

Yield potential of Pigeonpea varieties under System of Pigeonpea Intensification (SPI)

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ABSTRACT: A field experiment was conducted at Krishi Vigyan Kendra, JNKVV, Jabalpur for two consecutive years of 2016 and 2017 during *Kharif* seasons. Treatments consisted of Seven pigeon pea varieties having different maturity periods viz. V₁ (TJT-501) V₂ (ASHA), V₃ (DURGA), V₄ (ICPL 88039), V₅ (UPA5 120), V₆ (Manak) and V₇ (JKM 189) were tested in a randomized block design replicate thrice. Pigeon pea varieties were sown 8th and 10th June 2016 and 2017 respectively in a black poly bags. Thirty days old seedlings were transplanted on 10th and 12th July 2016 and 2017 respectively. Result of study reveal that variety TJT 501 attended the significantly higher plant height (192.8 cm) with girth of 3.10 cm. and bears a primary (13.6/plant and recorder branches (30.1/plant) closely followed by ASHA. These two varieties proved significantly superior over rest of varieties. As regards to the nodules the highest counts of nodules on per plant were recorded (45/plant) closely followed 40.33/plant under TJT 501 and ASHA respectively. The top ranking varieties TJT 501 recorded significantly higher number of pods/plant (376.6) and 4.03 seeds per pod; the mark variety recorded the lowest count of pods 202.7/plant and 3.26 seeds/pod. The seed and stalk yields of 2173.88 and 6813.48 kg ha⁻¹, respectively were recorded under TJT-501 closely followed by ASHA (2062.64 and 6462.50 kg/ha) and JKM 189 (2033.62 and 6493.20 kg/ha) seed and stack yields, respectively. The top yielded variety TJT 501 fetched net returns of Rs. 94606 with highest (3.28) cost benefit ratio.

Keywords: System of pigeonpea intensification (SPI), transplanting, yield potential, root nodule and seedling.

INTRODUCTION

Pigeon pea [*Cajanus cajan* (L.) Millsp], is one of the major *Kharif* pulse crops of the tropics and sub-tropics. It is generally known as red gram, tur, arhar in India. It is grown mainly in Maharashtra, Madhya Pradesh, Karnataka, Uttar Pradesh, Gujarat and Andhra Pradesh. It occupies an area of 3.88 million hectare in India with a production of 3.29 million tones with an average productivity of 849 kg/ha (Ministry of Agri & FW, 2018). In Madhya Pradesh pigeonpea is cultivated on 219 Lakh hectare with an annual production of 2.86 lakh tones and productivity of 1305 kg/ha (Agriculture statistics at a glance, 2015). Pigeon pea contains 19-23% proteins, 1-2% fat, 45-55% carbohydrates, 1-5% fibers, soluble sugar 3-5%, and water 1.5%. Arhar contains 2-3 times more protein as compare to cereals crops. The proteins of pigeon pea are nutritionally superior and it contains B-complex vitamins. Minerals like calcium, iron, phosphorus etc. major constrain in pigeon pea is low productivity due to use of low yielding varieties, poor level of management practices, high plant population, imbalanced use of fertilizers, damage due to drought or heavy rains and frost during

winter (Orozco *et al.*, 1996). To overcome these natural problems, pigeonpea was taken under System of Pigeon pea Intensification (SPI) (Chaudhary and Thakur, 2005). The major advantages of System of Pigeonpea Intensification (SPI) are seed saving, early sowing to escaping the crop from drought, heavy rains and frost damage and better yield. Pigeonpea being a *Kharif* crop and its yield potential is affected by climate aberrations. In this situation plant population is not maintained as per recommendation due to uncertainty, of rainfall. Under such circumstance maintaining adequate number of plants by transplanting of young seedlings of pigeon pea in presence of both abiotic and biotic stresses may be an option (Praharaj *et al.*, 2015). Counter of this problems and exploit full potential through certain crop contingencies including transplanting pigeon pea seedling in main field so as to maintain adequate plant population for compensating yield loss during *Kharif* season. Hence looking to facts as above and information in this regards the present investigation is under taken to evaluate the pigeon pea varieties under System of Pigeon pea Intensification (SPI).

