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Impact of large scale demonstration of pigeon pea variety TS-3R CFLD programme in Vijayapur district

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Abstract

A technology demonstration of Pigeon pea (*Cajanus cajan* L.) was aimed to improve the production after bringing new variety in to cultivation in Vijayapur district of Karnataka. Studies were carried out to assess yield and economics of a new variety, TS-3R at the farmer's field under cluster front line demonstration (CFLD) for two years (2018-19 to 2019-20). Among two varieties TS-3R recorded significantly higher yield (11.91 q ha⁻¹) as compared to local variety Gulyal (9.33 q ha⁻¹). Similar trend was observed for growth and yield parameters. The highest gross returns and BC ratio of Rs. 88308.5 ha⁻¹ and 3.42, respectively were realized with TS-3R variety as compared with local variety Gulyal.

Keywords: Pigeon pea, TS-3R, Farmers practice, CFLD, Gulyal, yield and economics

Introduction

Pigeon pea [*Cajanus cajan* L. Mill sp.] is a second most important grain legume crop next to chickpea, occupies a prominent place in Indian dry land agriculture by covering an area of around 3.9 m ha with productivity of 729 kg ha⁻¹ (MOA, 2016) [6]. It is an integral component of various agro ecological systems of the country mainly inter cropped with cereals, pulses, commercial crops, oilseeds and millets. India has the largest acreage under pigeonpea (4.05 m ha) with a total production and productivity of 3.27 mt and 799 kg ha⁻¹, respectively. The increase in area cultivated under pigeonpea, production and productivity from 1970-71 to 2012-13 is 43 per cent (2.66 m ha to 3.81 m ha), 60.6 per cent and 13.7 per cent, respectively (AICRPP, 2016) [1]. In Karnataka, pigeon pea is a major pulse crop grown in an area of 0.73 m ha with production of 0.47 m tones (MOA, 2016) [6]. However, the productivity (651 kg ha⁻¹) is much lower than national average (729 kg ha⁻¹) due to several abiotic and biotic constraints. Pigeonpea is a multi-purpose crop that fits very well in the context of sustainable agriculture. In addition to food, it is used as fodder, feed, and fuel and has functional utility (for making baskets, huts, fences, etc.). However, the current production of 2.86 million tons of pigeonpea in India cannot meet the domestic demands. Due to gap between the production and consumption the per capita availability of pigeonpea has come down from 70 gms to 35 gms. Therefore India is compelled to import pigeonpea from other countries. Despite the fact that a large number of high yielding varieties and have been released, productivity in the crop remains stagnant around 700 kg ha⁻¹ as compared to its potential yield (1500-3000 kg ha⁻¹). This gap may be attributed to several biotic and abiotic factors. Since it is mainly a rainfed crop, unfavorable rainfall (Delayed, erratic, improper distribution) leads to terminal drought or heavy down pour. Non adoption of improved management practices and lack of proper research and commercial perspective for the crop influence the low productivity to a greater extent.

Few empirical studies conducted reveals, which hardly throw any light on the performance of the high yielding varieties of pigeonpea hence, there is an urgent need to study the impact of the high yielding varieties and also to identify the main factors influencing the adoption of high yielding varieties for the pigeonpea production in Karnataka. The factors influencing the farmers decision to adopt improved varieties also need to be explained. The new pigeon pea variety TS-3R is early and resistant to wilt. The demonstration was under taken in 105 ha with 217 farmers in Vijayapur district since 2012-13. The yield increase was upto 25.0 per cent because of early maturity and wilt resistant character of the TS-3R variety. In this background, the current study attempts to provide a perspective on the status of pigeonpea production in Karnataka, in order to foster appropriate policies to accelerate its production.

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Materials and Methods

A field demonstration was carried out during the rainy (*kharif*) season of 2018-19 and 2019-20 under northern dryzone of Karnataka at Hullur village of Vijayapur district (situated at 16° 21' N latitude, 75° 59' E longitude and at an altitude of about 516 m above mean sea level). With the improved package of practice, assessment was carried out by taking 0.4 ha as a unit and covered a total area of 30.0 ha. The demonstration was carried out with 2 treatments (T₁=Farmers variety, T₂= TS 3R variety) and 75 replications under randomized complete block design in the farmer's field. The land was brought to optimum tilth by ploughing twice with tractor drawn mould board plough. The soils of demonstration field for evaluating pigeon pea crop was deep clay soil with pH 8.2, available organic carbon 0.40 per cent, available N, P and K were 249.1, 36.7 and 471.2 kg ha⁻¹, respectively.

Sowing of pigeon pea was done on 18th June 2018 and 21st June 2019, respectively. Weeds were controlled through one hoeing at 30 days after sowing and one manual weeding. The recommended rate of N (25 kg ha⁻¹) and P₂O₅ (50 kg ha⁻¹) was applied for pigeon pea at sowing. The remaining cultivation practices were followed as per the package of practice of UAS, Dharwad. In each year a pre-seasonal training and three trainings during the crop period were conducted to prepare the farmers on implementation of selected package of practices. The critical inputs were supplied to the farmers by procuring certified seeds of TS 3R from KVK, Vijayapur of Karnataka. Pigeon pea was harvested on 15th and 13th December 2018 and 2019, respectively. Five randomly selected plants from 75 sites in each treatment were harvested. Standard procedures were used to measure the yield attributes and yield parameters of pigeon pea. Variables were analyzed and least significance difference (LSD) test was carried out for analyzed mean square errors using Web Based Agricultural Statistics software Package (WASP 2.0). Significance and non-significance difference between treatments was derived through procedure provides for a single LSD value (Gomez and Gomez, 1984) [3]. Correlation studies among the yield components of pigeon pea was done using XLSTAT package.

