chickpea is usually eaten as vegetable or added to salads. Chickpea plants are also used as fodder. Leaves of chickpea plant are used as vegetable. Sometimes, whole seeds are milled for animal feed. Glandular secretion from leaves, stem and pods of Chickpea includes malic acid (90-96%) and oxalic acid (4-10%). About 4-4.5 kg of these acids can be obtained from per hectare of chickpea crop. This sour tasting acid can be used as medicine or used as vinegar. Milling into dal, puffing into snack foods, grinding into flour are the primary processes to which chickpea is subjected to. Chickpea is used for preparation of various sweets and spicy dishes using either spilt grains or flour. Exudation of leaves called 'Amb' possess medicinal value for cholera, constipation, diarrhea, bronchitis, blood purification. To cure scurvy disease, germinated seeds are recommended.

Chickpea has great importance because of its various and diversified use. Chickpea has ability to grow in different agricultural systems with low basic inputs even when the environmental and soil conditions are not favourable.

Chickpea has ability to meet a part of required protein because of its limitations existing in supply of animal protein (Sabbaghpour, 2003) [7]. Being a legume crop, it has more economic importance over world economy. Chickpea has specifications like improvement of human health, nitrogen fixation and thereby increasing soil quality, reduce poverty and hunger, Enhance ecosystem and essential for sustainability.

Fertilizer is one of the important inputs in agriculture and the use of right amount of fertilizer, at right time, in right quantity is fundamental for farm profitability and environmental protection. Imbalanced use of fertilizer by farmers not only reduces the yield of the crop but also deteriorate the quality of soil and water resource. Crop fertilization based on generalized recommendation leads to under fertilization or over fertilization, which leads lower production, profitability along with environmental pollution.

There is a recognized and increasing use of humic acids for their beneficial impact on the growth and cultivation of crop. Humic acid is not a fertilizer as it does not directly provide nutrition to plants, but is a compliment fertilizer. Humic acid, being natural organic polymeric compound is the important component of soil humus which helps to improve soil health, increase absorption of food elements, minerals, and nutrients, helps to control pathogenic factors, increase root volume, cause effectiveness of root system, accelerate root growth speed, enhance germination of seed, increase performance of dry matter, increase permeability of plant membrane and finally helps in increasing quality of products. Plant growth is improved by the ability of the plant to uptake and receives more nutrients.

Therefore, the field experiment was carried out to study the influence of different fertilizer levels and humic acid application on seed yield and economics of Chickpea (*Cicer arietinum* L.).

2. Materials and Methods

An agronomic investigation was conducted at Experimental Farm, Department of Agronomy, College of Agriculture, Latur during *rabi* 2020-2021. The experimental site was clayey in texture, slightly alkaline in reaction, soil was low in available nitrogen (236.36 kg ha^{-1}), medium in available phosphorous (14.36 kg ha^{-1}) and high in available potassium (460.59 kg ha^{-1}). Soil was well drained, with good moisture retention capacity which was favourable for optimum growth and development of crop. The experiment was laid out in Factorial Randomized Block Design (FRBD) with nine treatments combination, consisting of two factors i.e. different fertilizer levels and humic acid application through soil, which included three levels each of different fertilizer levels and humic acid application. The different fertilizer levels were 75% RDF (F_1), 100% RDF (F_2) and 125% RDF (F_3) whereas, humic acid levels were 1 kg humic acid ha^{-1} (H_1), 2 kg humic acid ha^{-1} (H_2) and 3 kg humic acid ha^{-1} (H_3). Each treatment was replicated three times. The gross plot size of each experimental unit was 5.4 m × 4.5 m and net plot size was 4.8 m × 3.9 m. Sowing was done by dibbling method at spacing 30 cm x 10 cm on 8th November, 2020. The recommended dose of fertilizers was 25:50:30 kg NPK ha^{-1}. A popular chickpea variety in Marathwada region, BDNG-797 (Akash), released in 2007 by Agricultural Research Station (ARS), Badnapur, Maharashtra, was used in the present study. The fertilizers were applied as per treatments at the time of sowing. The sources of nitrogen, phosphorus and potassium were urea, DAP and MOP, respectively. Harvesting was done on 23rd February, 2021.

3. Results and Discussion

3.1 Seed yield (kg ha^{-1})

Data on seed yield (kg ha^{-1}) as influenced by various treatments is presented in Table 1. The average seed yield of chickpea was 2872 kg ha^{-1}.

