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Impact of Frontline Demonstrations (FLDs) on Adoption of Production Technologies in Pulse Crop Bengal Gram in Kurnool District of Andhra Pradesh, India

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A B S T R A C T

The present study was carried out to evaluate the performance of improved cultivars with scientific package of practices on production, productivity and profitability of bengal gram. Frontline Demonstrations (FLDs) were conducted during 2018-19 and 2019-20 in total of 70 demonstrations with evaluation of the performance of NBeG-3, NBeG-47 and NBeG-49 varieties of bengal gram in Kodumur, Aluru and maddikera and Mecadona blocks of Kurnool district. The results revealed that average yield of chick pea under frontline demonstrations were 1940 Kgha^{-1}under irrigated conditions and 420 Kgha^{-1} under rainfed conditions. Compare to 1825 Kgha^{-1} under irrigated conditions and 370 Kgha^{-1} under rainfed conditions recorded in farmer's practice in 2018-19 and in 2019-20. It was observed that the benefit cost ratio (B: C) of recommended practice (FLDs) were 2.1 and 2.09 as compared to 1.40and 1.59 in farmer's practice. Therefore, the results clearly indicates that the use of improved varieties and package and practices with scientific intervention under frontline demonstration programme contribute to increase the productivity and profitability of pulses in Andhra Pradesh state.

Introduction

India's economy has been dominated by agriculture. However, Indian agriculture fiercely depends on monsoons to yield sufficient agricultural returns. India's major food crops rice and wheat have been heavily incentivized with MSP in addition to preferential treatment of Public Distribution System to benefit the Indian poor. Hence, Indian farmers are most motivated to grow either these crops or cash crops like cotton, sugarcane etc. Pulses have been a second choice for the farmers for cultivation.

Over a period of time, a number of improved pulses varieties and production technologies have been developed, but full potential of these varieties as well as technologies could not be exploited due to low rate of adoption

and low yields. Thus, factors limiting the productivity cannot be overlooked. Research and extension programmes need to be diverted to produce value additive pulses. It may emphasize on quality attributes, adoption and popularization of new agro technology, evolving better varieties for stress conditions and improving present yield potential. The aim of these demonstrations in general is to raise production through transfer of farm technology. The efforts were taken with planning, execution and follow up action of the pulses production technology through front line demonstrations (Gurumukhi and Mishra, 2003; Sumathi, 2012).

Front line demonstrations (FLDs) is a novel approach to provide a direct interface between researcher and farmer for the transfer of technologies developed by them and to get direct feedback from farming community. To meet the growing demand for food grains, National Development Council (NDC) in its 53rd meeting adopted a resolution to enhance the production of rice, wheat and pulses by 10, 8 and 2 million tons respectively by 2011 with an outlay of Rs. 4,882 crore under National Policy for Farmers in the Eleventh Five Year Plan. The proposed Centrally Sponsored Scheme 'National Food Security Mission (NFSM) is to operationalize the resolution of NDC and enhance the production of rice, wheat and pulses (Anonymous, 2011; Singh, *et al*., 2018). The concept of Cluster first line demonstrations was put forth under this mission. The scheme implemented in a mission mode through a farmer centric approach. The scheme aims to target the select districts by making available the improved technologies like promotion of Integrated Nutrient Management (INM), Integrated Pest Management (IPM), promotion of micronutrients/gypsum/bio-fertilizers, promotion of sprinkler irrigation, and Extension, training and mass media campaign. These demonstrations are conducted under the close supervision of scientists of Krishi Vigyan Kendras, SAUs and their Regional Research Stations.

