Original Research Article

Increasing Greengram productivity with ICM practices under rice fallow conditions through CFLD in Srikakulam district of Andhra Pradesh, India

ABSTRACT

The Cluster front line demonstration (CFLD) on Greengram was conducted in 50 locations during two consecutive years 2019-20 and 2020-21 in 3 villages namely K.P.Valasa, Kongaram and Ambavilli of Srikakulam district, Andhra Pradesh, during Rabi season 2019-20 and 2020- 21 under rice fallow conditions to demonstrate yield and economic benefit of improved technology in crop management and taking up of complete package of practices for greengram. The findings of the study discovered that enhanced technology (ICM) recorded the mean yield of 494 kg/ha which was 30.8 per cent increased than obtained in farmers' practice (377.5kg/ha). superior mean net income of Rs.19390/ha with a Benefit : Cost ratio of 2.2 was obtained with ICM technologies in contrast to farmers' practices (Rs. 12758/ha). Further, it was also revealed that the taking up of enhanced technologies notably augmented the yield as well as yield attributing characters of greengram crop and also the net returns of the farmers. Hence, there is an urgent requirement to spread the enhanced technologies among the farmers with efficient extension methods like training and demonstrations. The farmers' be supposed to be encouraged to take on the recommended package of practices for realizing higher net returns.

Keywords: CFLD**,** *Cluster Frontline demonstration and Greengram.*

Introduction

India's economy has been subjugated by agriculture. However, Indian agriculture is relentlessly depends on monsoons to yield enough agricultural returns. In a country like India, legumes are the cheapest and determined Source of dietary amino acids, where protein demand of vegan inhabitants is satisfied through pulses, so it is also well thought-out as "A poor man's meat. Pulses take up a exclusive position in the world of agriculture by asset of its high protein content which is more or less double than that of cereals. They have a special role in congregating the protein requirement of largely vegetarian people. Along with the protein, pulses are also containing good quality lysine, tryptophan, ascorbic acid and riboflavin.

"Over a era of time, a number of enhanced pulses varieties and production technologies have been developed, but complete potential of these varieties as well as technologies could not be oppressed due to low rate of acceptance and low yields. Thus, factors preventive the productivity cannot be ignored. Research and extension programmes need to be sidetracked to create value additive pulses. It may accentuate on quality attributes, adoption and popularization

of novel agro expertise, developing improved varieties for stress conditions and civilizing present yield potential. The endeavor of these demonstrations in common is to elevate production through reassign of farm technology. The hard work were taken with planning, execution and follow up action of the pulses production technology through front line demonstrations" (Samant, 2014). "Cluster front line demonstrations (CFLDs) is a narrative approach to offer a direct boundary between researcher and farmer for the relocate of technologies developed by them and to obtain direct feedback from agricultural community. 'National Food Security Mission (NFSM) is to operationalize the production of rice, wheat and pulses. The idea of Cluster first line demonstrations was put forward beneath this mission. The scheme implemented in a mission mode throughout a farmer centric approach. The scheme aims to target the selected districts by congress available the improved technologies like encouragement of Integrated Nutrient Management (INM) Integrated Pest Management (IPM), Integrated Crop Management (ICM), and Extension, training and mass media campaign. These demonstrations are conducted under the close administration of scientists of Krishi Vigyan Kendras" (Mitnala, et al. 2018).

In Andhra Pradesh (13 districts) the area under greengram is 1.03 lakh hectares in 2019-20 which accounted for 0.79lakh tonnes production with a productivity of 771, whereas the same in 2020-21 is 0.94 lakh hectares 0.81 lakh tonnes production with a productivity of 867. There is decline in area of greengram amongst total food crops area which is very low or stagnated over 5 years. Hence there is need for spreading out of area and production in pulses in Andhra Pradesh (Agriculture Statistics 2019-20 & 2020-21).

In Srikakulam district the area under greengram is 19,901 hectares in 2019-20 which accounted for 14000 M tonnes production with a productivity of 529 kg ha^{-1} , whereas the same in 2020-21 is 24,901 hectares 20837 M tonnes production with a productivity of 610 kg ha^{-1}. There is increase in area of greengram crop in rice fallows in the district. "Cluster Front Line Demonstrations (CFLDs) under National Food Security Mission (NFSM) singing key role in preamble of improved varieties and production technologies in pulses" reported by Venkata Subbaiah P and Jyothi V (2020).

