ASSESSING YIELD GAP ANALYSIS OF GROUNDNUT THROUGH CLUSTER FRONT LINE DEMONSTRATION IN BANASKANTHA DISTRICT OF GUJARAT

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ABSTRACT

Front line demonstration is one of the important tools for transfer of technology. The present study was carried out by Krishi Vigyan Kendra, Deesa, Banaskantha to find out yield gaps between improved package (IP) under Front Line Demonstration (FLD) and farmer's practice (FP) of kharif groundnut in 3 different villages during 2014-15 to 2016-17, respectively. The result indicated that average pod yield of groundnut in IP ranged between 22.03 to 29.25 q ha^{-1} whereas in FP it was 18.33 to 21.45 q ha^{-1}during demonstrated years. The per cent increased in yield with IP over FP was ranged between 19.08 to 36.36. The technological and extension gap were 10.47, 8.83, 3.25 and 3.53, 5.37, 7.8 q ha^{-1} respectively. Similarly, technological index were decrease from 32.22 to 10.0 percent from 2014-15 to 2016-17. The trends of technological gaps in all three years and technological impact change the perception of farmers in demonstrated villages and same were reflected in farmer's cooperation in carrying out in demonstration. Intervention practices (IP) recorded higher gross return, net return and benefit cost ratio as compared to farmer's practices (FP). The cost benefit ratio was 2.88 to 3.81 under demonstration, while it was 2.05 to 2.41 under control plots. By conducting cluster front line demonstration of intervention practices of proven technologies in farmer's field, yield potential of groundnut enhanced to a great extent which increased in the income level of farmers and improved livelihood of farming community.

Keywords: *groundnut, FLD, technological gap, extension gap, technological index*

INTRODUCTION

The adverse impact of climate change and continued fragmentation of landholding have led to poor socio-economic status leading to high dependency on farm income and productivity (Vinaya *et al* 2017). India is the largest producer of oilseeds in the world and the oilseed sector occupies an important position in the country's economy. The country accounts for 12-15 per cent of global oilseeds area, 6-7 per cent of vegetable oils production, and 9-10 per cent of the total edible oils consumption (FAO, 2011). The continuous increase in import of oilseeds crops specially groundnut and mustard occupies a prominent position in Indian oilseeds scenario. Groundnut is an important oilseed crop of Gujarat specially Banaskantha district which is cultivated in both *kharif* and summer season and cover an area of 61,413 ha with production 1,31,470 MT and 2186 kg/ha productivity. 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 like seed treatment with fungicide, insecticide and biofertilizers, use of sulphur which is important nutrient for oilseed crops 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 using varieties and other critical input through cluster frontline demonstration (FLD). 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 front line demonstration 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.

With a view to demonstrate under real farm situation the productivity potentials and profitability of a spectrum of improved oilseed crop production technologies, evolved by the oilseed research network in the country from time to time, on-farm demonstrations were organized through various technology transfer programmes of the Central and State. Among the most successful such programmes figured "Front Line Demonstrations in Oilseeds" Project, a component

of the Oilseed Production and Development Programme (OPDP) of the Government of India that supplemented the Oilseed Technology Mission. Under this programme the technologies are demonstrated for the first time by the Scientists themselves before being fed to the main extension system of the State Department of Agriculture (Mandavkar *et al.*,2015)

Keeping the above point in view, the FLD's on groundnut using improved production technologies was conducted with the objective of showing the productive potentials of the integrated production technologies under actual farm situation.

OBJECTIVES

(a) To know the comparison between intervention practices and existing farmers practice under groundnut FLDs.

(b) To know the productivity, technology gap, extension gap and Technology index in groundnut (GG-20) under Front Line Demonstration

(c) To know the economics of groundnut in intervention (IP) and farmers practices (FP) under front line demonstration

METHODOLOGY

The present experiment was carried out by Krishi Vigyan Kendra, Deesa during *kharif* season of 2014-15 and 2015-16 in 25 farmer's field and 2016-17 in 50 farmer's field in 3 different adopted villages of Vadgam Taluka viz., Ranchodpura, Thalvada and Dalvana in Banaskantha district of Gujarat. The region is characterized by sub-tropical and semi-arid weather comes under IV- North Gujarat Agro-climatic zone. During experimental study, total area of 10 ha was covered during initial two years of study and 20 ha in third 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. Soils in the experimental area were sandy loam texture with pH ranges between 7.4 to 8.6 and EC 0.28 to 0.39. The available nitrogen content was low and ranges from 153 to 231 kg N ha^{-1}, available phosphorous content was low to medium (12.34 to 45.76 kg P_2O_5 ha^{-1}) and available potassium content was high (422.7 to 597 kg K_2O ha^{-1}) respectively.

