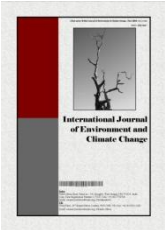

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Techno Economic Benefits through Cluster Frontline Demonstrations of Redgram in Mahbubnagar District of Telangana

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Redgram is the suitable pulse crop for the Mahbubnagar district of Telangana. The farmers are reaping poor yields and lesser net returns as they were nor aware of newly released medium duration Redgram varieties and not practicing the best management practices, keeping in view, Cluster front line demonstration in Redgram were organised in Mahbubnagar district of Telangana state using recent released variety PRG 176 (Ujwala). A total of 50 Front Line demonstrations were organized in cluster approach. Best management practices for Redgram production were demonstrated for getting higher net returns. The demonstrated variety PRG 176 having yield potential of 20 q/ha in light soils recorded average yield of 15.4 q/ha in demonstration field. The check variety recorded an average of 10.9 q/ha. The average gross cost, gross returns, net returns and benefit cost ratio recorded was Rs. 20,000/ha, 83430/ha, 63430/ha and 3.17 than the farmer practice Rs.21000/ha, Rs.67500/ha, Rs.46500 and 2.21 respectively. Cluster front line demonstration is one of the successful extension methods for the transfer of technology to reduce extension gap and adoption gap.

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Keywords: Agriculture; economic system; cluster methodology; front line demonstrations; best management practices.

1. INTRODUCTION

Legumes are important from an economic point of view in family farming systems. Legumes generally have a higher value than cereals and even a small area can provide a valuable source of income for smallholders. Legumes as well provide valuable source of protein, particularly among the poorest sections of the population who cannot afford animal protein. Pulses have health benefits, and can play a significant role in providing food security and nutrition, their nitrogen-fixing qualities can improve soil fertility and produce a smaller carbon footprint and sustainable development.

The Redgram (*Cajanus cajan* L.; Family: Fabaceae) is a perennial legume. Redgram occupies an area of 0.43 M ha production of 0.33M tonnes and productivity 778 kg/ha in Telangana (DES-2020-21). Redgram is a rainfed crop in the state with integral part of cropping system as sole crop, intercrop in cotton, maize and millets [1]. Redgram is hardy crop but sensitive to moisture stress at critical stages of flowering and pod development [2]. The farmers in the Telangana are usually adopting long duration Redgram verities which are of 160-180 days duration but it was facing the terminal stress to moisture during pod development stage leading to poor yields. It was the driving force towards adoption of medium duration varieties of Redgram. A high yielding medium duration variety PRG 176 with the whole package of best management practices were demonstrated in farmers' fields consecutively for two years during 2016 and 2017. Redgram being the suitable crop for the Mahbubnagar district, it was planned to take up cluster front line demonstrations in the adopted village of the Krishi Vigyan Kendra, Palem with objective of Promote the value and utilization of pulses throughout the food system, raise awareness about the benefits of pulses, including sustainable agriculture and nutrition and advocate for better utilization of pulses in crop rotations [3].

2. METHODOLOGY

Cluster front line demonstrations were taken up in the representative village of Mahabub nagar district *i.e* Nadivaddeman, Ippalapally and Kaloor in Telangana state covering Irrigated and rainfed red soils and black soil, with a sample of 50 farmers who adopts KVK technologies and 50 farmers who adopt local practices were selected [4]. Soils in the selected villages was red chalka. A medium duration Redgram variety PRG 176 was introduced in cluster demonstrations along with whole best management practices (Table 1).

Yield parameters of both demonstrations and check involving farmers practices were recorded. Using the yield parameters extension gap, technology gap, yield gap, technology index was calculated as procedure suggested by Samui et al. [5]. Extension gap (q/ha) = Demonstration yield – Yield under existing farmers practice. Technology gap (q/ha) = Potential Yield – Demonstration Yield. Yield gap (%) = Extension gap/ Yield under farmer practice x100. Technology Index (%) = Technology gap/ Potential Yield x100. Economics of the demos and check were recorded. Based on economics additional cost, effective gain, additional returns, incremental B: C ratio were calculated. Additional cost (Rs.) = Demonstration Cost (Rs.) - Farmers' Practice Cost (Rs.) Additional returns (Rs.) = Demonstration returns (Rs.) - Farmers' Practice returns (Rs.), Effective gain (Rs.) = Additional Returns (Rs.)-Additional cost (Rs.), Incremental B:C ratio = Additional Returns/ Additional Cost.

3. RESULTS AND DISCUSSION

Yield results were reported in Table 2. The demonstrated variety PRG 176 (Ujwala) having yield potential of 20 q/ha, in light soils recorded average yield of 15 .4 q/ha in demonstration field. The check variety recorded an average of 10.9 q/ha. The superior performance of demonstration over check was very much visible in crop performance. The duration of PRG 176 was 135 days which also facilitated to overcome terminal stress in the Mahbubnagar district of Telangana. The superiority of demonstrations was evident than check. Based on yield details extension gap, technology gap, yield gap, technology index was calculated and also presented.

