

Effect of Integrated Nutrient Management on Growth and Yield of Pigeonpea (*cajanus cajan* l. millsp.) Under Rainfed Condition

Neha Singh Kirar, D.S. Sasode, Ekta Joshi, Varsha Gupta,
Janmejay Sharma and Sarika Mahor

Department of Agronomy, RVSKVV, College of Agriculture, Gwalior-474002, India

Abstract

The field experiment was carried out during Kharif season of 2018 and 2019 at College of Agriculture, Gwalior to study the effect of integrated nutrient management on growth and yield of pigeonpea (*Cajanus cajan* L. Millsp.) under rainfed condition. The experiment was laid out in split plot design replicated thrice with six treatments viz., F₁-50% RDF+ PSB, F₂-75% RDF+ PSB, F₃-100% RDF+PSB, F₄-125% RDF+PSB, F₅-50% RDF+ 5t/ha FYM, F₆-50% RDF+ 2.5t/ha vermicompost. The growth attributes like plant height (cm) and number of branches plant⁻¹; yield attributes viz., number of pods plant⁻¹, number of seed pod⁻¹ and test weight and yield viz., seed and straw yield (kg/ha), Harvest index (%) was obtained with the application of 50% RDF+2.5t/ha vermicompost (F₆) over rest of the other treatments, respectively. From this study it could be concluded that the application of 50% RDF+2.5t/ha vermicompost (F₆) among different fertility levels plants showed favourable growth with improved yield attributes leading higher grain yield.

Keywords:-Pigeonpea, INM, Growth, Yield.

Introduction

The pulses have been one of the neglected crops in Indian Agriculture. The need for rectifying this position has been acute in recent years because of steady fall in the output and availability of per capita pulses. In India where a large population is vegetarian, the cheap and best source of proteins is still pulses. Pulses are integrated part of the cropping system of the farmers through counter because the crops fit well in crop rotation as well as mixed cropping. Pigeonpea (*Cajanus cajan* L.) is the fifth prominent pulse crop in the world and in India after chickpea. It is one of the most important *kharif* pulses suitable for rainfed situation. In India, the area under total pulses during 2017-18 was 29.99 million hectares with production of 25.23 million tones and average productivity of 841 kg ha⁻¹ (Anonymous, 2017-18). In India practice of integrated nutrient management is not very much popular, but now the concept has been changed radically over the years. Integrated nutrient management takes care of physical, chemical and biological needs

of the soil from the use of organic and inorganic fertilizers. It increases water holding capacity and the amount of nutrient in the soil. It is established that organic manure improves the physical and biological properties of the soil including supply of almost all the essential nutrients for growth and development of plants. Under favourable environment integrated nutrient management might have helped in the production of new tissue and development of new shoot and ultimately increased the growth, yield attributes and finally yield of the crops. Organic manures have been reported to be beneficial in augmenting the yield of pigeonpea under integrated nutrient management^[3,5,6]. Beneficial effect of supplementation of inorganic fertilizer with organic manures significantly increased the grain yield of pigeonpea. The paper deals with the study of the effect of integrated nutrient management on growth and yield of Pigeonpea (*Cajanus cajan* L. millsp) under rainfed condition.

Materials and Methods

The field experiment was conducted during *Kharif* 2018 and 2019 at the College of Agriculture, Gwalior (M.P.). The soil of the experimental plot was sandy clay loam, rich in potash content but low in organic carbon, available nitrogen and medium in available phosphorus. It was slightly alkaline in reaction and had moderate cation exchange capacity. The experiment was conducted in Split plot design with three replications. Treatments consisting of F₁, 50% RDF + PSB, F₂, 75% RDF + PSB, F₃, 100% RDF + PSB, F₄ 125% RDF + PSB, F₅ 50% RDF + 5t/ha FYM and F₆ 50% RDF+ 2.5t/ha vermicompost. Pigeonpea variety "ICPL 88039" was sown on 1st August 2018 and 1st August 2019 at spacing of 45cm x 15cm using seed rate

Results and Discussion

Different growth attributes like plant height, number of branches per plant at various stages significantly increased with fertility levels. The response of application of different

of 20kg/ha and fertilized with 20:50:20 NPK kg/ha, respectively as basal dose. The extra plants were thinned out at 30 days after sowing to maintain the plant to plant spacing of pigeonpea. The crops were harvested at physical maturity stage. The harvested material from each plot was carefully bundled, tagged and brought to the harvesting plot separately. The individual bundles were weight after complete drying. The grain yield was recorded separately after winnowing and cleaning. The straw and grain were recorded. Growth observations (plant height, number of branches), yield attributes (number of pods plant⁻¹, number of seed pod⁻¹ and test weight) and yield (seed and straw yield (kg/ha) were recorded at 30,60,90 DAS and harvest stage. The harvest index was calculated^[1].

fertility level showed to these values for the all growth stages and the increase maximum with F₆- 50% RDF+2.5t/ha vermicompost (Table 1).

