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Transfer of ICM technologies in enhancement of Redgram production through frontline demonstrations in Guntur district of Andhra Pradesh

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Abstract
The cluster frontline demonstration (CFLDs) on Redgram was conducted by Krishi Vigyan Kendra, lam, Guntur in two villages namely Narakullapadu and Vengalaipalem of Guntur district during the *kharif* season of 2016-17. The results revealed that in demonstrated plot T2 (improved seed of LRG-41 + seed treatment (*Trichoderma viridi* 5 g/kg+ *Rhizobium* sp. 25 g/kg) + Soil application of (PSB 500 g/acre) + pre emergence herbicide application (pendimethalin 1 L/acre) + plant protection (Pheromone trap 4 no./acre + *Maruca* lures 8 no)+ micronutrients (Multi-K 2kg/ acre) recorded average highest yield 14.65 q/ha whereas 12.85 q/ha in farmers practice. 2.6:1 and 1.7:1 Benefit cost ratio recorded in demonstrated and farmers practice plots. It can be concluded that the pigeonpea production could be enhanced by encouraging the farmers through adoption of integrated crop management practices coupled with improved variety which were followed in the CFLDs.

Keywords: CFLDs, pigeonpea, ICM, yield

Introduction
Pigeonpea (*Cajanus cajan* (L.) Millspaugh) is a deeprooted and drought-tolerant [1] leguminous food crop used in several countries particularly in India as a source of dietary protein. India accounts for about 80% of the total world pigeon pea production. It is one of the principal dry land crops in Andhra Pradesh with a very low productivity (601 kg ha-1). The production is constrained by the use of less productive land; water logging or dry spells during critical stages of crop growth, spotted pod borer, Podfly [2] and wilt problems, and lack of drought-resistant, high-yielding genotypes, and appropriate agronomic management. Pigeon pea is an important pulse crop of 170 days duration mainly sown in kharif and rabi and harvested in December. It is best suited to areas having low to moderate rainfall. Indian government imports large quantity of pulses to fulfill domestic requirement of pulses. In this regard, to sustain this production and consumption system, the Department of Agriculture, Cooperation and Farmers Welfare had sanctioned the project "Cluster Frontline Demonstrations on kharif Pulses 2016-17'' to ICAR-ATARI, Hyderabad through National Food Security Mission. This project was implemented by Krishi Vigyan Kendra, Lam, Guntur of Zone- X with main objective to boost the production and productivity of pulses through CFLDs with latest and specific technologies**.** 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. These pulses 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 2016-17 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 [3, 4].

Materials and Methods
The present investigation of CFLDs was conducted during *kharif* 2016-17 by the KVK, Guntur of Andhra Pradesh. Two villages namely Vengalaipalem of Amaravathi mandal and

Narakullapadu of Guntur rural were selected for this purpose. Total 100 farmers were selected and trained to follow the integrated crop management practices for pigeonpea cultivation and critical inputs were provided to the farmers (Table 1). The farmers followed the integrated crop management practices like soil testing, seed treatment with biofertilizer, *Trichoderma viride*, fertilizer application, weed and water management, integrated pest management practices *etc*. In case of cultivation of farmer practice plot, the traditional practices were followed in cultivation of NRI varieties, by the farmers. The yield data were collected from both CFLD and farmers practice plots and compiled results has been given in (Table 2 & 3).

Table 1: Differences between farmers' practices and technological intervention for Redgram crop

S. No	Particulars	Farmers practice	Demonstrated technology
1	Crop variety	NRI seeds	LRG 41
2	Seed treatment	Not practiced	2.5 g Captan/kg of seed
3	*Trichoderma viride*	Not practiced	Applied developed *Trichoderma viride* (80 kg well decomposed FYM + 20 kg Neem cake+ 2 kg Trichoderma viride incubated for 25-30 days in shade)
4	Time and method of sowing	July 10 th	26 th june
5	Weed management	Not practiced	Pendimethalin 2.5 L/ha
6	Biofertilizers	Not used	*Rhizobium* and *Phosphate solubulizing Bacteria*
7	Fartilizer dose	40 N, 100 DAP kg/ha	20 N, 50 P_2O_5, kg/ha
8	Plant protection measures	Not practiced	Chlorpyriphos 2.5 ml/L for *Maruca*
9	Use of pheramone traps	Not practiced	*Maruca* traps 10/ha
10	Foliar spray	Not practiced	Multi K, and Neemoil
11	Harvesting	Manual	Mechanical