3.1.1. Effect of different fertilizer levels

The mean seed yield was significantly influenced by the application of different fertilizer levels. The highest seed yield (3051 kg ha^{-1}) was obtained with the application of 125% RDF which was found at par with the application of 100% RDF (2885 kg ha^{-1}) and it was significantly superior over the application of 75% RDF (2678 kg ha^{-1}). Branches are the most important character of the crop which bears pods and ultimately increase the crop yield. Increase in number of leaves resulted in higher photosynthetic activity and higher supply of photosynthates to developing pods for proper grain filling and thus contributing to higher yield. Goyal *et al.*, (2010) [2], Nawange *et al.*, (2011) [6], Goud *et al.*, (2014) [1] and Kumar *et al.*, (2015) [4] also reported similar results.

3.1.2. Effect of humic acid application

The mean seed yield was significantly influenced by the application of humic acid. The highest seed yield (3025 kg ha^{-1}) was obtained with the application of 3 kg ha^{-1} humic acid which was found at par with the application of 2 kg ha^{-1} humic acid (2879 kg ha^{-1}) and it was significantly superior over the application of 1 kg ha^{-1} humic acid (2713 kg ha^{-1}). This was due to the increase in photosynthetic activity of photosynthates and were supplied rapidly to the grains. Plants remained physiologically active to build up sufficient food reserves for developing flowers and seeds resulting in proper grain filling and thus contributing to higher yield. Beneficial effect of humic acid on yield was also reported by Savita *et al.*, (2018) [8].

3.1.3. Interaction (F × H)

The interaction effect of different fertilizer levels and humic acid application on seed yield of chickpea was found to be non-significant.

3.2. Economics

Data presented in Table 1 revealed that the mean gross monetary returns, net monetary returns and B:C ratio of chickpea was influenced significantly due to different treatments. The mean gross monetary returns was ₹ 140720 ha^{-1}. The mean net monetary returns was ₹ 94953 ha^{-1}. The mean B:C ratio was 3.07.

3.2.1. Effect of different fertilizer levels

The gross monetary returns was significantly influenced by the application of different fertilizer levels. The maximum gross monetary returns (₹ 149499 ha^{-1}) was obtained with the application of 125% RDF which was found at par with the application of 100% RDF (₹ 141365 kg ha^{-1}) and it was significantly superior over the application of 75% RDF (₹ 131222 kg ha^{-1}). Similar results were concluded by Jaybhay *et al.*, (2015) [3].

In regards of application of different fertilizer levels, higher cost of cultivation (₹ 47075 ha^{-1}) was noticed with the application of 125% RDF.

The net monetary returns was significantly influenced by the application of different fertilizer levels. The maximum net monetary returns (₹ 102424 ha^{-1}) was obtained with the application of 125% RDF which was found at par with the application of 100% RDF (₹ 95369 kg ha^{-1}) and it was significantly superior over the application of 75% RDF (₹ 86418 kg ha^{-1}). Similar results were concluded by Goud *et al.*, (2014) [1].

The application of 125% RDF recorded highest B:C ratio (3.18) as compared to the application of 100% RDF (3.07) and the application of 75% RDF (2.93). Similar results were concluded by Goud *et al.*, (2014) [1].

3.2.2. Effect of humic acid application

The gross monetary returns was significantly influenced by the application of humic acid. The maximum gross monetary returns (₹ 148225 kg ha^{-1}) was obtained with the application of 3 kg ha^{-1} humic acid which was found at par with the application of 2 kg ha^{-1} humic acid (₹ 141071 kg ha^{-1}) and it was significantly superior over the application of 1 kg ha^{-1} humic acid (₹ 1329937 kg ha^{-1}).

Higher cost of cultivation (₹ 47798 ha^{-1}) was noticed with the application of 3 kg ha^{-1} humic acid.

The net monetary returns was significantly influenced by the application of humic acid. The maximum net monetary returns (₹ 100427 kg ha^{-1}) was obtained with the application of 3 kg ha^{-1} humic acid which was found at par with the application of 2 kg ha^{-1} humic acid (₹.95363 kg ha^{-1}) and it was significantly superior over the application of 1 kg ha^{-1} humic acid (₹ 89719 kg ha^{-1}). Results were in conformity with the findings of Kumar *et al.*, (2015) [4].

