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# Impact of Cluster Frontline Demonstrations (CFLDs) on *kharif* Groundnut Productivity and Income of Farmers in Jamnagar District of Gujarat

**S. H. Lakhani*, K. P. Baraiya and A. K. Baraiya**

*Krishi Vigyan Kendra, JAU, Jamnagar, India*

**Corresponding author*

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**A B S T R A C T**

The cluster frontline demonstrations (CFLDs) on groundnut were conducted by Krishi Vigyan Kendra, Junagadh Agricultural University, Jamnagar (Gujarat) during *kharif* season from 2016-17 to 2018-19 on 150farmer's field of different villages of Jamnagar district. The results revealed that the average higher pod (21.1 q/ha) and haulm (40.21 q/ha) yield of groundnut were recorded in CFLDs as compared to farmer's practices (FP) average pod (17.5 q/ha) and haulm (37.85 q/ha) yield. The increase in the demonstrations pod yield over FP was 20.35 %. The extension gap, technology gap and technology index were 3.6 q/ha, 6.16 q/ha and 22.60 % respectively. The average gross return (Rs. 110879/ha) and net return (Rs. 66207/ha) in CFLDs were found higher than the FP gross return (Rs. 93844/ha) and net return (Rs. 43334/ha). The average net returns 52.21 % higher than that of FP. The B: C ratio exhibited the same trend as in gross and net return which was found 2.49 in CFLDs and 1.86in FP. By conducting cluster frontline demonstrations of improved variety with intervention practices of proven technologies in farmer's field, groundnut productivity enhanced to a great extent which increased in the income level of farmers and improved livelihood of farming community.

## Introduction

Groundnut (*Arachis hypogaea* L.), is a leguminous crop plant which is widely cultivated in the tropics and subtropics between 40°N and 40°S latitudes. It is valued for its high-oil edible seeds and as such it is the fourth most important source of edible oil and third most important source of vegetable protein in the world. Groundnut is not only an important oilseed crop of India but also an important agricultural export commodity. With annual all-season coverage of about 70 lakh hectares, globally India ranks first in groundnut acreage and with an output of approx. 80-85 lakh MT (in shell groundnuts), second in production. Although in various states of India groundnut is cultivated in one or more (*kharif, rabi* and *summer*) seasons, nearly 80% of acreage and production comes from *kharif* crop (June-October). The area under groundnut in Gujarat is 14.68 lakh hectares with a production of 20.85 lakh MT and 1421 kg/ha productivity during *kharif* 2018-19 (Anon., 2019).

Groundnut is an important oilseed crop of Jamnagar district of Gujarat which is cultivated in *kharif* season cover an area of 1.3 lakh hectares with production 2.14lakh MT and 1641 kg/ha productivity during *kharif* 2018-19 (Anon., 2019). The district has been considered as productively potential region of groundnut due to assured irrigation facilities, precise irrigation management through sprinkler and favourable soil and climate conditions. However, there is a wide gap between the potential and the actual production realized by the farmers due to partial adoption of recommended package of practices by the growers. Technology gap i.e. poor knowledge about newly released crop production and protection technologies and their management practices in the farmers' fields is a major constraint in groundnut production. So far, no systematic approach was implemented to study the technological gap existing in various components of groundnut cultivation.

Awareness of scientific production technology *viz.*, new variety, seed treatment with fungicide, insecticide and biofertilizers, soil test based nutrient management is lacking in district which was a key reason for low productivity of groundnut. The productivity of crop could be increased by adopting recommended scientific and sustainable management production practices with improved high yielding varieties and other critical input through cluster frontline demonstrations (CFLDs).Conducting cluster front line demonstrations on farmer's field help to identify the constraints and potential of the groundnut in specific area as well as it helps in improving the economic and social status of the farmers. The aim of the cluster front line demonstrations is to convey the technical message to farmers that if they use recommended package and practices then the yield of this crop can be easily doubled than their present level.

