Original Research Article

Economic Importance of Frontline Demonstrations in improving the production and profitability of groundnut farmers of Nagarkurnool District

ABSTRACT:

The present investigation was conducted in the *rabi*, 2019-20 in Nagarkurnool District. A total of 25 demonstrations were conducted in Peddur and Uppununtala villages of Telkapally Mandal and Nagarkurnool District. The objective of the study is to demonstrate the improved crop management practices in groundnut to increase the productivity and profitability of groundnut crops. The study revealed that Improved Crop Management practices enhanced groundnut pod yield (2338 kg ha^{-1}) by up to 9.4% over farmer's practice (2116 kg ha^{-1}). The technology gap ranged from 300-900 kg ha^{-1} and the extension gap ranged from 200-350 kg ha^{-1} with an average technology Index of 22.1%. The ICM practices have reduced the cost of cultivation (Rs.46,775/-)and increased the gross returns (Rs.1,41,890/-), net returns (Rs.95,115/-) and B: C ratio (2.05) over farmer's practice (Rs.46,775/-, Rs.128102/-, Rs.78475/- and 1.59 respectively).

Key words: *Groundnut, Frontline Demonstrations, Oilseeds, Profitability*

INTRODUCTION:

Groundnut is an important edible oilseed crop in India having 40-53% oil and a rich source of dietary protein with the ability to meet up to 46% of the recommended daily allowance of essential vitamins, especially E, energy from its oils, fats and dietary fiber. It is also a rich source of minerals such as K, Na, Ca, Mn, Fe and Zn among others a rich source of biologically active compounds such as arginine, resveratrol, phytosterols and flavonoids.

Groundnut (*Arachis hypogaea* L.) is an important oilseed crop of India that occupies first in terms of area and second in terms of production in the world. In India, the major groundnut-growing states are Gujarat, Andhra Pradesh, Tamil Nadu, Karnataka, Maharashtra, Rajasthan, Madhya Pradesh, Telangana, Orissa and Uttar Pradesh. Groundnut is an important oilseed crop of Telangana grown in Mahabubnagar, Nagarkurnool, Wanaparthy, Gadwal, Mahabubabad, Suryapet, Karimnagar and Warangal districts which contributes nearly 80% of total groundnut production in the state.

The area under *rabi* groundnut in Telangana increased tremendously during the *rabi* season with productivity ranging from 2261-2330 kg ha^{-1}. In India, 24.4 percent of rabi season Groundnut is cultivated in Telangana State. In the state lion share of area and production are contributed from Wanaparthy, Nagarkurnool and Gadwal districts (72,030 ha). The average yield (2047 kg ha^{-1}) of groundnut in Telangana is higher than the national average (1,486 kg ha^{-1}) because of the season, suitable soils, weather, 90% of groundnut area under sprinkler system of irrigation combined with

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partial mechanization (All India crop situation *rabi*, 2019-20, GOI). There is tremendous scope for increasing the productivity of the *rabi* groundnut due to the above-mentioned reasons.

As a part of the regular survey, the Nagarkurnool district groundnut farmers were surveyed about the package of practices followed and found out the reasons for the yield gap. In the survey, it was found that due to a lack of awareness, the farmers are not practicing the recent technologies or improved crop management practices which has created a technology gap. Therefore, there was an immediate need to encourage farmers to practice scientific technologies through Frontline Demonstrations.

In this regard, AICRP on Groundnut Scheme, Regional Agricultural Research Station, Palem has conducted frontline demonstrations with the objectives of enhancing yield and income levels of the farmers of Nagarkurnool District.

MATERIALS & METHODS:

The frontline demonstrations on Integrated Crop Management in groundnut were conducted by AICRP on Groundnut Supporting Centre at the Regional Agricultural Research Station, Palem. A total of 25 Frontline Demonstrations were conducted in Peddur and Uppununtala villages of Telkapally Mandal and Nagarkurnool District on the “Effect of Improved Crop Management Practices in Enhancing the Productivity and Profitability of the Groundnut Farmers” during *rabi* season, 2019.

The soils of the demonstrated area are red sandy and sandy loam soils having low available nitrogen, medium in available phosphorus and high in available potash contents. The demonstrated area has having good canal water irrigation facility.

The farmers were selected and an awareness program cum training was conducted on the “Improved Crop Management Practices in Groundnut”. The selected farmers then allotted 0.4 ha of area for Improved Crop Management Practices and 0.4 ha for Traditional Practices or Farmer's Practices or Control.

The selected farmers were recommended to use 200 kg of groundnut seed per hectare sown in line sowing against 250 kg ha^{-1} seed rate in zig-zag sowing. Different inputs were provided such as seed treatment chemical (Tebuconazole 2 DS (2% w/w)) against the use of Dithane M-45 (75% WP), Pre-emergence herbicide Diclosulam 84% WDG against the use of Pendimethalin 30% EC, 500 kg gypsum ha^{-1} at 40 DAS against no application of gypsum and need-based plant protection chemicals. The recommended package of practices was demonstrated in the demo plot. The farmer's practices are the traditional practices farmers have practiced over the years. The adjacent fields were taken as farmer's practices where farmers are still practicing traditional practices.

An impact study was conducted in the year 2022 to study the rate of adoption of technologies demonstrated and adopted after completing 3 years of demonstration.

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The data on socioeconomic characteristics, yield parameters, cost of cultivation and other parameters were collected and analyzed. The following formulas were used to analyze different parameters.

