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Performance and yield economics of pigeonpea var bdn-711 under rainfed condition in Nicra villages of Dharashiv district in Maharashtra

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Abstract

Pigeon pea (*Cajanus cajan* (L.) Millsp.) is one of the most important pulse crops of India and plays a major role in ensuring nutritional security due to its high protein content. Rainfed crops are more vulnerable to climate change because of the limited options for coping with variability of rainfall and temperature. Pigeon pea is one of the most important pulse crops of the Dist Dharashiv. It is widely grown under rainfed condition. In the district the average productivity of pigeonpea remains low due to cultivation under marginal environments, dry spell, decrease in rainy days, increased intensity of rainfall, erratic nature of rainfall, unseasonal rains. Therefore, Development and dissemination of tolerant crop varieties of Pigeon pea with higher yield potential and stress tolerance is essential for enhancing productivity. Pigeonpea var BDN -711 is a climate resilient variety characterized by 150-160 days duration, so can utilize rainwater during its growth stages, minimizing the risk of water stress at flowering and pod development stage. In the NICRA villages of Dharashiv district the productivity and economic returns of pigeon pea var BDN -711 were calculated and compared with the corresponding farmer's practices (local check). pigeon pea var BDN -711 recorded higher yield as compared to check plot. The improved pigeon pea var BDN -711 gave higher gross return and net return per ha with higher benefit cost ratio as compared to farmer's practices. The variation in percent increase in the yield was found due to climate vulnerability. It is concluded that the demonstrations of BDN-711 variety of Pigeon pea performed well under dryland condition.

Keywords: Pigeon pea, climate change, drought, Productivity

Introduction

Pigeonpea is widely grown under rainfed conditions and is well adapted to semi-arid and drought-prone regions. Despite being the largest producer of pigeon pea, India's productivity remains low due to cultivation under marginal environments, use of local varieties, moisture stress, and pest and disease incidence.

ICAR has launched National Innovation in Climate Resilient Agriculture (NICRA) project to enhance the resilience of Indian Agriculture to climate change and climatic variability. As party of this initiative extensive technology demonstration of location specific best practices are conducted on farmer's field. Technology demonstration component (TDC) of NICRA aims at demonstration of proven technologies to Cope with the extreme vulnerability of dryland farming for sustaining the farm busyness throughout the year.

Therefore, Krishi Vigyan Kendra, Dharashiv conducted a survey and found that farmers were using traditional varieties which are frequently affected by terminal drought. Keeping in view, dissemination of improved Pigeon pea varieties with higher yield potential and stress tolerance is essential for enhancing productivity, conducted demonstration on pigeon pea BDN-711 with crop management practices in the Sarola and Kalegaon villages of the block Tuljapur.

Materials and Methods

Krishi Vigyan Kendra, Dharashiv conducted the demonstration of pigeon pea variety BDN-711 in NICRA (National Innovations in Climate Resilient Agriculture) project during the year 2022-2023, 2023-2024 and 2024-25 in the water scarcity villages Sarola and Kalegaon of district Dharashiv.

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In general soil of the area under study was medium to heavy. The total number of demonstrations were 185 conducted on 74 ha area of these villages. The component demonstration of technology was improved variety. The pigeon pea variety BDN-711 characterized by the short duration, escaping terminal drought, and wilt resistant. These demonstrations were conducted in three consecutive years. The demonstration included control plot as the farmers practices.

Sowing was done with the onset of monsoon. Recommended spacing 90 x 20 square cm and recommended seed rate 15kg per ha were followed in both demonstration and check plot. Same practices of Soil test-based fertilizer dose of 25:50:00 NPK application, thinning and gap filling to maintain plant population as well as Need-based plant protection measures were undertaken for demonstration and check plot.

The demonstration was conducted to study the technology gap between the potential yield and demonstrated yield. The yield data were collected from both the demonstration and farmers practice by random crop cutting method and analysed by using simple statistical tools.

Observations recorded

Observations were recorded during the demonstration conducted to evaluate the performance of pigeon pea variety BDN -711.

systematic observations were recorded on key yield and economic parameters. The productivity was evaluated by recording grain yield expressed in quintals per hectare ($q\ ha^{-1}$). Economic analysis included the estimation of cost of cultivation on a per hectare basis ($Rs.\ ha^{-1}$). Further, the profitability of the variety was assessed by computing gross returns and net returns ($Rs.\ ha^{-1}$). The overall economic viability of the demonstration was determined through the calculation of the benefit-cost (B:C) ratio.

Statistical analysis

The data recorded from different farmers' fields were pooled and analysed using standard statistical procedures. Mean yield and economics were compared between treatments to assess performance. The average yield of each demonstration and farmers practice, cost of cultivation, gross return, net return and benefit cost (B: C) ratio was taken for interpretation of the results. Economic parameters such as cost of cultivation, gross returns, net returns and benefit-cost ratio were computed using prevailing market prices. The percent increase in yield was calculated using the following formula as

Percent increase in yield = (Demonstration yield – check plot yield)/ check plot yield x 100

Table 1: Yield economics of Pigeon pea variety BDN -711

Year	Area (ha)	Demo (number)	Demo yield (q/ha)	Check yield (q/ha)	% increase in yield	Gross return		Net return		B:C
						Demo (Rs.)	Check (Rs.)	Demo (Rs.)	Check (Rs.)	
2022-23	30	75	13.5	11.0	22.72	81000	66000	55000	40000	3.1
2023-24	20	50	13.0	11.5	13.0	58500	51750	32500	25750	2.25
2024-25	24	60	16.0	13.5	18.51	96000	81000	65000	50000	3.0
Total/Avg	74	185	14.16	12.0	18.07	78500	66250	50833	38583	2.78

Results and Discussion

During the three years of demonstrations, results obtained are presented in Table-1. The results revealed that the average yield of the demonstration on pigeon pea var BDN -711 was 14.16 q/ha over the farmers practice 12.0 q/ha. The highest yield in the demonstration plot was 16.0 q/ha during 2024-25 and in farmers practice 13.5 q/ha during 2024-25. These results indicated that the higher average grain yield in demonstration plots over the years compare to local check due to drought resistance of BDN-711 variety. The average yield of pigeon pea over three years shows 18.07 per cent yield increase. Therefore, Pigeon pea variety BDN -711 found superior over local variety for this region. Similar results were recorded by SS Holmukhe (2025)^[2], and Kishor Zade *et al.* (2020)^[7].

Economic return

The inputs and outputs prices of commodities prevailed during the study of demonstration were taken for calculating net return and benefit: cost ratio. The cultivation of pigeon pea var BDN -711 gave higher average gross return Rs.78500 per ha over farmers practice Rs.66250 per ha. The average net return Rs.50833 per ha is also higher than farmer's practice Rs.38583 per ha during the three years of demonstration. The average benefit: cost ratio of pigeon pea var BDN-711 cultivation practices was 2.78. This may be due to higher yield obtained under improved pigeon pea var BDN-711 compared to farmer's practice. Similar results H.S. Garud *et al.* (2023)^[4] and Kishor Zade *et al.* (2020)^[4].

Conclusion

The Demonstration of Pigeonpea var BDN-711 produces a

significant positive result in yield enhancement in dryland area. The production potential and profitability of this pigeonpea variety BDN -711 found superior over farmers practice for long time. The use of improved, drought-tolerant, and wilt-resistant varieties like BDN-711 played a critical role in mitigating climate vulnerabilities in the region. Therefore, it is concluded that, use of Pigeonpea var BDN -711 enhancing the production & productivity ultimately gives more profitability than local variety.

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