Plant Archives Vol. 19 No. 1, 2019 pp. 737-740 **e-ISSN:2581-6063 (online), ISSN:0972-5210**

INFLUENCE OF NIPPING AND NUTRIENT MANAGEMENT PRACTICES ON GROWTH, YIELD ATTRIBUTES AND YIELD IN PIGEONPEA

G. Srinivasan[1], R. Gobi[1]*, A. Balasubramanian[1] and S. Sathiyamurthi[2]

[1]Department of Agronomy, Faculty of Agriculture, Annamalai University, Annamalainagar - 608 002 (T.N.), India.
[2]Department of Soil Science and Agricultural Chemistry, Faculty of Agriculture, Annamalai University, Annamalainagar - 608 002 (T.N.), India.

Abstract

Field experiment was conducted at Farmer's Field, Palacode, Palacode Taluk, Dharmapuri District to study the effect of nipping and nutrients on growth, yield and economics of irrigated pigeonpea. The experiment was laid out in Randomized Block Design and replicated thrice. The results revealed that application of 125% Recommended Dose of Fertilizer + Nipping + Micronutrient mixture (T_9) recorded maximum growth, yield attributes, yield and economics.

Key words : Pigeonpea, nipping, macro and micronutrients.

Introduction

Pigeonpea (C*ajanus cajan* L.) is the fifth prominent grain legume in the world and second in India after chickpea (Narendra *et al*., 2013). It is an important multipurpose pulse legume crop in the tropics and subtropics, endowed with several unique characteristics. Pigeonpea is used in more diversified ways than other pulses. Pulses are considered to be the major sources of protein among the vegetarians in India and complement the staple cereals in the diet with proteins, essential amino acids, vitamins and minerals. It contains 22-24% protein, which compares well with that of other important grain legumes which is almost twice the protein in wheat and thrice that of rice. Pulses provide significant nutritional and health benefits and are known to reduce several non-communicable diseases such as colon cancer and cardiovascular diseases (Jukanti *et al*., 2012). Pigeonpea is commonly known in India as redgram or arhar or tur. Among the pulses, chickpea contribute about 48%, pigeonpea 17%, blackgram 10%, greengram 7% and other pulses 18% towards total pulses production. Worldwide pigeonpea is grown over an area of 5.41 million hectares with a production of 4.49 million tonnes and with the productivity of 829.9 kg ha^{-1}. In India, pigeonpea is grown in area of 3.88 million hectares with the production of 2.80 million tonnes with the productivity of 733.4 kg ha^{-1}.

The productivity of pulse crop is low due to cultivation on agriculturally marginal and sub marginal lands under poor management. So, it needs earnest attention in adoption of desirable production technologies to exploit the yield potential of the pulses and it can be possible by application of fertilizers, nipping and foliar application of nutrients. Low and imbalanced use of fertilizer is one of the major reasons for low productivity. In general, when the vertical growth of the plant is arrested or restricted the growth of lateral branches gets induced. With this concept in view, the terminal buds are usually removed in crops like cotton, castor and chrysanthemum to induce more auxiliary branches. Similarly, in pigeonpea also nipping of terminal bud significantly increased the number of primary and secondary branches and pods plant^{-1} (Arjun Sharma *et al*., 2003). Optimum nitrogen and phosphorus nutrition result in development of deep root system, increased leaf area and chlorophyll content. Foliar application is credited with the advantage of quick and efficient utilization of nutrients, eliminating losses

***Author of correspondence:** E-mail: gobirenyagri@gmail.com

through leaching and fixation and helps in regulating the uptake of nutrients by plants (Manonmani and Srimathi, 2009). Foliar nutrition is recognized as an important method because it facilitates easy and rapid utilization of nutrients (Thakur *et al*., 2017).

Materials and Methods

Field experiment was conducted at Farmer's field, Palacode, Palacode Taluk, Dharmapuri district to study the effect of nipping and nutrients on growth, yield and economics of pigeonpea var. Co(RG)7. The experimental soil is clay loam in texture with pH of 7.7. The soil was low in available nitrogen (238.72 kg ha^{-1}), medium in available phosphorus (20.78 kg ha^{-1}) and high in available potassium (319.3 kg ha^{-1}). The experiment was laid out in Randomized Block Design and replicated thrice. There were altogether nine treatments *viz*., T_1 - control, T_2 - 100% Recommended Dose of Fertilizer (RDF), T_3 - 125% RDF, T_4 - 100% RDF + Nipping, T_5 - 125% RDF + Nipping, T_6 - 100% RDF + Micronutrient mixture, T_7 - 125% RDF + Micronutrient mixture, T_8 -100% RDF + Nipping + Micronutrient mixture and T_9 - 125% RDF + Nipping + Micronutrient mixture. The pigeonpea seeds were sown by adopting a spacing of 45 × 30 cm. A manurial schedule of 25: 50: 25 kg of N, P_2O_5 and K_2O ha^{-1} was followed. Entire dose of N, P_2O_5 and K_2O were applied basally. The foliar spraying of 0.5 per cent Micronutrient mixture was done as per treatment schedule on 30th & 45th DAS using Knapsack Sprayer. The spray fluid used per hectare was 500 lit. ha^{-1}. The observations on growth characters, yield attributes and yield were recorded. The economics were worked out based on the prevailing market price.