Keeping the above point in view, CFLDs on groundnut using improved production technologies was conducted under National Mission on Oilseeds and Oil palm (NMOOP) scheme with the objectives of showing the productive potentials and profitability of the integrated production technologies under real farm situation over the locally cultivated groundnut crop.

## Materials and Methods

The present study was carried out in operational area by Krishi Vigyan Kendra, Junagadh Agricultural University, Jamnagar (Gujarat) during *kharif* season from 2016-17 to 2018-19 (3 years) in farmer's field of different villages of Jamnagar district of Gujarat under National Mission on Oilseeds and Oil palm (NMOOP) scheme. In total 150 cluster frontline demonstrations (CFLDs) conducted in 60 ha area covering different villages. Each farmers plot size was 0.4 ha (1.0 acre) under CFLDs for demonstration of recommended improve production practices of groundnut. The rainfall recorded in the demonstration area during 20016-17 was 435 mm, in 2017-18 was 697 mm and in 2018-19 was 370 mm.

In the demonstration plots, few technical inputs of CFLDs were given to farmer per acre basis on one month before a season in group meeting programme and trained each farmers for their appropriate application in field. The technological inputs were improved variety GJG-22 seed, Bio fertilizers (*Rhizobium* and Phosphate solubilizing micro-organisms), *Tricoderma harzianum*, *Beauveria bassiana* and *Metarhizium anisopliae* provided to farmers. The soil samples were taken and analyses before sowing of CFLDs. Other technological information like sowing time, seed treatment, soil test based nutrient management, weed and water management, IPM practices,

harvesting and threshing also given time to time. KVK scientist also visited regularly to the demonstrations fields and continuously guides the farmers. Field days and group meeting were also organised at demonstration sites to provide the opportunities for other farmers to witness the benefits of demonstrated technologies. The necessary steps for the selection of site, farmers and lay out of demonstration were followed as suggested by Chaudhary (1999).

In the demonstration, one control plot was also kept where farmer's practices was carried out. Data were collected with the help of personal contact and observations on yield data was also recorded at the time of separate threshing. The yield of each demonstration was recorded in a systematic manner and the yield of farmer's practices was also recorded at the same time. The data obtained from demonstration plot and famers plot were analyzed for extension gap, technological gap and technological index study (Samui *et al.*, 2000) as given below.

Extension gap = Demonstration yield- Farmer's yield

Technology gap = Potential yield- Demonstration yield

$$\text{Technology index} = \frac{(\text{Potential yield} - \text{Demonstrationyield}) \times 100}{\text{Potential yield}}$$

The data collected were tabulated and statistically analyzed to interpret the results. The economic parameters (gross return, net return and B: C ratio) were worked out on the basis of prevailing market prices of input and Minimum Support Prices of output.

## Results and Discussion

### Groundnut yield

Results of 150 cluster frontline demonstrations conducted during 2016-17 to 2018-19 in 60 ha area on farmer's field revealed that the average higher pod (21.1 q/ha) and haulm (40.21 q/ha) yield of groundnut were recorded in CFLDs as compared to farmer's practices average pod (17.5 q/ha) and haulm (37.85 q/ha) yield. The results clearly indicated that the pod yield of groundnut could be increased by 20.35 % over the pod yield obtained under farmer's practices of groundnut cultivation due to adoption of improved variety GJG-22 with appropriate production technology. Similar results were also observed by Dubey *et al.*, (2011), Jat and Katiyar (2015), Pawar*et al.*, (2017) and Undhad *et al.*, (2019).

### Extension gap and technology gap

The data presented in Table-1 indicated that the extension gap ranged from 2.3 q/ha to 5 q/ha and overall average extension gap was 3.6 q/ha during the period of demonstration emphasized the need to educate the farmers through various means for the adoption of improved groundnut production technologies to reverse this trend of wide extension gap. More and more use of latest production technologies with high yielding varieties will subsequently change this alarming trends galloping extension gap. The new technologies will eventually lead to the farmers to discontinuance of old varieties with new technology.

