



## Productivity Enhancement of Pigeonpea (*Cajanus cajan* L.) Through Improved Production Technologies

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Front line demonstrations were conducted at 219 farmers' fields to demonstrate production potential and economic benefits of improved technologies comprising high yielding Fusarium wilt resistant and Helicoverpa tolerant varieties in Ranga Reddy district of southern Telangana region of Andhra Pradesh during *kharif* seasons of 2007-08, 2008-09 and 2009-10 in rainfed condition. The improved technologies recorded an additional yield ranging from 2.75 to 5.0 q/ha with a mean of 3.84 q/ha. There was an increase of 50% (ICPL 332wr), 60.7% (Asha), 54% (ENT 11) during 2007-08; 46.4% (ENT 11), 50.0% (ICPL 332 wr), 36% (Asha) during 2008-09 and 57.1% (Asha), 62.5% (ICPL 332 wr) in production of pigeonpea under improved technologies. The improved technologies gave higher benefit cost ratio of 2.08 (Asha), 2.45 (ICPL 332 wr), 1.70 (ENT 11) during 2007-08 compared to 1.72, 1.54 and 1.39 under local check.

**Key words:** Pigeon pea, productivity, improved technologies.

Pigeonpea (*Cajanus cajan* L.) is an important pulse crop in India and it fits well in different cropping systems and is grown under inter and multiple cropping systems during rainy and spring seasons under wide range of different agroclimatic conditions. In India, among the pulses pigeonpea occupies an area of 4.07 million hectares with a production of 3.09 million tones with a productivity of 752 kg/ha during 2007-08 (Anonymous, 2007). The major pigeonpea growing states are Maharashtra, Uttar Pradesh, Madhya Pradesh, Karnataka, Tamilnadu and Andhra Pradesh. Among these states, Andhra Pradesh alone contributes 16% to total area (12 lakh hectares) and 10% (2 lakh tons) production with a productivity of 450 kg/ha during 2007-08 (Anonymous, 2007). In Andhra Pradesh its cultivation is mainly confined to Ranga Reddy, Mahaboobnagar, Guntur, Prakasam, Nalgonda, Warangal and Khammam district. Ranga Reddy district has 5.5% area and 5.2% production of pigeonpea in the state. In general, average productivity of pigeonpea continues to be lower (450 kg/ha) than expected from improved technology from the last ten years, mainly due to its cultivation on marginal lands and non availability of high yielding varieties. The major constraints responsible for lower yield are namely, Fusarium wilt, susceptible varieties and heavy incidence of Helicoverpa pod borer. The yield of pigeonpea can be increased by using Fusarium wilt resistant and Helicoverpa tolerant varieties in this area. Keeping this in view, on farm trials on pigeonpea were conducted to demonstrate the production potential and economic benefits of improved technologies in farmers' fields.

### Material and Methods

On farm trials were conducted in farmers' fields of five mandals, namely Tandur, Yalal, Peddemul, Basheerabad, Gandveedu of Ranga Reddy district in southern Telangana region of Andhra Pradesh during *kharif* seasons of 2007-08, 2008-09 and 2009-10 under rainfed condition, in light to medium soils with low to medium fertility status under pigeonpea sole cropping systems. Each demonstration was conducted in an area of 0.4 ha and adjacent to the farmers field in which the crop was cultivated with farmers' practice/variety. The package of practices included were Fusarium wilt resistant and Helicoverpa tolerant varieties, seed treatment and maintenance of optimum plant population. The varieties of pigeonpea viz., Asha, ICPL 332 wr and ENT11 during 2007-08, 2008-09 and Asha and ICPL 332 wr during 2009-10 were included in the demonstrations. The spacing followed was at 1.5m x 0.20 m sown between June 20 to July 10 during the three years with the seed rate of 4 kg/ha. Entire dose of N and P through diammonium phosphate and K through muriate of potash @ 20:60:20 kg ha<sup>-1</sup>, respectively, was applied as basal before sowing. The seeds were treated with bavistin @ 3g kg<sup>-1</sup> of seed. Hand/line weeding was done 30 days after sowing. Inter cultivation with bullock drawn guntaka was done for twice with a gap of 20 days after sowing. The first intercultivation was done at 25-30 days after sowing.

