E-ISSN: 2618-0618
P-ISSN: 2618-060X

NAAS Rating (2025): 5.20
www.agronomyjournals.com
2025; 8(9): 284-286
Received: 23-07-2025
Accepted: 27-08-2025

N Manjunatha
Associate Professor of Agronomy, COA, Hagari-Ballari, Karnataka, India

Vikramsimha HV
Assistant Professor FPD, College of Agriculture, Ambalavayal, Wayanad, Karnataka, India

Ravi S
Senior Scientist soil Science, ICAR-KVK, Hagari-Ballari, Karnataka, India

Ahalya BN
Assistant Professor Sericulture, COA, Hagari-Ballari, Karnataka, India

Corresponding Author:
N Manjunatha
Associate Professor of Agronomy, COA, Hagari-Ballari, Karnataka, India

Assessment of short duration pigeonpea varieties for higher productivity and accommodate *Rabi* crops in double cropping system under rainfed condition

N Manjunatha, Vikramsimha, HV, Ravi S and Ahalya BN

DOI: https://www.doi.org/10.33545/2618060X.2025.v8.i9d.3767

Abstract
ICAR-Krishi vignan kendra, Raddewadgi, conducted the on farm trials of short duration varieties of pigeonpea, GC-11-39, PRG-176 and PUSA-16 with two spacing 45x30 cm and 90 x 30 cm under vertisol by adopting standard package of practices like providing the farm yard manure at the rate of 10 tonne per ha and nitrogen was supplied in the form of urea and phosphorus was given through di ammonium phosphate (DAP), in time weeding was done in the farmers field of in three villages of Kalaburgi districts *viz*, Rasanagi village (Jevargi, block) Beeranahalli (Chittapur, block) and Raddewadgi (Jewargi block) during the year 2021-22 under rainfed condition. Among the different varieties under study the short duration variety PRG-176 with adopting the spacing of 90x30 cm recorded higher seed yield (24 q per hectare), gross returns (Rs.1,44,300), Net returns (Rs. 1,09,000) and BC ratio (4.12). How ever short duration variety released from IARI, New Delhi, PUSA-16 recorded higher per day productivity (19.89 kg/day) that mature in just 92 days which facilitate sowing of *Rabi* season crop on time, the farmer can adopt PUSA-16 under double cropping system involving the pigeonpea fallowed by *Rabi* Jowar or safflower or Chickpea.

Keywords: Pigeonpea, per day productivity, short duration variety and double cropping

Introduction
India is the largest producer, consumer, importer and processor of pulses in the world. Pulses are the basic ingredient in the diets of a vast majority of the Indian population, as they provide a perfect mix of vegetarian protein component of high biological value when supplemented with cereals. Pigeonpea (*Cajanus cajan* (L.) Millsp.) is one of the protein rich pulse crop of the semi-arid tropics, grown predominantly under rainfed conditions. It has an important place in the farming systems adopted by dry land farmers. In India, it is grown in an area of 48.24 lakh hectares with an annual production 38.8 lakh tonnes production and productivity is 804 kg ha-1 (https://www.indiastat.com.). The productivity of pigeonpea is too low and almost static for the last five decades due to cultivation of long duration genotypes that are prone to climatic variations (Singh, 2018) [5] Recurrent droughts in Kharif causes moisture stress at one or several stages of crop growth and development resulting in poor yields under rainfed conditions. The problem is more acute as most of the cultivars growing in Andhra Pradesh are long duration and prone to moisture stress at flowering and pod filling stages. Occurrence of mid-season and terminal droughts of 1 to 3 weeks consecutive duration during reproductive period happens to be the dominant reason for crop (and investment) failures and low crop yields (Rijks, 1986) [4]. It performs well in poor soils and regions where moisture availability is unreliable or inadequate (Reddy *et al*, 1993) [3]. because of its deep root system it is a boon for the farmers to grow under rainfed condition (Daniel *et al*, 2019) [1]. The release of new short duration with higher harvest index through better utilization of monsoon rains during both vegetative and reproductive phases. These genotypes after great promise for introduction of Pigeon pea in new as well as in existing cropping systems. Maintenance of optimum plant population per unit area in proper geometry is an important test in rain fed crops like Pigeon pea to exploit the yield potential of any genotype. Short duration Pigeon pea varieties are in general short statured with different compactness. Thus, those may require different plant geometry for proper development of

individual plant on which yield depends. Though such short duration Pigeon pea genotypes have higher yield potential, their achievable yields are comparatively poor. To achieve their yield potential in a given environment, proper selection of most suitable variety and maintenance of optimum plant stand per unit area in proper geometry is necessary. With this in view, the present On farm testing of varietal trial with different spacing was initiated in Kalaburgi district of Karnataka.

Materials and Methods

On farm testing (OFT) was implemented during Kharif, 2022 under rain fed condition Pigeon pea at ICAR- Krishi Vigyan Kendra, Kalaburgi district (Karnatak). The OFT was carried out in three villages of blocks via, Jewargi and Chittapur of Kalaburgi district. The treatments comprised of three varieties *viz*. GC-11-39, PRG-176 and PUSA- 16 with two plant geometry, 45 x 30 cm and 90x30 cm adopted. Recommended package of practices were followed. The observation like days to maturity and per productivity worked out. Yield parameters like number of pods per plant and yield was recorded at the time of harvesting and economics was worked out. Cost of cultivation (Rs/ha) was calculated considering the prevailing charges of agricultural operations and market price of inputs involved. Gross returns (Rs/ha) Gross returns were obtained by converting the grains into monetary terms at the prevailing market rate during the course of studies. Gross return (Rs/ha) = (Seed yield x price), Net returns (Rs/ha) Net returns (Rs/ha) = Gross return (Rs/ha) - Cost of cultivation (Rs/ha). Cost: benefit ratio. The benefit: cost ratio was calculated by dividing gross returns by cost of cultivation.