MATERIALS AND METHODS

A field experiment was conducted at Krishi Vigyan Kendra, JNKVV, Jabalpur during *Kharif* seasons of 2016 and 2017. The treatments consisted of seven varieties of pigeon pea of different duration *viz.*, V₁ (TJT 501), V₂ (Asha), V₃ (Durga), V₄ (ICPL 88039), V₅ (UPAS120), V₆ (Manak) and V₇ (JKM 189) were tested in randomized block design with three replications. Sowing of pigeon pea varieties were done on 8th and 10th June 2016 and 2017 respectively, in a black poly bags. Thirty days old seedlings were transplanted on 10th and 12th July 2016th and 2017 respectively. Seedlings were planted at spacing of 90x60 cm. apart by using 4 kg seed ha⁻¹. Crop was fertilized as per the recommended dose of 30:60:30 kg NPK ha⁻¹ through urea, single super phosphate and murate of potash. Before sowing of seed in poly bags it was treated with fungicide carbendazim and thiram @ 2.0 g kg⁻¹ seed as well as thiomethoxiam 30 Fs @10ml kg⁻¹ seed. Crop was harvested as per the varieties in different days to Physiological maturities.

RESULTS AND DISCUSSION

A. Growth parameters

It is obvious from the Table 1 that significantly the tallest plants (192.8 cm) and its girth (3.10 cm) bearing of primary (13.6) and secondary branches per plant (30.1) were recorded in variety TJT 501. Whereas ASHA was proved at par with TJT 501 with respect to plant height (176.8 cm), secondary branches per plant (22.5 plant⁻¹) and significantly superior over rest of the varieties. The shortest plant (149.50 cm) with thin thickness (1.8 cm) primary branches (43 plant⁻¹) and secondary branches (14.14 plant⁻¹) were observed in

Manak variety. The variations in plant height, girth are the genetic characteristics of varieties. Similar results were also reported by Anilkumar *et al.* (2011) and Jamadar and Sajjan (2014).

B. Root nodules per plant

Root nodules are the good sign of nitrogen fixation by crop and have a markable variations among the varieties. The maximum counts of nodules per plant (45) closely followed by variety TJT-501 and ASHA (40). These two varieties proved significant superior over rest of the varieties except Durga which recorded 33 root nodules per plant. The higher number of nodules in variety TJT 501, ASHA and Durga might be because of genetic factor associated within micro environmental condition of soil which created by plant structure hence counts of nodules varied in these varieties. These findings are enclose conformity with the findings of Sonawane *et al.*, (2015).

C. Yield attributes and yields

Yield attributing parameters with respect to pods per plant and seeds per pod were observed at harvest of crop during both the years and mean values are presented in Table 2 the pods per plant and seeds per pod were significantly higher (376.6 pods plant⁻¹ and 4.03 seeds per pod were recorded in variety TJT 501. Further it was also noted that variety JKM-189, ASHA, Durga, ICPL88039 and UPAS-120 recorded statically at par with respect to pods/plant. Whereas, seeds per pod was found at par in JKM 189 (3.90 seeds pod⁻¹) and ASHA (3.80 seeds pod⁻¹). The lowest counts of pods per plant and seeds pod⁻¹ (3.26) were observed in variety Manak.

Table 1: Growth Parameters of Pigeon pea varieties under system of Intensification.

