Original Research Article

Impact of Cluster Frontline Demonstrations (CFLD) Oil Seeds on Yield Enhancement of Groundnut (*Arachis hypogaea* L.) in Vellore District of Tamil Nadu, India

Abstract

The cluster frontline demonstrations (CFLDs) on groundnut were conducted by ICAR- Krishi Vigyan Kendra, Virinjipuram, Vellore District (Tamil Nadu) during Rabi season from 2020-2021 and 2021-2022 farmer's field of different villages of Vellore district. The results revealed that the average higher pod (25.18 q/ha.) were recorded in CFLDs as compared to farmer's practices (FP) average pod (16.50 q/ha). The increase in the demonstrations pod yield over FP was 48.81 %. The extension gap, technology gap and technology index were 8.68 q/ha., 1.93 q/ha. and 6.76 % respectively. The average gross return (Rs. 100920/ha.) and net return (Rs. 66677/ha.) in CFLDs were found higher than the FP gross return (Rs. 65700/ha.) and net return (Rs. 31130/ha.). The B: C ratio exhibited the same trend as in gross and net return which was found 2.95 in CFLDs and 1.90 in Farmer practice. By conducting cluster frontline demonstrations of improved variety with intervention practices of proven technologies in farmer's field, yield and increased the doubling income with higher productivity in Groundnut.

Keywords: Groundnut, Cluster front line demonstration, technology gap, productivity, Benefit Cost Ratio

Introduction

Groundnut is called the 'King' of oilseeds. India ranks first in groundnut acreage and is the second-largest producer of groundnut in the world with 101 lakh tonnes with a productivity of 1816 kg/ha in 2020-21 (Groundnut outlook report 2021). The main objective of front-line demonstrations is to demonstrate newly released crop production technologies and their management practices in the farmers' field under different farming situations and at different agro-climatic regions. Keeping the above point in view, the CFLD on groundnut using improved production technologies was conducted by Krishi Vigyan Kendra, Vellore, under the supervision of agricultural scientists and the seeds of dharani variety the high potential yield of 29.96 kg/ha. (Directorate Oilseed status report, 2008-2019) and it is suitable for early kharif (irrigated) kharif (rain-fed) and rabi situation and technical inputs critical

inputs were provided to the farmers to find out yield gaps between farmer's practices and demonstration practices.

MATERIALS AND METHODS

The present experiment was carried out by Krishi Vigyan Kendra, Virinjipuram, Vellore district of TamilNadu during *Rabi* season of 2020-2021 and 2021-2022 in 150 farmers with area of 60 hectare and 2021-2022 in 25 farmer's with area of 10 hectare field in block of Kaveripakkam and Gudiyatham of Vellore and Ranipet district of Tamil Nadu. During experimental study, total area of 60 ha was covered during initial first years of study and 10 ha in second year and each farmers plot size was 0.4 ha (1.0 acre) under cluster frontline demonstration programme with active participation of farmers. Before conducting the FLD programme, list of farmers were collected in group meeting and specific production technology training programme was conducted to create a awareness among about the demonstrated technology and how it differ from farmers practices. In intervention plots (IP), technical inputs of FLD were demonstrated to farmer's field on one month before a season in group meeting programme and trained each farmer for their appropriate time and application. The technological inputs were quality seeds of groundnut (Dharani) 40 kg, Seed treatment with Biofertilizer (Azosprillum and Phosphobacteria), Fungicide with *Bacillus subtilis*, application with micronutrient mixture, groundnut booster, Ground nut Rich @2kg. For weed effective management, pre-emergence application of pendimethaline (1.0 liter) was provided to farmers. Other technological information like balanced fertilizer uses, pesticide, irrigation scheduling etc also given time to time and comparison has been made with existing farmers practices which is shown in Table 1. The necessary steps for the selection of site and farmers, lay out of demonstration etc were followed as suggested by Chaudhary (1999). The farmer's practices (FP) plots were maintained as local check for comparison study. The data obtained from intervention practices (IP) and famers practices (FP) were analyzed for extension gap, technological gap, technological index and benefit cost ratio study (Samui *et al.*, 2000) as given below