Materials and Methods

Cluster frontline demonstrations were conducted by the Krishi Vigyan Kendra, Amadalavalasa, Srikakulam district of Andhra pradesh in Rabi seasons in the farmer's fields during 2019-20 and 2020-21 with assessment of the performance of new varieties and package of practices (ICM) on production and productivity of pulses demonstrated for Greengram. A group of supportive farmers were recognized on the basis of rice fallow pulse involved farmers with the intention to demonstrate the improved technologies of pulses production potential in different villages. A total area of 20 hectare in every year was fixed for the demonstration of technologies in Green gram along with farmers practice as control plot. Assessment of the gap in acceptance of recommended technology before laying out the cluster frontline demonstrations (CFLD's) through personal discussion with selected farmer's. The awareness programme (pre-season training) was structured for selection of farmers and skilled development about complete technological intervention with improved package and practice for successful farming. Critical inputs for the technologies to be demonstrated (Table 1, 2 and 3) were distributed to the farmers after the training of improved high yielding variety, recommended chemicals and literature and

regular field visit in each crop growth stage, monitoring and pest and disease advisory services management by the KVK scientist to the demo farmers. "At the end field day was conducted concerning 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 each crop. Crop yield was recorded from the demonstration and control plots for the crops at the time of harvest" (Mitnala, et al. 2018).

"The most practicable way by which this could be achieved is by demonstrating the recommended enhanced technology on the farmer's fields throughout front line demonstrations with the objectives to work out the input cost and economic returns between front line demonstration and farmers methods, to recognize the yield gaps between farmer's practices and front line demonstrations. The necessary information were recorded from the farmer's field and analyzed to comparative performance of cluster frontline demonstrations (CFLD's) and farmer's practice" (Mitnala, et al. 2018).

The following formula were used to calculate the parameters.

Extension gap = Demonstration yield -Farmers' practice yield
Technology gap = Potential yield- Demonstration yield
Technology index = $\frac{\text{Potential yield - Demonstration yield}}{\text{Potential yield}} \times 100$
Net returns = Gross returns - Cost of cultivation
B: C ratio = Net Returns/ Cost of cultivation

Results and Discussion

Gowth and yield attributes of Greengram

The growth and yield arriving parameters like plant height, number of branches per plant, number of pods per plant, number of seeds per pod and test weight were higher in greengram under demonstrated field than farmer's practice is presented in table 3.

The results discovered that the mean plant height, number of branches per plant, number of pods per plant, number of seeds per pod and test weight for two consecutive years of 2019-20 and 2020-21 for Greengram under cluster frontline demonstrations is 47.9cm, 4.5, 13.7, 10.8 and 3.7as compare to 43.7cm, 3.6, 10.9, 10.1 and 3.6 recorded in farmer's practice respectively. These results also supported by Samant*et al.*, (2014) and also Lalit (2014) in greengram crop.

Table 1: Comparison between demonstration under CFLD and farmers practices of Greengram

Particulars Farming situation	Greengram	
	Demonstration	**Farmers Practice**
Variety	IPM-2-14	Local
Farming type	Rainfed	Rainfed
Method of sowing	Broadcasting	Broadcasting
Seed rate	12kg/ac	12 kg/ac
Seed treatment	Imidacloprid	-
Fertilizer	13-0-45	-
Herbicide	Imazithpyr	-

Plant protection	Acephate	-
Whole package	Seed 12kg, Imidacloprid @ 5ml/kg seed Imazithpyr @ 250ml/ac 13-0-45 and Acephate	Farmers are cultivating the Greengram crop without practicing any improved technology/practices.