Table1: Effect of integrated nutrient management on growth and yield attributes of pigeonpea

Treatments	Plant height (cm)		Number of branches plant ⁻¹		Number of pods plant ⁻¹		Number of grains pod ⁻¹		Test weight (g)	
	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019
F1-50%RDF+PSB	153.17	155.26	11.36	11.41	78.33	74.00	3.28	3.27	92.00	92.33
F2-75%RDF+PSB	159.17	158.39	12.38	12.46	81.78	76.78	3.45	3.39	98.67	93.89
F3-100%RDF+PSB	165.84	161.55	14.70	14.71	94.00	84.89	3.85	3.82	103.78	98.56
F4- 125%RDF+PSB	162.15	160.15	13.92	14.00	89.33	79.78	3.58	3.78	103.67	94.44
F5-50%RDF+5t/ha FYM	171.01	166.99	15.96	16.18	96.22	86.00	3.86	3.84	103.89	100.22
F6-50% RDF+2.5t/ha vermicompost	173.87	167.87	16.47	16.61	103.88	93.01	3.94	3.88	104.34	102.12
S.E.(m)±	3.696	2.981	0.495	0.340	2.543	2.338	0.090	0.086	1.892	1.618
C.D.(P=0.05)	10.672	8.609	1.429	0.963	7.344	6.752	0.260	0.248	5.463	4.674

The similar effect on growth attributes of pigeonpea were also reported in the past^[4]. The yield attributes like number of pods per plant,

number of grains per pod and test weight showed positive correlation with yield of pigeonpea. Application of fertility levels increased these parameters significantly.

Application of higher dose of fertility i.e., 50% RDF+2.5t/ha vermicompost (F₆) increased higher yield than other levels^[5]. The grain and straw yield was favourably affected by fertility levels. The grain and straw yield show

maximum with 50%RDF+2.5t/ha vermicompost (F₆) i.e. 2155 & 2011 kg/ha and 6636 & 6284 kg/ha, respectively during both the years (Table 2).

Table 2: Effect of integrated nutrient management on seed and straw yield and harvest index of pigeonpea

Treatments	Seed yield (kg ha ⁻¹)		Straw yield (kg ha ⁻¹)		Biological yield (kg ha ⁻¹)		Harvest index (%)	
	2018	2019	2018	2019	2018	2019	2018	2019
F1-50%RDF+PSB	1102	1075	3606	3559	4707	4635	23.23	23.12
F2-75%RDF+PSB	1222	1161	4038	3871	5260	5032	22.96	22.87
F3-100%RDF+PSB	1703	1619	5341	5182	7043	6800	24.16	23.79
F4- 125%RDF+PSB	1531	1438	4933	4709	6464	6148	23.70	23.41
F5-50%RDF+5t/ha FYM	1979	1791	6149	5806	8128	7598	24.33	23.60
F6-50%RDF+2.5t/ha vermicompost	2155	2011	6636	6284	8791	8296	24.50	24.23
S.E.(m)±	43.3	45.8	138.2	154.0	179.3	196.6	0.258	0.253
C.D.(P=0.05)	124.9	132.3	399.1	444.7	517.9	567.9	0.745	0.730

The increase in yields might be owing to beneficial effect of organics in improving the soil environment resulting in better absorption of moisture, nutrient and thus resulting in higher yields. Thus, the increase in growth, yield attributes and yield might be due to the beneficial effect of organics with balanced inorganic fertilizers. Under favourable environment integrated nutrient

management might helped in the production of new tissue and development of new shoot and ultimately increased the growth; yield attributes and finally yield of the crops. Beneficial effects of supplementation of inorganic fertilizer with organic manures significantly increased the grain yield of pigeonpea were reported other investigators^[2].

References

1. Ahlawat, I.P.S, Singh, A. and Saraf, C.S. (1975). Response of pigeonpea to fertilizers under rainfed condition. *Indian Journal of Agronomy*, **20**(1):63-64
2. Datta, D. (2007). Study on the efficiency of rock phosphate as a source of phosphorus to pigeonpea in acid laterite soil of West Bengal. *Indian Journal of Agriculture Science*, **3**(1):228-231
3. Namdev, S.L. and Gupta, S.C. (1999). Effect of bio fertilizer with different levels of chemical fertilizer on pigeonpea (*Cajanus cajan* L. Millsp.). *Crop Research*, **18**(1):29-33
4. Patil, A.B and Padamini, D.R. (2007). Effect of Integrated nutrient management on growth and yield of pigeonpea (*Cajanus cajan* L. Millsp). *International Journal of Agricultural Sciences*, **3**(2):49-51
5. Singh, R and Prasad, K. (2008). Effect of vermicompost, Rhizobium and DAP on Growth, yield and Nutrient uptake by chickpea. *Journal of food Legumes*, **21**(2):112-114
6. Singh, R.S. (2007). Effect of organic and inorganic sources of nutrition on productivity of long duration pigeonpea (*Cajanus cajan* L. Millsp). *Environment and Ecology*, **25**(3A):768-770.