The application of 3 kg ha^{-1} humic acid recorded highest B:C ratio (3.10) as compared to the application of 2 kg ha^{-1} humic acid (3.09) and the application of 1 kg ha^{-1} humic acid (3.08). Similar results were concluded by Kumar *et al.*, (2015) [4], Madhavi *et al.*, (2017) [5] and Savita *et al.*, (2018) [8].

3.2.3. Interaction (F × H)

The interaction effect of different fertilizer levels and humic acid application on gross monetary returns, net monetary returns and B:C ratio of chickpea was found to be non-significant.

Table 1: Mean seed yield (kg ha^{-1}), gross monetary returns (GMR) (₹ ha^{-1}), cost of cultivation (₹ ha^{-1}), net monetary returns (NMR) (₹ ha^{-1}) and benefit cost ratio (B:C ratio) of chickpea as influenced by different treatments

Treatments	Seed yield (kg ha^{-1})	Gross monetary returns (GMR) (₹ ha^{-1})	Cost of cultivation (₹ ha^{-1})	Net monetary returns (NMR) (₹ ha^{-1})	Benefit cost ratio (B:C ratio)
A) Fertilizer levels					
F_1 - 75% RDF	2678	131222	44804	86418	2.93
F_2 - 100% RDF	2885	141365	45996	95369	3.07
F_3 - 125% RDF	3051	149499	47075	102424	3.18
SE ±	85	4148	-	4148	-
CD at 5%	254	12435	-	12435	-
B) Humic acid					
H_1 - 1 kg ha^{-1}	2713	132937	43218	89719	3.08
H_2 - 2 kg ha^{-1}	2879	141071	45708	95363	3.09
H_3 - 3 kg ha^{-1}	3025	148225	47798	100427	3.10
SE ±	85	4148	-	4148	-
CD at 5%	254	12435	-	12435	-
Interaction (F×H)					
SE ±	147	7185	-	7185	-
CD at 5%	NS	NS	-	NS	-
General Mean	2872	140720	45767	94953	3.07

4. Conclusion

Higher seed yield (***3051*** kg ha^{-1}), gross monetary returns (₹ 149499 ha^{-1}), net monetary returns (₹ 102424 ha^{-1}) and B:C ratio (3.18) was observed with the application of 125% RDF (F_3) and in case of application of humic acid, higher seed yield (3025 kg ha^{-1}, gross monetary returns (₹ 148225 kg ha^{-1}), net monetary returns (₹ 100427 kg ha^{-1}) and B:C ratio (3.10) was observed with the application of 3 kg ha^{-1} humic acid (H_3).

5. Acknowledgements

The authors are thankful to Agronomy Section, College of Agriculture, Latur, Maharashtra, India for providing necessary facilities to undertake the field experiment.

6. References

1. Goud VV, Konde NM, Mohod PV, Kharche VK. Response of chickpea to potassium fertilization on yield, quality, soil fertility and economic in vertisols. Legume Research - An International Journal. 2014;37(3):311-315.
2. Goyal S, Verma HD, Nawange DD. Studies on growth and yield of *Kabuli* chickpea (*Cicer arietinum* L.) genotypes under different plant densities and fertility levels. Legume Research 2010;33(3);221-223.
3. Jaybhay BJ, Jaybhay SA, Bhalerao GA, Kamble SK. Effect of potassium on yield and economics of *Kabuli* Chickpea. International Journal of Advanced Research. 2015;3(06):436-438.
4. Kumar D, Arvadiya LK, Desai KL, Usadadiya VP, Patel AM. Growth and yield of chickpea (*Cicer arietinum* L.) as influenced by graded levels of fertilizers and biofertilizers. The Bioscan 2015;10(1):335-338.
5. Madhavi P, Sailaja V, Ram Prakash T, Hussain SA. Effect of fertilizers, biochar and humic acid on seed, stover yield, harvest index and economics of maize (*Zea mays* L.) grown on alfisols. International Journal of Pure & Applied Biosciences. 2017;5(04):766-770.
6. Nawange DD, Yadav AS, Singh RV. Effect of phosphorous and sulphur application on growth, yield attributes and yield of chickpea. Legume Research. 2011;34(1):48-50.
7. Sabaghpour SH, Sadeghi E, Malhotra RS. Present status a future prospect of chickpea cultivation in Iran. International chickpea conference, Iran. 2003, 20-22.

8. Savita SP, Ginjesh GK, Kumar D, Adivappar N. Effect of humic substances on nutrient uptake and yield of soybean. International Journal of Chemical Studies. 2018;6(4):1565-1569.