Table 2: Details of Need Based Input Given for Greengram under CFLD

Year	No of demonstrations	Variety	Technology demonstrated	Need based inputs provided
2019-20	25	IPM-2-14	Integrated Crop Management	Seed 12kg, Imidacloprid, Imazithpyr, 13-0-45 and Acephate
2020-21	50	IPM-2-14	Integrated Crop Management	Seed 12kg, Imidacloprid, Imazithpyr, 13-0-45 and Acephate

Table 3: Yield attributes of Greengram under CFLD

Parameter	**2019-20**		**2020-21**		**Mean**	
	Demonstration	**Farmers Practice**	**Demonstration**	**Farmers Practice**	**Demonstration**	**Farmers Practice**
Plant height (cm)	46.48	43.20	49.24	44.15	47.9	43.7
No of branches per plant	4.40	3.21	4.61	3.95	4.5	3.6
No of pod per plant	13.20	10.53	14.10	11.24	13.7	10.9
No of seeds per pod	10.4	9.6	11.2	10.5	10.8	10.1
Test weight (g)	3.65	3.47	3.74	3.68	3.7	3.6

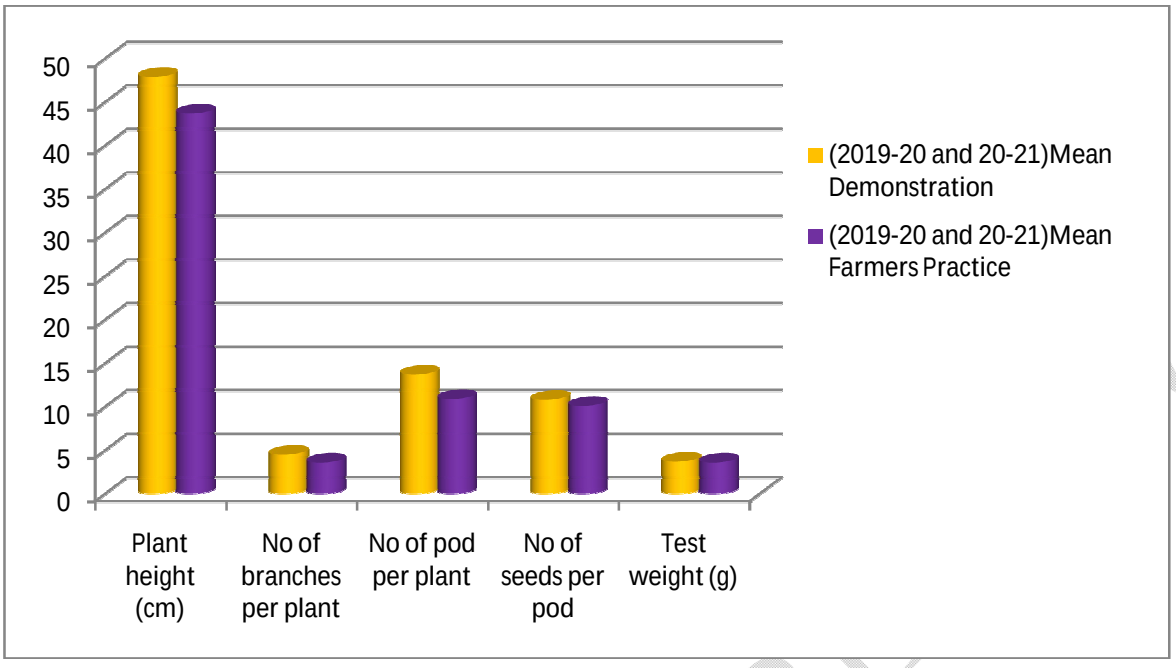

Fig-1,Yield attributes of Greengram under CFLD during 2019-20 and 20-21

Table 4: Technological gap analysis of cluster frontline demonstrations on Greengram under CFLD

Year &Season	**No. of locations**	**Potential yield (kg/ha)**	**CFLD yield (kg/ha)**	**FP Yield (kg/ha)**	**Percent increase**	**EG (kg/ha)**	**TG (kg/ha)**	**TI (kg/ha)**
2019-20 Rabi	50	650	538	430	25.1	108	112	17.2
2020-21 Rabi	50	650	450	325	38.5	125	200	30.7
Average	50	650	494	377	31.0	117	156	24.0

EG= Extension gap; TG= Technology gap; TI= Technology index; FP= Farmers practices