Technology gap: Technology gap refers to the yield difference between potential of the variety and yield in demonstration. In cluster FLDs the technology gap recorded was 4.6q/ha. The findings are in line with that reported by Vijaya lakshmi et al. [3]. The potential yield of the variety couldn't be realised in the technology adopted farmers also indicating the difference in

the micro climate of the crop. It can observed that though potential yield of variety was higher, actual field performance may vary due to variety interaction with environment [6].

Extension gap: Extension gap refers to the yield difference between demonstration and farmer practice. It is observed as 4.5q/ha in this case study. It can be addressed by dissemination of best management technical know-how through extension means like timely sharing the information via electronic mode, interventions of extensions personnel's and delivering crop advisories. The findings are in line with that reported by Kulkarni et al. [7] and Dhanavandan [8].

Yield gap: The yield gap in the study is recorded as 41.2%, which arises from ratio between extension gap and farmer yield expressed in percentage.

Technology index: Technology index is the ratio between technology gap and potential yield expressed as percentage. It is 23% in this study. The findings are in line with that reported by Balai et al. [9], Raj et al. [10].

Economics: The economics of the demonstrations was presented in Table 4 and it indicated that in the demonstration plot the average gross cost, gross returns, net returns and benefit cost ratio recorded was Rs. 20,000/ha, 83430/ha, 63430/ha and 3.17 over the farmer practice Rs.21000/ha, Rs.67500/ha, Rs.46500 and 2.21 respectively. Net returns in the demonstration increased by the 36% as result of increase yield in the demonstration with improved management practices followed.

Farmer perception: Feedback from the demonstrated farmers were recorded on the major technological interventions of the demonstration like introduction of the new variety (PRG 176), seed treatment with rhizobium and Trichoderma, spraying of pre emergence herbicide to control weeds in the initial stage and spraying of 19-19-19 and IPM practices for pod borer management. Farmers expressed those technologies were acceptable, affordable and suitable to their farming system and preferred to follow the technologies further in future redgram cultivation to reap the higher yields. Farmers revealed that advantage of the PRG 176 variety i.e escape terminal moistures stress due to reduced crop duration, less flower drop and high yield.

Socio economic impact was also recorded from farmers. On average yield obtained/ha was 15q/ha farmers sold the 85% produce keeping the 15% pulse production for the household consumption and for sowing next season crop. The money obtained used for clearing existing loans to the farmer. Employment generated per house hold was recorded as 50 days. Even though the new variety was demonstrated, as per farmer perception the seed of new variety was not distributed to other farmers.

Table 1. Technologies demonstrated in cluster approach

Particulars	Technologies demonstrated	Farmer's practice
Variety	PRG 176	Seed from local markets
Seed treatment	Rhizobium 500 gm and trichoderma 30gm	No treatment
Seed rate and spacing	3kg/ac, 90x20,120x20	1 kg, 180 x 30
Manures & Fertilizer applied for present crop	20 Kg nitrogen/ha-50 kg phosphorus/ha	No fertilizers applied
Weed Control	Pre-emergence herbicide Pendimethalin @ 1.0 kg a.i/ha and harrowing at 25-40 DAS	Harrowing at 25-40 DAS
Irrigation	At critical stages	Rainfed
Plant protection	IPM practices for pod borer management	Chloropyriphos 2.5ml/l
Harvesting	Mechanical harvesting	Manual Harvesting

Table 2. Redgram yield (q/ha) under cluster frontline demonstrations in Mahbubnagar

	No. of demonstrations	Area (ha)	Yield Q/ha				% Increase
			Highest	Lowest	Average	Farmer practice	
Irrigated red soils							
90x20	24	9.6	26.25	15.25	19.2	12.5	34.9
120x20	4	1.6	15.75	12.0	13.5	11.75	12.9
Rainfed red soils							
90x20	10	4	21.25	7.75	12.0	7.75	35.4
120x20	8	3.2	11.25	5.75	7.25	5.0	31.0
Irrigated black soils							
180x20	4	1.6	29.0	22.5	25.25	17.75	29.7
	Average				**15.4**	**10.9**	**28.8**

Table 3. Yield, extension, technology gap under cluster frontline demonstrations in Mahabubnagar

Particulars	
Demonstrated Variety yield potential	20 q/ha
average yield recorded in demonstration	15.4 q/ha
average yield recorded in farmer practice	10.9 q/ha
Yield gap	41.2%
Extension gap	4.5 q/ha
Technology gap	4.6 q/ha
Technology index	23

Table 4. Economics of cluster frontline demonstrations in of Redgram Mahabubnagar

Variety demonstrated	Farmer's existing plot				Demonstration plot			
	Cost of cultivation (Rs./ha)	Gross return (Rs./ha)	Net return (Rs./ha)	B:C ratio	Cost of cultivation (Rs./ha)	Gross return (Rs./ha)	Net return (Rs./ha)	B:C ratio
Pinky – Vs- PRG-176	21000	67500	46500	2.21	20000	83430	63430	3.17