The major pulses producing states in India are Madhya Pradesh, Maharashtra, Rajasthan, Uttar Pradesh, Andhra Pradesh and Karnataka. These six states account for 79 percent of area and 80 percent of production of pulses in India. Among these pulse crops can be grown in *Kharif* and *Rabi* seasons in India and cultivated in marginal lands under rainfed conditions. Only 15 percent of area under pulses has assured irrigation. Among these six major pulses producing states in India, the productivity per hectare vary significantly from one state to another state. In Andhra Pradesh (13 districts) the area under pulses is 14.13 lakh hectares in 2017-18 which accounted for 2.8 per cent in total food crops area, whereas the same in 2011-12 is 13.38 lakh hectares which accounted for the same 2.8 per cent of total food crops area which is very slow or stagnated over 5 years. Among pulse crops Gram commonly known as chick pea or Bengal gram is the most important pulse crop of India and widely cultivated in an area of 95.59 lakh ha area coverage with production of 9.94 Million tonnes. (Dacnet.nic.in).

Materials and Methods

Cluster frontline demonstrations were conducted by the Krishi Vigyan Kendra, Banavasi, Kurnool district of Andhra Pradesh in Rabi seasons in the farmer's fields during 2018-19 and 2019-20 with evaluation the performance of new varieties and package of practices on production and productivity of pulses demonstrated for Bengal gram were identified based on Participatory Rural Appraisal (PRA) technique. A group of co-operative farmers were identified based on their participation and feedback received during the preliminary survey and interactive meeting. A group of co-operative farmers were identified based on their participation

and feedback received during the preliminary survey and interactive meeting. All 70 demonstrations in 85ha area were conducted by the active participation of farmers with the objective to demonstrate the improved technologies of pulses production potential in different villages. A total area of 10-20 hectare in every year was fixed for the demonstration of technologies in Bengal gram along with farmers practice as control plot. Assessment of gap in adoption of recommended technology before laying out the frontline demonstrations (FLD's) through personal discussion with selected farmers. The awareness programme (preseason training) was organized for selection of farmer's and skilled development about detailed technological intervention with improved package and practice for successful cultivation.

Critical inputs for the technologies to be demonstrated (Table 1, 2 & 3) were distributed to the farmers after the training like improved high yielding variety, recommended chemicals and literature and regular visit, monitoring and pest and disease advisory services management by the KVK scientists to the demo farmers. Finally field day was conducted involving demonstration holding farmers, other farmers in the village, Scientists from University and ATARI, officials from Department of Agriculture and local extension functionaries to demonstrate the superiority of the technology for gram.

$$\text{Impact on yield} = \frac{\text{Yield of demonstration plot } (ha^{-1}) - \text{yield of control plot } (ha^{-1}) * 100}{\text{Yield of control plot } (ha^{-1})}$$

$$\text{Impact on adoption} = \frac{\text{No of adopters after demonstration} - \text{No of adopters before demonstration} * 100}{\text{No of adopters before demonstration}}$$

$$\text{Impact on horizontal spread} = \frac{\text{Area after demonstration } (ha^{-1}) - \text{Area before demonstration } (ha^{-1}) * 100}{\text{Area before demonstration } (ha^{-1})}$$

Results and Discussion

The yield analysis of gram in demonstrated field's and farmer's practice is presented in table 1.

The results revealed that average grain yield of gram under frontline demonstrations were 1940 Kg ha^{-1}under irrigated conditions and 420 Kg ha^{-1} under rainfed areas as compare to 1825 and 370Kg ha^{-1} recorded in farmer's practice and average yield increase of 106 and 113.5 per cent respectively.

These results also supported by Bairwa *et al.*, (2013) and also Hiremath and Nagaraju (2010) in pulse crops.

The observed yield gap may be attributed dissimilarity in soil fertility status, rainfall distribution, disease, insect, pest infestations and weed intensity well as the change in the locations of cluster frontline demonstration sites.

The impact on yield shows the feasibility of the variety at the farmer's field with high returns than local farmer practice (JG11). From Table 2 it could be inferred that 72.90 per cent change in adoption of land preparation and application of FYM, cent percent change in adoption of improved varieties (NbeG 3, NbeG 47 & 49), 94.11 per cent change in seed rate, 273.68 per cent change in seed treatment, 91.89 per cent change in sowing time, 38.63 per cent change in fertilizer management, weed management (10.25%), 155 per cent change in IPM practices and overall impact change in adoption of recommended practices is 121.26.