Results and Discussion

Growth characters

Growth characters of pigeonpea were significantly influenced by the application of nutrients and nipping practice (table 1). The maximum plant height (192.74 cm) was recorded by T_7 (125% RDF + Micronutrient mixture) treatment. The maximum LAI (3.05), DMP (6015 kg ha^{-1}) and CGR (5.25 g m^{-2} day^{-1}) were observed in the treatment T_9 (125% RDF + Nipping + Micronutrient mixture). This was on par with T_5 (125% RDF + Nipping) treatment. Application of NPK fertilizer along with micronutrient foliar spray increased the growth characters, as many researchers state that micronutrient is involved in a number of physiological processes of plant growth and metabolism (Malla Reddy *et al*., 2007 and Handiganoor *et al*., 2017). Enhanced nutrient availability in rhizosphere could have favoured higher nutrient uptake resulting in better crop growth leading to higher dry matter production, leaf area index and crop growth rate.

Yield attributes and yield

Nipping and application of nutrients markedly increased the yield attributes and yield (table 2). The maximum number of branches $plant^{-1}$ (18.95), pods $plant^{-1}$ (165), seeds pod^{-1} (4.99) and seed yield (1896 kg ha^{-1}) were significantly registered with the application of 125% RDF + Nipping + Micronutrient mixture (T_9). The better performance of integrated supply of nutrient increased the availability and uptake of nutrients which could have favoured better translocation of photosynthates from source to sink. Nipping of terminal bud activated the dormant lateral buds to produce more branches. Moreover, by nipping the terminal buds, the utilization of photosynthates lead to increased number of branches $plant^{-1}$ (Venkadachalam, 2003 and Imayavaramban *et al*., 2004). The mineral nutrient are directly involved in the synthesis of protein, chloroplast pigments and electron transfer, thus increasing the nutrient levels which lead to increased photosynthetic activity of pigeonpea plant which naturally accounts for higher number of primary and secondary branches per plant. A similar result of finding was in concomitance with Amruta *et al.* (2015).

Foliar application of micronutrients might have been easily absorbed by plant system and translocated more effectively and efficiently into developing pods and might have resulted in proper seed filling, which ultimately reflected with higher seed yield. Moreover, nipping of terminal buds might have offered congenial crop architecture that exploit the available resources to the maximum extent and resulted in appreciable improvement on growth, yield parameters and on seed yield. These results are accordance with the findings of Kokilavani *et al.* (2007). Lower seed yield were recorded under control (T_1), where nutrients are not supplied, pigeonpea has to be obviously depending upon initial soil nutrients, which is not sufficient to produce even reasonable yields.

Economics

Among the different nutrient management practices, application of 125% RDF + Nipping + Micronutrient mixture (T_9) recorded the higher gross return of Rs. 102384 ha^{-1} and net return of Rs.77815 ha^{-1}. The enhanced nutrient availability in balanced manner by integration of major nutrients and micronutrient mixture foliar spray with nipping resulted in improvement of yield attributing characters and yield. This ultimately led to increased gross income and net return.

Table 1 : Effect of nipping and nutrient management practices on growth characters of Pigeonpea.

Treatments	Plant height (cm) at harvest	LAI at flowering stage	DMP(kg ha^{-1}) at harvest	CGR (g m^{-2} day^{-1}) at flowering to harvest
T_1 - Control	140.32	1.82	3412	3.14
T_2 - 100% Recommended dose of fertilizer (RDF)	178.58	2.08	3945	3.45
T_3 - 125% RDF	190.35	2.39	4412	3.65
T_4 - 100% RDF + Nipping	149.42	2.68	5172	3.93
T_5 - 125% RDF+ Nipping	164.92	2.96	5845	5.08
T_6 - 100% RDF + Micronutrient	181.23	2.17	3968	3.50
T_7 - 125% RDF+ Micronutrient	192.74	2.46	4438	3.70
T_8 -100% RDF + Nipping + MN	153.28	2.73	5301	3.95
T_9 - 125% RDF + Nipping + MN	165.67	3.05	6015	5.25
S.Ed	3.48	0.04	97.06	0.09
CD (P = 0.05)	7.31	0.10	205.76	0.21

Table 2: Effect of nipping and nutrient management practices on yield attributes, yield and economics of pigeonpea.