Chart 1. Demonstration and farmer practice

Details	No. of demonstrations	Area (ha)	Demonstration Rs/ha				Farmer practice Rs/ha			
			CC	GR	NR	B:C	CC	GR	NR	B:C
Irrigated red soils										
90x20	24	9.6	27500	96960	69460	3.52	28600	63125	34525	2.30
120x20	4	1.6	27250	68175	40925	2.50	28750	59337	30587	2.18
Rainfed red soils										
90x20	10	4	26800	60600	33800	2.26	27900	39137	11237	1.46
120x20	8	3.2	26550	36613	10063	1.37	27650	25250	-2400	0.95
Irrigated black soils										
180x20	4	1.6	27200	127513	100313	4.68	28400	89637	61237	3.30

Table 5. Farmer perception

Technologies demonstrated (with name)	Farmer's perception parameters				
	Suitability to their farming system	Preference	Affordability	Any negative effect	Is technology acceptable to all in the group/village
PRG176	Suitable	Preferred	Affordable	Nil	Yes
Seed treatment	Suitable	Preferred	Affordable	Nil	Yes
PE herbicide	Suitable	Preferred	Affordable	Nil	Yes
19-19-19	Suitable	Preferred	Affordable	Nil	Yes
Maruca and helicoverpa control	Suitable	Preferred	Affordable	Nil	Yes

Table 6. Socio economic parameters

Crop and variety demonstrated	Total produce obtained (q/ha)	Produce sold (kg/household)	Selling rate (Rs/kg)	Produce used for own sowing and consumption	Produce distributed to other farmers	Purpose for which income gained was utilised	Employment generated (Man days/ houlse hold)
Redgram PRG 176	15	12.8	5400	220	Nil	Loans	50 days

4. CONCLUSION

To create awareness on good agricultural practices for the Redgram crop to reap higher yields and higher economic returns, cluster front line demonstrations were conducted as they are one of the successful extension methods for the transfer of technology to reduce extension gap and adoption gap. Cluster frontline demonstrations created more awareness not only among participating farmers but also neighbouring farmers. The fields days conducted on the best practicing farmer field stood as the classical example for the seeing and believing in technology. The demonstration farmers shared their experience with other farmers about the timely suggestions, supervision from scientists resulted in getting higher yields and profits. The economic benefits of technology demonstrated to farmers' fields made the farmers to stood as the torch bearers for adoption in the whole village. Thus, cluster front line demonstration is one of the successful extension methods for the transfer of technology to reduce extension gap and adoption gap.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Singh RP. Status paper on pulses. Published from the Directorate of Pulse Development, Government of India, Ministry of Agriculture (Department of Agriculture and Cooperation), Bhopal, India. 2013;226.
2. Ahlawat IPS, Gangaiah B, Singh IP. Pigeon pea (*Cajanus cajan*) research in India: an over view. Indian Journal of Agricultural Science. 2005;75(6):309-320.
3. Vijaya Lakshmi D, Vijay Kumar P, Padma Veni C. Impact of cluster frontline demonstrations to transfer of technologies in pulse production under NFSM. Bulletin of Envir., Pharm. and Life Sci. 2017;6 (1):418-421.
4. Rao NV, Jain PK, Kumar NK, Reddy MJ. Adoption of maize (*Zea mays* L.) Production technologies in Karimnagar district of Telangana. J Krishi Vigyan. 2017;5(2):1-4.
5. Samui SK, Maitra S, Roy DK, Mondal AK, Saha D. Evaluation on front line demonstration on groundnut (*Arachis Hypoggaea* L.) in Sundarbans. J. of Indian Society Coastal Agril. Res. 2000;18 (2):180-183.
6. Rao NV, Ratnakar R, Jain PK. Impact of farmer field schools in KVK adopted villages on level of knowledge and extent of adoption of improved practices of paddy. The Journal of Res Angrau, XL. 2012;(1):35-41.
7. Kulkarni Shyamrao, Biradar Renuka, Rathod Arvind, Sharanappa Prakash. Impact of frontline demonstration on adoption of improved practices of sunflower (*Helinathus annuuss* L.). Intl. J. of Curr. Microbio and Applied Sci. 2018; 7(9):2511-2515. DOI:https://doi.org/10.20546/ijcmas.2018.709.311
8. Dhanavandan S. Application of garret ranking technique: Practical approach. International Journal of Library and Info. Studies. 2016;6(3):135-140.
9. Balai CM, Jalwania R, Verma LN, Bairwa RK, Regar PC. Economic impact of front line demonstrations on vegetables in tribal belt of Rajasthan. Current Agricultural Research Journal, 2013;1(2): 69-77.
10. Raj AD, Yadav V, Rathod JH. Impact of front-line demonstrations (FLD) on the yield of pulses. Intl. J. of Scie. and Res. Publi. 2013;3(9):2250-3153.

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