Table.1 Impact of frontline demonstrations on yield of Bengal gram

Season & year	Technology interventions	Number of farmers	Demonstrated area (ha) NBeG-49	Average yield (q ha^{-1})		Impact (% Change)
				Control plot (JG-11) (q ha^{-1})	Demonstration plot (NBeG-49) (q ha^{-1})	
2018-19, 2019-20 Irrigated	NBeG-49 + Seed treatment+ Neem Oil+ Trichoderma + Sticky traps+ Need based chemicals	25	10.00	18.25	19.4	106.3
Rainfed	NBeG-49 + Seed treatment+ NeemOil+Trichoderma+ Sticky traps+ Need based chemicals	25	10.00	3.7	4.2	113.5

Table.2 Impact of frontline demonstrations on adoption of Bengal gram production technologies

Sl. No	Technology	Number of adopters (N=70)		Change in no. of adopters	Impact (% Change)
		Before demonstration	After demonstration		
1	Land preparation and application of 10 T FYM	37 (52.11)	64 (90.14)	+27	72.90
2	Improved varieties (NBeG 49/NBeG-47/NBeG-3)	00	25 (35.21)	+25	100.00
3	Seed rate (100 kg/ha)	34(47.88)	66 (92.95)	+32	94.11
4	Seed treatment (Trichoderma)	19 (26.76)	71 (100.00)	+ 52	273.68
5	Sowing time (Oct-Nov) and spacing (30×10 cm)	37 (52.11)	71 (100.00)	+34	91.89
6	Fertilizer management NPK (18:125:15)	44 (61.97)	61 (85.91)	+17	38.63
7	Weed management(Use of Pendmethalin)	39 (54.92)	43(60.56)	+4	10.25
8	IPM Practices (Use of Pheromone traps, sticky traps and Neem oil and other need based chemicals)	20(28.16)	51 (71.83)	+ 31	155.00
9	Recommended yield	14 (19.71)	49 (69.01)	+ 35	250.00
Overall impact					**121.26**

Table.3 Impact of frontline demonstrations on horizontal spread of varieties of Bengal gram (NBeG-49, NBeG-47 & NBeG-3)

Sl. No	Crop varieties	Area (ha)		Change in area (ha)	Impact (% Change)
		Before demonstration	After demonstration		
1. A	**Bengal gram**				
	NBeG-49	0.00	43.00	+43.00	1000.00
B	**NBeG-47**	1.00	19.00	+18.00	800.00
C	**NBeG-3**	2.00	23.00	+ 21	212.00

The possible reason for the adoption of recommended technologies in gram is conducting pre-season training by KVK scientists and distribution of recommended technologies for conducting demonstration to the farmers, distribution of literature and regular visit, monitoring and pest and disease advisory services management by the KVK scientists to the demo farmers and conduct of extension activities like method demonstration and field day. From Table 3 it could be inferred that there was 1000 per cent increase in area of NBeG-49 variety followed by 800 per cent increase in horizontal spread of NbeG-47 and 212 per cent in NbeG-3 variety of gram. The possible reason for the adoption of recommended ANGRAU varieties in gram are yield potential of cultivars, regular field visits, monitoring and pest and disease advisory services by the KVK scientists to the demo farmers and conduct of extension activities like method demonstration and field day.

The FLD programme is an effective tool for increasing the production and productivity of pulse crop chick pea and changing the knowledge, attitude and skill of farmers. The per cent increment in yield of gram to the extent of 106.3 to 113.5and overall impact of 121.26 in adoption of production technologies in gram and created greater awareness and motivated the other farmers to adopt the improved package of practices of pulses.

These demonstrations also built the relationship and confidence between farmers and scientists. The beneficiary farmers of FLDs also play an important role as source of information and quality seeds for wider dissemination of the high yielding varieties of gram for other nearby farmers.

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