Original Research Article

Increasing Greengram (*Vigna radiata* L. Wilczek) productivity with ICM practices under rainfed conditions through CFLD in Srikakulam district of Andhra Pradesh

ABSTRACT

The CFLD on Green-gram 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 rainfed conditions to demonstrate production potential and economic benefit of improved production technologies comprising, nutrient management and adoption of complete package of practices for greengram. The findings of the study revealed that improved technology (ICM) recorded a mean yield of 494 kg/ha which was 30.8 per cent higher than obtained under farmers' practice (377.5kg/ha). Higher mean netin come of Rs.19390/ha with a Benefit:Cost ratio of 2.2 was obtained with improved technologies in comparison to farmers' practices (Rs. 12758/ha). Further, it was found that the adoption of improved technologies significantly increased the yield as well as yield attributing characters of green-gram crop and also the net returns to the farmers. Hence, there is a need to disseminate the improved technologies among the farmers with effective extension methods like training and demonstrations. The farmers' should be encouraged to adopt the recommended package of practices for realizing higher returns.

Keywords: *Cluster Frontline demonstration and Greengram.*

Introduction

India's economy has been dominated by agriculture. However, Indian agriculture is severely depends on monsoons to yield sufficient agricultural returns. In a country like India, pulses are the cheapest and concentrated Source of dietary amino acids, where protein demand of vegetarian population is fulfilled through legumes~~pulses~~, so it is also considered as "A poor man's meat". Legumes occupy a unique position in the world of agriculture by virtue of its high protein content which is almost double than that of cereals. They have a special role in meeting the protein requirement of predominantly vegetarian population. In addition to protein, pulses are also contain good quality lysine, tryptophan, ascorbic acid and riboflavin.

Over a period of time, a number of improved legumes ~~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 legumes ~~pulses~~. It may emphasize on quality attributes, adoption and popularization of new agro technology, evolving better varieties for stress conditions and

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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 legumes production technology through front line demonstrations (Samant, 2014). Cluster front line demonstrations (CFLDs) 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. 'National Food Security Mission (NFSM) is to operationalize the production of rice, wheat and legumes ~~pulses~~. 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), Integrated Crop Management (ICM), and Extension, training and mass media campaign. These demonstrations are conducted under the close supervision of scientists of KrishiVigyan Kendras.

In Andhra Pradesh (13 districts) the area under green-gram is 1.03 lakh hectares in 2019-20 which accounted for 0.79 lakh 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 reduction in area of greengram among total food crops area which is very low or stagnated over 5 years. Hence there is need for expansion of area and production in pulses in Andhra Pradesh (Agriculture Statistics 2019-20 & 2020-21).

In Srikakulam district the area under green-gram 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) playing key role in introduction of improved varieties and production technologies in pulses reported by Venkata Subbaiah P and Jyothi V (2020).

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Materials and Methods

Cluster frontline demonstrations were conducted by the Krishi Vigyan Kendra, Amadalavalasa, Srikakulam district of Andhrapradesh in Rabi seasons in the farmer's fields during 2019-20 and 2020-21 with evaluation of the performance of new varieties and package of practices (ICM) on production and productivity of pulses demonstrated for Green-gram. A group of cooperative farmers were identified with the objective 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 greengram along with farmers practice as control plot. Assessment of gap in adoption 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 organized for selection of farmers 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 and 3) were distributed to the farmers after the training of improved high yielding variety, recommended chemicals and literature and regular visit, monitoring and pest and disease advisory services management by the KVK scientist to the demo farmers.

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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 each crop. Crop yield was recorded from the demonstration and control plots for the crops at the time of harvest.

The most feasible way by which this could be achieved is by demonstrating the recommended improved technology on the farmer's fields through front line demonstrations with the objectives to work out the input cost and monetary returns between front line demonstration and farmers methods, to identify the yield gaps between farmer's practices and front line demonstrations. The basic information were recorded from the farmer's field and analyzed to comparative performance of cluster frontline demonstrations (CFLD's) and farmer's practice. 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 attributing 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 revealed 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 (*Vigna radiata* L. Wilczek)

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 adoption of any improved technology/practices.

Table 2: Details of Need Based Input Given for Greengram (*Vigna radiata* L. Wilczek) 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 (*Vigna radiata* L. Wilczek) 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

Table 4: Technological gap analysis of cluster frontline demonstrations on Greengram (*Vigna radiata* L. Wilczek) under CFLD

Yield &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	25	650	538	430	25.1	108	112	17.2

Rabi								
2019-20 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

Table 5: Yield and economics of Greengram (*Vigna radiata* L. Wilczek) 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 grain yield and gap analysis of greengram in demonstrated field and farmer's practice is presented in table 5. The results revealed that the grain yield for two consecutive years of Greengram under cluster frontline demonstrations were 538 and 450 kg ha^{-1} as compare to 430 and 395 kg ha^{-1} recorded in farmer's practice and average yield increase of 28.1 and 38.5 per cent, respectively. These results also supported by Jayalakshmi *et al.*, (2018) and also Venkata Rao (2020) 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 performance of Greengram under cluster frontline demonstration was explained in table 5. The economics revealed 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 additional returns were Rs.7668 and Rs.5595 ha^{-1} through recommended 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 accordance with the findings Gaur V and Jadav P (2020) and Siddeswari*et al.*, (2017).

CONCLUSION

It is concluded from the above findings of CFLDs on Greengram (*Vigna radiata* L. Wilczek) var. IPM-2-14, that the technology gap can be reduced to a considerable extent by adopting scientific methods of greengram cultivation thus leading to increase productivity of greengram in the district. It was observed that potential yield can be achieved by imparting scientific knowledge to the farmers, providing the quality need based inputs and their proper utilization. Horizontal expansion of improved technologies may be achieved by implementation

of various extension activities like training programmes, field days, exposure visits etc. organized in CFLD programmes in the farmer's fields. Moreover, Krishi Vigyan Kendra in the district played the lead role in providing proper technical support to the farmers through different extension activities to reduce the extension gap for better pulse production in the district**.**

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