Treatments	Number of branches plant^{-1}	Number of pods plant^{-1}	Number of seeds pod^{-1}	Seed yield (kg ha^{-1})	Gross income (Rs.ha^{-1})	Net return (Rs.ha^{-1})
T_1 - Control	13.02	109	3.89	950	51300	32800
T_2 - 100% Recommended Dose of Fertilizer (RDF)	14.23	121	4.23	1172	63288	41733
T_3 - 125% RDF	15.92	136	4.32	1364	73656	51337
T_4 - 100% RDF + Nipping	17.29	150	4.28	1580	85320	62765
T_5 - 125% RDF+ Nipping	18.66	163	4.37	1790	96660	73341
T_6 - 100% RDF + Micronutrient	14.56	124	4.84	1247	67338	44533
T_7 - 125% RDF+ Micronutrient	16.12	138	4.92	1461	78894	55325
T_8 -100% RDF + Nipping + MN	17.49	152	4.88	1676	90504	66699
T_9 - 125% RDF + Nipping + MN	18.95	165	4.99	1896	102384	77815
S.Ed	0.32	2.78	0.08	52.02		
CD (P = 0.05)	0.68	5.89	0.19	110.24		

Conclusion

Based on the results of the present study, it is concluded that the application of 125% Recommended Dose of Fertilizer + Nipping + Micronutrient mixture foliar spray registered the higher values for most of the parameters like growth, yield attributes, seed yield and economics of pigeonpea. Hence, this is considered to be a suitable agro-technique to the pigeonpea farmers for realizing better yield and returns.

References

Amruta, N., J. B. Maruthi, G. Sarika and C. Deepika (2015). Effect of integrated nutrient management and spacing on growth and yield parameters of blackgram *cv*. LBG-625 (Rashmi). *The Bioscan*., **10(1)**: 193-198

Arjun Sharma, M. P., Potdar, B. T. Pujari and P. S. Dharmaraj (2003). Studies on response of pigeonpea to canopy modification and plant geometry. *Karnataka J. Agric. Sci*., **16(1)** : 1-3.

Gobi, R. and V. Vaiyapuri (2012). Effect of sulphur, zinc and boron fertilization on growth, yield, quality and economics of irrigated cotton (*Gossypium hirsutum* L.). *Int. J. Agril. Sci*., **3(3)** : 279-282.

Handiganoor, G. Mallikarjun, S. B. Patil and S. N. Vasudevan (2017). Response of Pigeonpea (*Cajanus cajan* L.) to Seed Polymerization with Micronutrients and Foliar Spray at Different Growth Stages. *British Journal of Environment and Climate Change*, **7(4)**: 205-213.

Imayavaramban, V., P. Pannerselvam, R. Issac manuael and K. Thanunathan (2004). Effect of different nitrogen levels, clipping and growth regulators on the growth and yield of sesame. *Sesame and safflower Newsl*., **19**: 40-44.

Jukanti, A. K., P. M. Gaur, C. L. L. Gowda and R. N. Chibbar (2012). Nutritional quality and health benefits of chickpea (*Cicer arietinum* L.). *Br. J. Nutr*., **108** : 11-26.

Kokilavani, S., R. Jagannathan, R. Selvaraju and N.

Thavaprakaash (2007). Influence of terminal clipping on growth and yield of sesame varieties. *Asian Journal of Agricultural Research*, **1** : 142-145.

Malla Reddy, M., B. Padmaja, S. Malathi and L. Jalapathi Rao (2007). Effects of micronutrients on growth and yield of pigeonpea. *Journal of SAT Agricultural Research*, **5(1)**: 1-3.

Manonmani, V. and P. Srimathi (2009). Influence of mother crop nutrition on seed and quality of blackgram. *Madras Agricultural Journal*, **96(1/6)** : 125- 128.

Narendra, K., S. Rajendra Prasad, K. Rakesh and Hari Om (2013). Effect of integrated nutrient management on the performance of sole and intercropped pigeonpea (*Cajanus cajan*) under rainfed conditions. *Indian J. Agron*., **58(3)** : 309-315.

Venkadachalam, K. (2003). Response of sesame cultivars to crop geometry and clipping management in tail end of cauvery delta zone. *M.Sc. (Ag.) Thesis*, TNAU., Coimbatore.

Vijaysingh Thakur, R., G. Teggelli and M. K. Meena (2017). Influence of foliar nutrition on growth and yield of pulses grown under north eastern dry zone of Karnataka. *Int. J. Pure App. Biosci*., **5(5)** : 787-795.