Table 1: Special features of varieties

Variety / Special feature	GC-11-39	PRG-176	PUSA-16
Yield (kg ha^{-1})	2000-2200	2000-2500	1900-2000
Plant type	Medium	Medium	semi-dwarf
Days to maturity	125-135 days	130 days	Extra early maturing (120 days)
Other character	Suitable for multiple cropping system	It is resistant to terminal drought and is suitable for light *chalka* soils	Synchronous maturity, and suitable for combine harvesting

Results and Discussion

Yield parameter, productivity and disease and pest incidence

The higher number of pods per plant recorded (183 plant-1) in var, PRG-176 with 90x30 cm compare to var. GC-11-39 (135 plant-1) and var. PUSA-16 (28.4), However comparable number of pods per plant was recorded in closer spacing 45x30 cm (27.6) in var. PUSA-16 with that of wider spacing. The variety PUSA-16 took less number of days for maturity (92 days) compare to PRG-176 (140 days) and GC-11-39 (135 days). The important parameter that is productivity per day was highest with var. PUSA-16 with closer spacing 45x30 cm (19.89 kg per day) compare to wider spacing (90x30 cm)of the same variety(7.83 kg per day).however wider spacing with var. GC-11-39 and PRG-176 recorded (14.89 and 17.14 kg per day, respectively) and closer spacing 45x 30 cm recorded (5.56 and 6.86 kg per day, respectively). The incidence of diseases like wilt and SMD were low in var. PUSA-16 (2.25 and 2.75%, 4.15 and 5.50% with closer spacing and wider spacing respectively) compare GC-11-39 and PRG-176.

Table 2: Yield parameter, Productivity and disease incidence as influence by varieties and spacing

Varieties/ Spacing	GC-11-39		PRG-176		PUSA-16	
Parameter	**45x30 cm**	**90x30 cm**	**45x30 cm**	**90x30 cm**	**45x30 cm**	**90x30 cm**
No. of pods / Plant	34.60	115.00	71.20	183.00	27.60	28.40
Days to maturity	135.00	135.00	140.00	140.00	92.00	92.00
Per day productivity (Kg/day)	5.56	14.89	6.86	17.14	19.89	7.83
Wilt Incidence (%)	2.50	1.75	8.75	7.75	2.25	2.75
SMD incidence (%)	6.75	5.25	25.25	20.15	4.15	5.50

Yield and economics

Among the three varieties under testing the var. PRG-176 recorded higher yield (24 q ha-1) under wider spacing (90x30 cm) followed by var. GC-11-39(20.1 q ha-1) compare to closer spacing of same varieties. However, reverse trend was observed in var. PUSA-11, which recorded higher yield (18.3) under closed spacing (45x30 cm). With respect economics var. PRG-176 with wider spacing (90x30 cm) recorded higher gross returns, net returns and B:C ratio (Rs,1,44,300, 1,09,300 ha-1 and 4.12, respectively) followed by var. GC-11-39 (Rs. 1,20,300, 85,300 ha-1 and 3.44, respectively) compare to in their closer spacing. However, var, PUSA-16 recorded higher gross returns, net returns and B:C ratio (Rs. 108000, 73, 000 ha-1 and 3.08 respectively) under closed spacing compare to wider spacing (Rs.54,444, 21,443 ha-1 and 1.65).

Table 3: Yield and Economics of short duration pigeon pea varieties with different spacing

Varieties/ Spacing	GC-11-39		PRG-176		PUSA-16	
Parameter	**45x30**	**90x30**	**45x30**	**90x30**	**45x30**	**90x30**
Yield (q ha^{-1})	7.5	20.1	9.6	24.0	18.3	9.1
Gross returns (Rs. ha^{-1})	45000	120300	57000	144300	108000	54444
Net returns (Rs ha^{-1}.)	16000	85300	28600	109300	73000	21443
BCR	1.55	3.44	1.97	4.12	3.08	1.65

Conclusion

From the above foregoing results and discussion it can be concluded that, although growing of medium duration variety PRG-176 results in the higher yield and economics, it is possible to grow only single crop in a year under rainfed condition considering the duration of the variety (145 days). However, by

growing extra short duration var. PUSA-16 which record higher per day productivity and less number days to maturity (92 days) with reasonable economics farmer can grow var. PUSA-16 when opted for double cropping in a year under rainfed condition of Kalaburgi District of Karnataka.

References

1. Daniel PSJ, Kumar VR, Singh B. Performance of Red Gram (*Cajanus cajan*) under Rain fed Situation in district Mahabubnagar. J Krishi Vigyan. 2019;8(1):323-5.
2. INDIASTAT. 2021. https://www.indiastat.com.
3. Reddy MV, Raja TN, Sharma SB, Nene YL, McDonald D. Handbook of pigeonpea diseases. ICRISAT Information Bulletin No. 42. International Crops Research Institute for the Semi-Arid Tropics; 1993.
4. Rijks D. Development of rainfed agriculture under arid and semi-arid conditions. The environment-assessing the problems. In: Davis TJ, editor. Proceedings of the Sixth Agricultural Sector Symposium on Development of Rainfed Agriculture under Arid and Semiarid Conditions. World Bank; 1986. p. 133-52.
5. Singh YP, Sudhir S, Prabakhar S, Anilkumar S. Impact of establishment techniques and maturity duration of pigeonpea cultivars on yield, water, productivity and properties of soil. Agric Res. 2018;7(3):271-9.