### Results and Discussion

#### Effect of season

A total rainfall of 1134.3 mm, 863.1 mm and

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830.4 mm was received in 51, 46 and 45 days during 2007-08, 2008-09 and 2009-10, respectively. There was normal receipt of rain during the years; however, a rainfall of 116.3mm was received in seven rainy days during the first fortnight of June and later there was no rain upto last week of July during 2009-10. This caused unusual delay in sowing in some of the farmers' fields. In fields where delayed sowing was done because of prolonged dry spell in the month of July, the crop growth was restricted. The late planted crop was subjected to relatively less time span available for plant growth and development. Pigeonpea crop needs dry weather at the time of flower initiation and pod setting. However, during 2009-10 the flowering coincided with heavy rains for a prolonged period of 17 days during September and October resulting in heavy flower drop and poor pod set and increased infestation of insect pests.

### Yield

The productivity of pigeonpea in Ranga Reddy district under improved production technologies ranged between 10.5 to 18.8 q/ha with a mean yield of 11.2 q/ha. The productivity under improved technologies varied from 10.0 to 12.5, 10 to 12.5, 8.0 to 10.5 during 2007-08 for the varieties ICPL 332 wr, Asha and ENT 11, respectively and 8.5 to 12.0, 7.0 to 14.0 and 8.0 to 12.5 during 2008-09 for ENT 11, ICPL 332 wr and Asha, respectively. During 2009-10, 8.0 to 18.8 for Asha and 7.5 to 18.7 for ICPL 332 wr (Table 1) as against the yield range between 6.0 to 8.7 with a mean of 7.3q/ha under farmers local practice/variety. The additional yield under improved technologies over local practice ranged from 2.8 to 5.0 q/ha with a mean of 3.8 q/ha. In comparison to local practice, there was an increase of 50% (ICPL 332wr), 60.7% (Asha), 54%

**Table 1. Yield of pigeonpea as influenced by improved varieties and local practices in farmers' fields**

Year	Variety	Area (ha)	Demo. Nos.	Yield (q/ha) Improved technology				Additional yield over local check (q/ha)	% increase in yield over local check
				Max	Min	Average	Local		
2007-08	ICPL 332 wr	12.0	19	12.5	10.0	11.3	7.5	3.8	50.0
	Asha	6.0	9	12.5	10.0	11.3	7.0	4.3	60.7
	ENT11	8.0	17	10.5	8.0	9.3	6.0	3.3	54.0
2008-09	ENT11	8.0	14	12.0	8.5	10.3	7.0	3.3	46.4
	ICPL 332 wr	12.0	40	14.0	7.0	10.5	7.0	3.5	50.0
	Asha	12.0	40	12.5	8.0	10.2	7.5	2.8	36.0
2009-10	Asha	12.0	40	18.8	8.0	13.7	8.7	5	57.1
	ICPL 332 wr	12.0	40	18.7	7.5	13	8.0	5	62.5

(ENT 11) during 2007-08; 46.4% (ENT 11), 50.0% (ICPL 332 wr), 36% (Asha) during 2008-09 and 57.1% (Asha), 62.5% (ICPL 332 wr) in production of pigeonpea under improved technologies in respective years for the varieties ENT 11, ICPL 332 wr and Asha. This increased grain yield with improved technologies was mainly because of inherent potential of the resistant varieties. Nazrul Islam *et al.* (2004) and Tomar *et al.* (2009) reported that adoption of improved variety increased the productivity by 35 to 159 percent than the local variety of black gram.

### Net return

The economic viability of improved technologies over traditional farmers practice/ varieties was calculated depending on the prevailing prices of inputs and output costs (Table 2). It was found that cost of production of pigeonpea under improved technologies varied from Rs. 12458 to Rs. 19784/ ha in case of Asha, Rs. 10548 to Rs. 19979/ ha for ICPL 332 wr and Rs. 12542 to Rs. 15635/ha in case of ENT 11 with an average of Rs. 15217/ha as against Rs. 9948 to Rs.17805/ ha with an average of Rs.