In demonstration plots, technical inputs of FLD were given to farmers 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 quality seeds of groundnut (GG-20) 40 kg, secondary nutrient sulphur (10 kg), Dithane M-45 fungicide for seed treatment (250 gm), Quinolphos insecticide for seed treatment (500 ml) followed by biofertilizer (Rhizobium and PSB – 1 liter each) for seed treatment through FIR approach. 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 plots were maintained as local check for comparison study. The data obtained from intervention plot and famers plot 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

$$\textbf{Technological index} = \frac{Potential\ yield - Demonstration\ yield}{Potential\ yield}$$

Table 1: Comparison between intervention practices and existing farmers practice under groundnut FLDs

Sr. No.	Particulars	Demostration Plot	Farmers practices
1	Seed rate	40 kg/acre	60 kg/acre
2	Seed treatment	Seed treatment with Dithane M-45 (250g) followed by (2.5 Liter Quinolphos) and Rhizobium and PSB (1.0 Liter)	Seed treatment (Dentos Syngenta 2.5 Liter)
3	Weed management	Pre-emergence herbicide (Pendimethaline 1.0 Liter) + One interculturing + One hand weeding	Hand weeding 2 times + Post emergence herbicide (Odyseyy - 500 ml)
4	Fertilizer application	Fertilizers (DAP 40 kg, Sulphur 20 kg, Urea 25 kg)	Fertilizers (DAP 100 KG, Urea 50 kg)
5	Plant protection	Plant protection (Choloropyriphos 2.5 Liter)	Plant protection (Regent 2.5 Liter)
6	Cost of cultivation (₹ ha^{-1})	30,780	35,975

RESULTS AND DISCUSSION

It is evident from the data presented in Table 1 that intervention practices of integrated crop management approach comprised under front line demonstration programme *viz.,* seed rate of promising variety of groundnut (GG-20) @ either 100 or 40 kg ha^{-1}, seed treatment with fungicide (Dithane M-45), insecticide (Quninolphos) followed by Biofertilizer (Rhizobium and PSB), basal dose of sulphur @ 25 kg ha^{-1} along with 40 kg DAP and 25 kg urea, pre emergence application of pendimethaline 30 EC 1 kg a.i ha^{-1} recorded higher the pod yield of groundnut ranged from 22.03 to 29.25 q ha^{-1} as compared with farmers practices (18.50 to 21.45 q ha^{-1}) in 2014-15 to 2016-17 respectively. The percent increased in pod yield under intervention practices over farmers practices were 19.08, 29.34 and 36.36 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). FIR approach of 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 Banaskantha district. 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). Further, Application of secondary nutrient i.e. sulphur @ 25 kg ha^{-1} as basal dose along with chemical fertilizer application had impact on oil content in seed of groundnut, improved the quality and boldness of seed (Singh and Chaudhari, 1995). Pre emergence application of pendimethaline reduced the incidence of weed which was the one of the major constraints for groundnut production followed by one inter culturing operation at 30 DAS and one hand weeding. These findings are in agreement with AICRPG, 1997.

The extension gap showed increasing trends in each consecutive year of study (Table 2). The extension gap ranging between 3.53 – 7.80 q/ha 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 trend of technology gap (ranged between 3.25 to 10.47 q ha^{-1}) reflects the farmer's cooperation in carrying out such demonstrations with encouraging results in subsequent years (Table 2). 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). Mukharjee (2003) have also opined that depending on identification and use of farming situation, specific interventions may have greater implications in enhancing system productivity. The results indicated that the cluster front line demonstrations has 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 Banaskantha district.

In case of technological index, lower the value of technology index indicate more is the feasibility of technology. The wider gap in technology index (ranging between 10.0 to 32.22) 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. This is in the tune of Meena *et al.,* (2012) on rapeseed mustard experiment at Udaipur. 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 2.88 to 3.81 in intervention practices against 2.05 to 2.41 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.

Table 2 : Productivity, technology gap, extension gap and Technology index in groundnut (GG-20) under Front Line Demonstration n=100

Year	Area	No. of farmers	Seed yield (q/ha)			% increase over FP	Technology gap (q/ha)	Extension gap (q/ha)	Technology index (%)
			Potential	IP	FP				
2014-15	10	25	32.5	22.03	18.50	19.08	10.47	3.53	32.22
2015-16	10	25	32.5	23.67	18.30	29.34	8.83	5.37	27.17
2016-17	20	50	32.5	29.25	21.45	36.36	3.25	7.80	10.00
Mean			**32.50**	**24.98**	**19.42**	**28.26**	**7.52**	**5.57**	**23.13**

(Note: IP: Intervention practices**; FP:** Farmers practices**)**

Table 3 : Economics of groundnut in intervention (IP) and farmers practices (FP) under front line demonstration

n=100

Year	Gross return (₹)		Net return (₹)		BCR (₹)	
	IP	FP	IP	FP	IP	FP
2014-15	88777	73678	57997	37703	2.88	2.05
2015-16	95488	72831	64708	36856	3.10	2.02
2016-17	117275	86790	86495	50815	3.81	2.41
Note: Market price of groundnut pod: ₹ 3760 per quintal and Bhusa: ₹ 450 per quintal						

From the above findings, it can be concluded that 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 KVK, ATMA, 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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