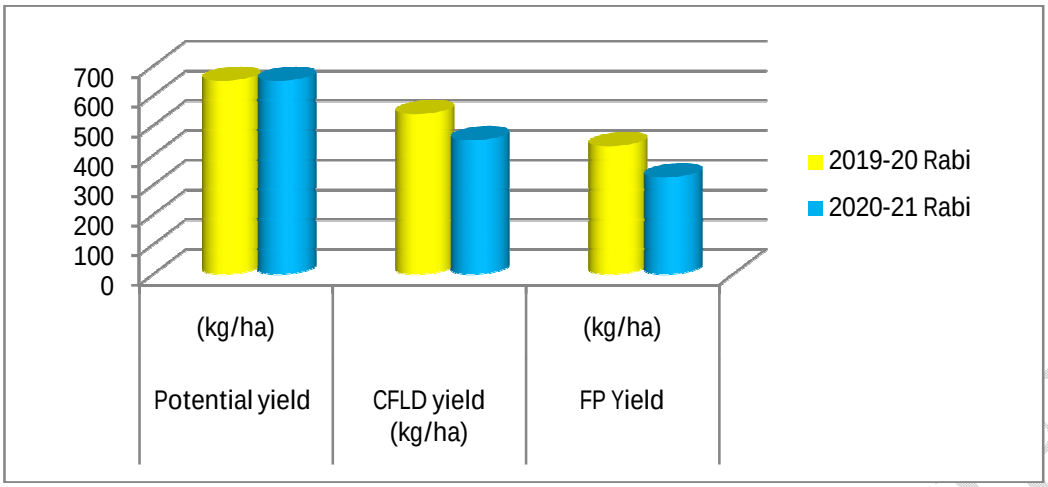

Fig-2 : Yield and economics of Greengram under CFLD during 2019-20 and 20-21

Table 5: Yield and economics of Greengram under CFLD

Parameter	2019-20		2020-21		Mean	
	Demonstration	**Farmers Practice**	**Demonstration**	**Farmers Practice**	**Demonstration**	**Farmers Practice**
Yield (kg/ha)	538	430	450	325	494.0	377.5
Cost of cultivation	14900	11500	15900	12500	15400	12000
Net Return	22298	14630	16482	10887	19390	12758
B:C ratio	2.40	1.92	2.04	1.87	2.2	1.9

The yield attributing characters like plant hight, number of branches, number of pods per plant, number of seeds per pod and test weight was high in ICM practiced demonstration field than the farmer field (Table 3 and Figure 1) .The grain yield and gap analysis of greengram in demonstrated field and farmer's practice is presented in Table 5 and Figure 2. The results exposed that the grain yield for two successive years of Greengram under cluster frontline demonstrations were 538 and 450 kg ha^{-1} as evaluate to 430 and 395 kg ha^{-1} recorded in farmer's practice and average yield increase of 28.1 and 38.5 per cent, in that order. These results also supported by Jayalakshmi *et al.*, (2018) and also VenkataRao (2020), Vinal,G and Prabhatsinh (2020), Ranjitha,B and Sharma,D.R .,(2020) and Hansram *et al.*, (2021) in pulse crop. The extension gap 108 and 125 kg ha^{-1} technology gap 112 and 200 kg ha^{-1} and technology index 17.2 and 30.7 was recorded.

Economic recital of Greengram under cluster frontline demonstration was discussed in table 5. The economics showed that the Greengram recorded higher net return from recommended practice (CFLD's) were Rs.22,298 ha^{-1} in 2019- 20 and Rs.16,498 ha^{-1} in 2020-21 as compared to Rs.14,630 ha^{-1} and Rs.10,887 ha^{-1} in farmer's practice respectively. It was economically observed that supplementary returns were Rs.7668 and Rs.5595 ha^{-1} through suggested practice in both the years. The benefit cost ratio also recorded higher in recommended practice with 2.40 and 2.04 as compared to 1.92 and 1.87 in farmer's practice in both the years. These results in agreement with the conclusions of Gaur V and Jadav P (2020).and Siddeswari*et al.,* (2017).

CONCLUSION

It is accomplished from the above findings of CFLDs on Greengram var. IPM-2-14, that the knowledge gap can be condensed to a substantial point by adopting scientific methods of greengram cultivation thus leading to augment productivity of greengram in the Srikakulam district. It was observed that potential yield can be achieved by imparting technical knowledge to the farmers, providing the quality need based inputs and their appropriate exploitation. Horizontal spreading out of enhanced technologies may be achieved by execution of an assortment of extension activities like training programmes, field days, exposure visits etc. organized in CFLD programmes in the farmer's fields. Furthermore, Krishi Vigyan Kendra in the district played the pilot role in providing appropriate scientific support to the farmers through diverse extension activities to condense the extension gap for superior pulse production in the district**.**

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