Technology gap = Potential yield- Demonstration yield

Extension gap = Demonstration yield- Farmers yield

Technology index= Potential yield – Demonstration yield/Potential yield

Results and Discussion

It is evident from the data presented in Table 2 that intervention practices (IP) of integrated crop management approach recorded higher the pod yield of groundnut ranged from 24.25 to 25.18 q ha-1 as compared with farmers practices (16.50 q ha-1) during 2020-21 to 2021-22 respectively. The percent increase in pod yield under intervention practices (IP) over farmers practices (FP) were 48.48 and 49.14 respectively. The above trend of successively increased in pod yield of groundnut over the year was obtained due to integrated crop management approach through appropriate use seed rate of groundnut (100 kg ha-1) which maintain optimum plant population and reduced the competition for nutrient, moisture and sunlight (Chaniyara *et al.,* 2001). The Fertilizer, Insecticide and Rhizobium approach for seed treatment showed good impact on pest and disease management, root nodules formation and finally on pod yield. Seed treatment of fungicide with Dithane M-45 followed by Quinolphos insecticide effectively minimize the incidence of root rot disease and white grub pest which is major issue in sandy light soil of north Gujarat. Seed treatment with biofertilizer i.e. rhizobium for increased root nodules formation for atmospheric nitrogen fixation and reduced the dose of nitrogen fertilizer and PSB improved the phosphorous uptake from soil (Balamurugan and Gunasekaran, 1996). Pre-emergence application of pendimethaline reduced the incidence of weed which was the one of the major constraints for groundnut production followed by two inter culturing operation at 30 and 45 Days after sowing and one hand weeding. The extension gap showed increasing trends in each consecutive year of study (Table 2). The extension gap ranging between 7.75 – 9.60 q ha-1 during the study period emphasizes the need to educate the farmers through various means for adoption of improved agricultural production technologies to reverse the trend. The similar results were also reported by Bairwa *et al*. 2013. The trend of technology gap (ranged between 1.10 to 2.75 q/ha.) reflects the farmer's cooperation in carrying out such demonstrations with encouraging results in subsequent years (Table 2). The similar results were also recorded by Gangadevi *et al*. 2018. The technology gap observed might be attributing due to the dissimilarity in soil fertility status, enriching soil nutrient especially with organic manure and weather conditions i.e. rainfall and temperature (Dhandhalya *et al.,* 2009). The results indicated that the cluster front line demonstrations have given a good impact on the farming community of demonstrated villages as they were motivated by the improved agricultural practices and realized them how it differ from existing practices in Vellore districts. The mean value of technology index of 6.76 q/ha. and the wider gap in extension gap (ranging between 7.75 to 9.60 q/ha.) during the experimental period, may be attributed to the difference in soil fertility

status, weather conditions, non-availability of irrigation water and insect-pests attack in the crop. Gross return, net return and Benefit-Cost ratio were recorded higher under intervention practices against farmer's practices in all the years of study. The Benefit-Cost ratios were ranges from 2.92 to 2.97 in intervention practices against 1.86 to 1.93 in farmer's practices during experimental year (Table 3). Higher benefit cost ratio under intervention practices was self-explanatory of economic viability of the technology and convinced the farmers for adoption of intervention imparted.

Conclusion

Use of appropriate scientific methods of cultivation under cluster front line demonstration programme on large scale reduced the technological gap to a considerable extent thus leading to increased productivity. Moreover, extension agencies like Krishi Vigyan Kendra (KVK), Agricultural Technology Management Agency (ATMA), Non Government Organization (NGO's) of the district need to provide more technical support to the farmers through method demonstration, training programme, exposure visit to other fields and field days which increased the horizontal spread of the technology to more number of farmers in the district, with its positive effect on livelihood of farmers.

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Table 1. Comparison between intervention practice and existing farmers practice under groundnut FLDs in Vellore District of Tamil Nadu

No.	Package practice	Farmer practice	Intervention practice
1	Variety	TMV 7	Dharani
2	Seed rate	150 kg/ha	125 kg/ha
3	Seed treatment	Without seed treatment	Seed treatment with, *Bacillus subitilus* @ 10 g/kg of seed and *Trichoderma viride* @ 4 g/kg seed and Rhizobium @ 20 g/kg seed
4	Method of sowing	Seed dropping behind the plough	Line sowing with spacing of 25 × 10 cm.
5	Fertilizer application	Irrational use of nitrogenous fertilizer without Sulphur application	Fertilizer dose of 20, 40 and 40 kg N, P2 O5 and K2 O per ha, respectively along with Sulphur @ 20 kg/ha.
6	Insect-pests and disease management	Use of Insecticide like Dimethoate, Imidacloprid, and Chlorpyrifos	Use of yellow sticky traps & sex pheromone of Spodolure, Helialure raps for attract the male insect @ 5 no/acre to control the sucking pest and attract male adults of lepidopteron pests. Spraying of Thiomethoxam 25% WG @ 0.2 g/litre of water for management of sucking pests. Spraying of Profenophos 50% EC @ 2 ml/litre of water for pest management like red hairy caterpillar and tobacco caterpillar. Drenching with Metalaxyl-M 8% + Mancozeb 64% WP @ 2 g/litre of water for management of collar rot.
7	Weed management	Manual weeding at 25-30 days	Post emergence spray of Imazethapyr 10% SL @ 75 g a.i./ha at 15 Days after sowing one by earthing up just before flowering
8.	Flower and pod development	No application with Micro nutrient mixture	Use of Groundnut Rich @ 2kg/acre for induces flowering and pod setting.

Table 2. Productivity, technology gap, extension gap and Technology index in Groundnut under Front line demonstration

Year	Area (ha.)	No.of farmers	Potential yield (q/ha.)	Yield (q/ha.)		% increase over FP	Technology gap (q/ha.)	Extension gap (q/ha.)	Technology index (%)
				IP	FP				
2020-2021	60	150	27.00	24.25	16.50	48.48	2.75	7.75	10.19
2021-2022	10	25	27.00	26.10	16.50	49.14	1.10	9.60	3.33
Mean			27.00	25.18	16.50	48.81	1.93	8.68	6.76

(Note: IP: Intervention Practice, **FP:** Farmers Practice)

Table 3. Economic of groundnut in intervention (IP) and farmer's practices (FP) under front line demonstration

Year	Gross return (Rs. ha.)		Net return (Rs. ha.)		BCR	
	IP	FP	IP	FP	IP	FP
2020-2021	97000	65400	63744	31660	2.92	1.93
2021-2022	104840	66000	69610	30600	2.97	1.86
Mean	100920	65700	66677	31130	2.95	1.90