Variety	Plant height (cm)	Stem girth (cm)	Chlorophyll content (%)	Primary branches/plant	Secondary branches/plant	Root nodules/plant
TJT 501	192.80	3.10	59.96	13.16	30.10	45.00
ASHA	176.83	2.16	51.00	07.96	22.53	40.00
Durga	170.80	2.10	47.93	07.40	21.10	33.00
ICPL 88039	162.90	2.06	49.23	06.73	18.50	31.00
UPAS 120	158.83	2.03	48.10	05.26	17.82	34.00
Manak	149.50	1.86	45.90	04.30	14.14	27.00
JKM 189	174.00	2.26	54.80	07.84	24.14	30.00
SEm ±	05.41	0.22	1.78	0.97	03.29	2.07
CD(P=0.05)	16.37	0.68	5.38	2.93	09.95	8.04

Table 2: Yield attributes and yields of Pigeon pea varieties under system of Intensification (SPI).

Variety	Pods/plant	Seeds/pod	Seed yield (kg/ha)	Stalk yield (kg/ha)	Seed index (g)	Harvest index (%)
TJT 501	376.56	04.03	2173.88	6813.48	09.50	24.18
ASHA	312.06	03.80	2062.64	6462.50	10.50	24.19
Durga	310.86	03.56	1828.64	6357.90	09.06	22.23
ICPL 88039	296.86	03.66	1521.30	6029.56	11.06	20.14
UPAS 120	289.33	03.56	1408.94	5873.16	09.43	19.44
Manak	202.70	03.26	1059.72	4280.56	09.70	19.84
JKM 189	322.76	03.90	2033.62	6493.20	10.90	23.84
SEm ±	09.45	0.09	68.18	178.40	00.15	-
CD(P=0.05)	28.58	0.28	204.60	539.48	00.48	-

The seeds index of variety JKM-189, ASHA, Durga, ICPL 88039 possessed 10.90, 10.50 and 10.40 g respectively at par with each other.

Whereas, TJT 501 (9.50 g) and Durga (9.46) UPAS 120 (9.43 g) recorded seed index which were at par to each other. As regards to the seed and stalk yields of pigeon pea reveal significant differences among the varieties and significantly higher yields of 2173.88 kg and 6813.48 kg/ha of seed and stalk yields, respectively were recorded under TJT 501 and proved superior over rest of the varieties except JKM 189 and ASHA. The variety Manak recorded lowest yield of 1059.72 and 4280.56 kg seed and stalk respectively. Harvest index of various varieties were estimated and presented in Table 2. It indicates that variety ASHA computed highest HI of 24.19 closely followed by 24.18 in TJT-501 and 23.84 in JKM 189. The lowest

HI 19.44 was observed in UPAS 120. The better yield performance of variety TJT-501 followed by ASHA and JKM-189 might be due to bearing of good number of root nodules, pods per plant and seeds per pod. These parameters favored the yield contributor per plant resulted in significantly higher yield. These findings more close conformity with the findings of Singh and Kirar (2016) and Sonawane *et al.* (2015).

Economics

Data presented in Table 3 revealed that variety TJT 501 recorded highest net returns of Rs. 94606/ha with B: C ratio of 3.28. However, variety ASHA and JKM 189 having the similar values of net returns Rs. 88288 and 86883/ha with B: C ratio of 3.06 and 3.01 respectively.

Table 3: Economics of Pigeon pea varieties under System of Intensification (SPI).

Variety	Gross Return (Rs/ha)	Net returns (Rs/ha)	B:C Ratio
TJT 501	123406	94606	3.28
ASHA	117088	88288	3.06
Durga	105061	76261	2.64
ICPL 88039	88884	60084	2.08
UPAS 120	82897	54097	1.87
Manak	62076	33276	1.15
JKM 189	115683	86883	3.01
SEm ±	-	-	-
CD(P=0.05)	-	-	-

CONCLUSION

From the above findings it may be concluded that the variety TJT 501 proved superior with respect to growth and yields and fetched net returns of Rs. 94606/ha with B:C ratio of 3.28 under system of pigeon pea intensification (SPI).

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Conflict of interest. None

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