Results and Discussion

Plant height and number of pods per plant

Impact of two varieties of Pigeon pea on plant height was recorded (Table 1), among the two varieties of Pigeon pea,

variety TS-3R has recorded the highest plant height 176 cm followed by local variety Gulyal with 160 cm. Similarly, among the various varieties of Pigeon pea the highest number of pods per plant was recorded in variety TS-3R with 165 followed by local variety Gulyal 152. The results are in good agreement with the findings of Siddayya *et al.*, (2016) [7] who have reported that the short duration of the crop, more grain yield and high market price were found to be the main reasons for adoption of the improved varieties. The results are also in line with the results of Suryavanshi and Mahindre Prakash (1993) [8] and Arun kumar *et al.*, (2005) [2] who have reported that the adoption of recommended practices in frontline demonstration trials in oilseeds and in hybrid cotton have shown increased yield over respective check plot.

Pigeon pea yield and cost economics

Average yield recorded in various varieties of Pigeon pea was ranged from 8.04 to 14.65 q ha⁻¹ (Table 1). Among the varieties TS-3R was recorded highest yield of 11.91 q ha⁻¹ followed by local variety Gulyal (9.33 q ha⁻¹). The total mean cost of cultivation was higher in Pigeon pea variety Gulyal demonstrated plots (Rs. 30812.5) and lower was in TS-3R variety (Rs. 25911.5). This is due to additional application of vermicompost to the soil at the time of sowing. Present results were in line with the earlier findings of Jayalakshmi *et al* (2018) [4] who reported higher net profits in demonstration with an additional income of Rs 7743/ha and B:C ratio of 2.09 against control (1.59).

The comparative profitability of Pigeon pea crop has been studied by estimating the net profit and benefit cost ratio (Table 2). Highest gross return, net profit and BC ratio were recorded in Pigeon pea variety TS-3R. TS-3R recorded higher mean gross return of Rs. 88308.5 per ha mean net profit of Rs. 62397 per ha with a mean benefit cost ratio of 3.415 followed by local variety Gulyal. The results obtained in the present study were in line with the findings of Mauria *et al* (2017) [5] who reported the higher net returns (Rs46250/ha) and benefit cost ratio (3.53) for chickpea gained through the improved production technologies demonstrated under CFLD programme. Moreover, extension agencies in the district need to provide proper technical support to the farmers through different educational and extension methods to reduce the extension gap for better Pigeon pea production in the district.

Table 1: Impact of various varieties of Pigeon pea on growth and yield parameters

Treatments	Plant height (cm)			No. of pods per plant			Yield (Q/ha)		
	2018-19	2019-20	Pooled	2018-19	2019-20	Pooled	2018-19	2019-20	Pooled
T ₁ (TS 3R)	174.3	177.6	175.5	164	166	165	9.17	14.65	11.91
T ₂ (Gulyal)	158.0	161.5	159.5	150	153	151.5	8.04	10.61	9.33
SEM	5.49	5.17	5.41	4.84	4.31	4.726	0.375	1.365	0.932
CD@0.05	16.65	15.34	16.215	14.85	12.84	14.263	1.17	4.16	2.731

Table 2: Impact of various varieties of Pigeon pea on economics

Treatments	Gross return (Rs/ha)			Gross Cost (Rs/ha)			Net Profit (Rs/ha)			B:C ratio		
	2018-19	2019-20	Mean	2018-19	2019-20	Mean	2018-19	2019-20	Mean	2018-19	2019-20	Mean
T ₁ (TS 3R)	89365	87252	88308.5	25571	26254	25911.5	63796	60998	62397	3.51	3.32	3.415
T ₂ (Gulyal)	64721	61465	63093	30569	31056	30812.5	34152	30409	32280.5	2.12	1.98	2.05
SEM	7991.6	8404.2	8491.5	1661.3	1602.5	1641.2	9907.3	10359.4	10067	0.469	0.436	0.415
CD@0.05	23989	25189	25498	4976	4794	4909	29711	31083	30211	1.415	1.315	1.290

Conclusion

Frontline demonstration was effective changing of farmers towards the adoption of integrated crop management in Pigeon pea production. Most of the farmers became aware

about recommended production practices of Pigeon pea after conducting the frontline demonstration on farmers field. Yield of Pigeon pea, net return and BC ratio were found to increase in demonstrated plot as compared to farmers practice.

Improved technology for cultivation of Pigeon pea under CFLD was proved profitable in the present yield economics assessment. The economic details of the demonstrations give us a green signal to further popularize them among the farming community for large scale adoption. It can be concluded from the study that increased Pigeon pea yield was due to the adoption of improved varieties.

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