However, the technology gap observed ranged from 4.26 q/ha to 9.46 q/ha. The average 6.16 q/ha technology gap observed during the experimental period. The technology gap observed may be attributed to the dissimilarity in the soil fertility status and weather conditions i.e. rainfall and temperature. Hence variety wise location specific recommendation appears to be necessary to minimize the technology gap for yield level of different situations.

## Technology index

In case of technology index, lower the value of technology index indicate more is the feasibility of technology. The data (Table 1) showed that minimum technology index value 15.63 % was noticed in 2017-18 followed by 17.46 % in 2016-17 whereas, maximum value of technology index 34.70 % in 2018-19, it may be due to uneven and lower rainfall (370 mm) during *kharif* season in 2018-19. The average 22.60 % technology index found during the experimental period it exhibited the feasibility of technology demonstrated. The finding of the present study is in line with the finding of Jat and Katiyar (2015) and Pawar *et al.*, (2017).

**Table.1** Productivity, extension gaps, technology gaps and technology index of *kharif* groundnut as grown under cluster frontline demonstrations (CFLDs) and existing farmer's practices (FP)

| Year | Area (ha) | No of Demo | Potential pod Yield (q/ha) | Average pod yield (q/ha) | | Average Haulm yield (q/ha) | | % pod yield increase over FP | Extension gap (q/ha) | Technology gap (q/ha) | Technology index (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Demo. | FP | Demo. | FP | | | | |
| **2016-17** | 20 | 50 | 27.26 | 22.5 | 19 | 41.40 | 39.55 | 18.42 | 3.5 | 4.76 | 17.46 |
| **2017-18** | 20 | 50 | 27.26 | 23 | 18 | 44.32 | 42.50 | 27.78 | 5 | 4.26 | 15.63 |
| **2018-19** | 20 | 50 | 27.26 | 17.8 | 15.5 | 34.90 | 31.50 | 14.84 | 2.3 | 9.46 | 34.70 |
| **Mean** | | | **27.26** | **21.1** | **17.5** | **40.21** | **37.85** | **20.35** | **3.6** | **6.16** | **22.60** |

**Table.2** Economic analysis of cluster frontline demonstrations and farmer's practices

| Year | Cost of cultivation (Rs./ha) | | Gross return (Rs./ha) | | Net return (Rs./ha) | | B:C ratio | | Net return increase over FP (%) |
|---|---|---|---|---|---|---|---|---|---|
| | Demo. | FP | Demo. | FP | Demo. | FP | Demo. | FP | |
| **2016-17** | 45000 | 53500 | 111510 | 96000 | 66510 | 42500 | 2.48 | 1.79 | 56.49 |
| **2017-18** | 43736 | 50400 | 120124 | 97136 | 76388 | 46736 | 2.75 | 1.93 | 63.45 |
| **2018-19** | 45280 | 47630 | 101002 | 88395 | 55722 | 40765 | 2.23 | 1.86 | 36.69 |
| **Mean** | **44672** | **50510** | **110879** | **93844** | **66207** | **43334** | **2.49** | **1.86** | **52.21** |

## Economics

The economics of groundnut production under cluster frontline demonstrations and farmer's practices have been presented in Table 2. The average gross return (Rs. 110879/ha) and net return (Rs. 66207/ha) in CFLDs were found higher than the farmer's practices gross return (Rs. 93844/ha) and net return (Rs. 43334/ha). The average net returns 52.21 % higher than that of farmer's practice. The B: C ratio exhibited the same trend as in gross and net return which was found 2.49 in CFLDs and 1.86in farmer's practice. It showed that the adoption of demonstration technology by farmers would be higher economically and gainful proposition. Similar results were also reported by Jat and Katiyar

(2015), Pawar *et al.*, (2017) and Undhad *et al.*, (2019).

From the above findings, it can be concluded that by conducting cluster frontline demonstrations of improved variety with intervention practices of proven technologies in farmer's field, groundnut productivity enhanced to a great extent which increased in the income level of farmers and improved livelihood of farming community. Farmers were motivated by cluster frontline demonstrations in groundnut crop and they would adopt these technology in the coming years.

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