Table 2: Details of critical inputs provided to farmers on CFLDs of pigeon pea

Cluster	Number of demonstrations	Variety	Technology Demonstrated	Critical inputs
Narakullapadu Vengalaipalem	50 50	LRG-41 LRG -41	Improved variety, ICM	Improved Seed, Soil testing, *Rhizobium* spp., PSB, *Trichoderma* viride, pheromone traps, Micro nutrients)

Table 3: Details of Economics and benefic cost ratio of cluster frontline demonstration on Redgram

Treatment	Yield (q/ha)	Cost of cultivation (Rs./ha)	Gross Returns (Rs./ha)	Net Returns (Rs./ha)	B:C ratio
T1: Farmer practice	12.85	24000	64892	40862	1.7:1
T2: Improved Seed Digvijay + seed treatment (*Trichoderma viridi* 5 g/kg + Rhizobium sp. 25 g/kg + PSB 25 g/kg) + plant protection (Pheromone trap 3 no./acre)	14.65	20500	75835	54335	2.6:1

Results and Discussion

Cluster frontline demonstrations on Redgram were conducted at vengalaya palem, narakulla padu of Guntur district by using variety LRG-41 in an area of 20 ha at 100 farmer's field. The critical inputs like Seed (LRG-41) 3 kg, Biofertilizers *Rhizobium spp.* @ 500 g, PSB @500 ml, biopesticide like *Trichoderma* viride @ 2 kg, pheromone traps 4 no+ *Maruca* lures 8 no, pre emergence herbicide application pendimethalin 1 L/acre, micronutrients Multi-K 2kg/ acre provided to farmers. Demonstrated plot recorded average highest (14.65 q/ha) yield compared to farmers practice (12.85 q/ha). 2.6:1 and 1.7:1 Benefit cost ratio recorded in demonstrated and farmers practice plots respectively.

Supplied Redgram variety LRG-41 it is medium duration variety having bold seeded nature with recouping ability, highly suitable for both kharif and rabi. *T. viride* colonizes the seed surface and kills not only the pathogens present on the cuticle, but also provides protection against soil-borne pathogens Rhizoctonia *solani, Macrophomina phaseolina and Fusarium* species. It developed plant resistance by releasing certain antibiotics. Timely application of recommended preemergence herbicide reduced the weed population. Yadav *et al*., 2017 observed that Soil inoculation of bio-fertilizers (PSB, VAM and PSB + VAM) significantly enhanced the number of pods/plant, number of grains/ pod, test weight as well as grain and straw yield of urdbean. These results are in close conformity with the findings of [5] in greengram and [6] and [7] in urdbean [8] reported that the yield attributes and seed yield of pigeonpea varieties were significantly influenced by phosphorus and zinc application with a maximum benefit-cost ratio of 4.12.

Pheramone traps helped to monitor the incidence of spotted pod borer, there by farmers could manage this pest in time before it reached to Economic injury level. In present investigation improvement in yield (14.65 q/ha) of demonstrated plot might be due to the application of seed treatment, use of fertilizers, timely weed and water management and integrated pest management practices. Where as in case of farmers practice yields were affected by various environmental and socio-economic factors like non-availability of quality seed, lack of awareness on latest technology, causes severe yield loss, delayed sowing, lack of improved seed-cum-fertilizer drill, use of recommended dosage of fertilizers etc. High losses in yield observed due to heavy infestation of *Maruca* due to improper method and time of application of pesticides [9-12].

Conclusion

Cluster frontline demonstrations on pulses (Redgram) conducted in two villages in vengalaya palem, Narakulla padu and resulted average highest yield (14.65 q/ha) in demonstration plot compared to farmers plot 12.85 q/ha. It was observed that yield gap can be minimized by imparting scientific knowledge to the farmers, providing the quality

need based inputs and proper application of inputs. Horizontal spread of integrated crop management may be achieved by the successful implementation of frontline demonstrations coupled with training programme, field day, exposure visit organized in CFLDs programmes in the farmer's fields. For wide dissemination of technologies recommended by SAUs and other research institute, more number of FLDs should be conducted. It can be concluded that the Redgram production could be enhanced by encouraging the farmers through adoption of integrated crop management practices coupled with improved variety which were followed in the CFLDs.

Method demonstration of mixing of PSB with Vermicompost

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