12824 /ha in local practice. The improved production technologies registered an additional cost of production ranging from Rs. 2000 to Rs. 3545/ ha for Asha, from Rs. 524 to Rs. 2174/ ha for ICPL 332 wr and from Rs. 2594 to Rs. 2889/ ha for ENT 11 with a mean of Rs.2392/- per hectare over local check. The additional cost incurred in the improved technologies was mainly due to more costs involved in the cost of improved seed only. Cultivation of pigeonpea under improved technologies gave higher net return which ranged from Rs. 13417 to Rs. 35216/ ha in case of Asha, Rs. 15327 to Rs. 32021/ ha in case of ICPL 332 wr and Rs. 8733 to Rs. 17165/ ha in case of ENT 11 with a mean value of Rs. 19686 / ha. As compared to the farmers' practice/local check which recorded from Rs.3852 to 18761/ ha with a mean of Rs.10044/ha, there was an additional net return of Rs. 4881, 7775 and 8101/ha during 2007-08 for ENT 11, Asha and ICPL 332 wr, respectively. During 2008-09, there was an additional net return of Rs. 5383, 7511 and 9202 /ha for Asha, ENT 11 and ICPL 332 wr respectively, while for 2009-10, there was an additional net return of Rs. 16455 and 17826/ha was recorded for Ash and

**Table 2. Cost of cultivation (Rs/ha), net returns (Rs/ha) and Benefit: Cost ratio of pigeonpea as affected by improved and local practices**

Year	Total cost of cultivation (Rs/ha)		Net returns (Rs/ha)		Benefit : Cost ratio		Additional cost of cultivation (Rs/ha)	Additional net returns (Rs/ha)
	Improved technology	Local check	Improved technology	Local check	Improved technology	Local check		
2007-08	10548	10024	15327	7226	2.45	1.72	524	8101
	12458	10458	13417	5642	2.08	1.54	2000	7775
	12542	9948	8733	3852	1.70	1.39	2594	4881
2008-09	15635	12746	17165	9654	2.10	1.76	2889	7511
	14565	12567	19035	9833	2.31	1.78	1998	9202
	16225	12808	16575	11192	2.02	1.87	3417	5383
2009-10	19784	16239	35216	18761	2.78	2.16	3545	16455
	19979	17805	32021	14195	2.60	1.80	2174	17826

ICPL 332 wr, respectively in farmers fields under demonstration plots.

The improved technologies also gave higher benefit cost ratio of 2.08 (Asha), 2.45 (ICPL 332 wr), 1.70 (ENT 11) during 2007-08 compared to 1.72, 1.54 and 1.39 under local check. During 2008-09, the higher benefit cost ratio of 2.02 (Asha), 2.31 (ICPL 332 wr) and 2.10 (ENT 11) as against 1.76, 1.78 and 1.87 for local check. The benefit cost ratio of 2.78 (Asha) and 2.60 (ICPL 332 wr) when compared to 2.16 and 1.80 for local check during the year 2009-10.

The results from the present study clearly brought out the potential of improved production technologies in enhancing pigeonpea production

and economic gains in rainfed conditions of southern Telangana region of Andhra Pradesh.

### References

- Annual Report, 2007, 2008 and 2009, Agricultural Research Station, Tandur.
- Anonymous 2007. Bureau of Economics and Statistics.
- Nazrul Islam, M., Rezual Karim Md and Safigul Islam Q.M., 2004. Economic performance of BARI Mash I (Improved variety of Black gram) with traditional variety at farmers fields of Bangladesh. *Asian J. Plant Sci.*, **3**: 247-250.
- Tomar, R.K.S., Sahu, B. L., Rupendra, K. Singh and Prajapati, R.K. 2009. Productivity enhancement of black gram (*Vigna mungo* L.) through improved production technologies in farmers field. *J. Food Legumes*. **22**: 202-204.