Gross Income (Rs.) = Economic yield (kg/ha)×Market Price (Rs/kg)……..(1)

Net Income (Rs.) = Gross Income -Cost of Cultivation……..(2)

B:C Ratio (Rs.) = Gross Returns/Cost of Cultivation……..(3)

% increase in the yield = (Demonstrated yield-farmers yield/ Farmers yield ×100……..(4)

Technology Gap = Pi (Potential Yield)-Fi (Farmers Yield) ……..(5)

Extension Gap = Di (Demonstration Yield)-Fi (Farmers Yield)……..(6)

Technology Index= (Potential Yield-Demonstration Yield)/(Potential Yield) ×100…….(7)

Impact of yield = (Yield of Demonstration Plot-Yield of Control Plot)/ (Yield of Control Plot)×100

Impact on adoption (% change) = No. of adopters after demonstration-No. of adopters before demonstration)/ (No. of adopters before the demonstration) × 100

RESULTS AND DISCUSSION:

Socio-economic characteristics of the respondents:the data was collected and the results obtained were discussed accordingly. The socio-economic characteristics of the respondents are presented in Table 01. 68% of the respondents were middle-aged. About 80% of the sampled population is educated. 68% of the population of sampled farmers are small and marginal. 84% of the farming population have more than 5 years of experience with very low extension contacts.

Table No. 01 Details of the sample population

S.No.	Variable	Category	Frequency	%
1.	Age	Young (24-39)	06	24
		Middle (40-54)	17	68
		Old (55-69)	02	08
2.	Education	Illiterate	05	20
		Primary School	08	32
		High School	09	36
		Above Matriculation	03	12
3.	Farm Size (in acres)	Marginal (0.2.5)	03	12
		Small (2.5-5)	14	56
		Large (5 & above)	08	32
4.	Farming Experience	< 5 years	04	16
		5-10 years	17	68

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		>10 years	04	16
5.	Family Size	1-4 members	18	72
		5-8 members	07	28
		More than 8 members	00	00
6.	Extension Contacts	Low (10-16)	14	56
		Medium (17-23)	09	36
		High (24-30)	02	08

Yield Gap Analysis:

A yield gap analysis was conducted before implementing the frontline demonstrations to study the gap between demonstration and farmer's practice. Technologies to be demonstrated were decided on the basis of presence of gap. Depending on the priority some technological gaps were targeted through giving awareness and some through giving inputs like tebuconazole for treating the seed, Gypsum bags for improving the test weight, pre-emergence herbicides for control of weeds during critical periods, need based pesticides and insecticides for identification and timely application of the insecticides and pesticides.

Table No. 02 Details of the Front Line Demonstration Technology

S.No.	Particulars	Demonstration	Farmers practice	Gap
1.	Seed	K-6 (Local Admixtures)	K-6 (Local Admixtures)	Full Gap
2.	Seed rate	80 kg	100 kg	Full Gap
3.	Seed Treatment	Seed Treatment with Tebuconazole 1gram per I kg seed	Seed Treatment with Dithane M-45	Moderate
4.	Sowing Time	October 1st fortnight to 2nd fortnight	October 1st fortnight to 2nd fortnight	No Gap
5.	Fertilizers	20-100-33 kg Urea, SSP and MOP	25 kg Urea	Moderate Gap
6.	Weed Management	Pre-emergence herbicide Diclosulam 84 % wdg12.4 grams per acre	Pre-emergence herbicide Pendimethalin 30 EC 1.3 to 1.6 liters per acre	Moderate
7.	Irrigation Management	Irrigation with sprinkler irrigation system	Irrigation with sprinkler irrigation system	No Gap
8.	Pest Management	Early diagnosis and timely spraying of effective low-dose chemicals	Higher concentration chemicals after pest outbreak	Moderate Gap
9.	Disease	Early diagnosis and timely	Higher concentration	Moderate

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	Management	spraying of effective low-dose chemicals	chemicals after pest outbreak	Gap

YieldParameters:

The perusal of the yield data (Table 3) indicates that due to frontline demonstration, groundnut yields have been improved significantly ranging from 2100 to 2700 kg ha^{-1} against farmer's practice ranging from 1900 to 2450 kg ha^{-1} with a yield increment of 9.4%. An average yield of 2338 kg ha^{-1} was obtained under the demonstration plot as compared to the control plot of 2116 kg ha^{-1}. The yield increment observed in groundnut cultivation in 2019 was 9.4% due to the farmers' literacy level (68%). These findings are similar to Chakraborthy*et al*. (2024), Chhodavadia*et al*. (2024), Natarajan, *et al.,* (2024), Bai *et al*. (2022), Sheker *et al.* (2022).

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Table No.3a: Productivity in Front Line Demonstration over Farmers Practice

Year	No. of Farmers	Area (ha)	Yield (kg/ha)			% increase in yields
			Potential Yield	Demonstration Yield	Framers Yield	
2019-20	25	10	2500	2338	2116	9.4

Table No. 3b Technology gap, technology index and extension gap in Front Line Demonstration over Farmers Practice

Extension gap (kg/ha)	Technology gap (kg/ha)	Technology Index
222	162	6.48

Economic Parameters: The data on the economic parameters of the Frontline Demonstrations indicate that, in terms of the cost of cultivation, the Frontline Demonstration could save Rs. 2,852/- hectare due to reduced pesticide costs. Higher gross returns were observed with the demo plot (Rs.1,41,890/-) over the demo plot (1,28,102/-). A similar trend was followed for net returns. Higher Benefit: Cost Ratio was observed with demo plot (2.04) over control plot (1.59). The results are inline with Chakraborthy*et al*. (2024), Chhodavadia*et al*. (2024), Natarajan, *et al.,* (2024), Bai *et al*. (2022), Sheker *et al.* (2022).

Table No. 04: Economic Parameters of the Front Line Demonstration

S.No.	Parameter	Demo/Check	(Rs/ha)
1.	Cost of Cultivation (Rs/ha)	Demo	Rs. 46,775/-
		Check	Rs. 49,627/-
2.	Gross Returns (Rs/ha)	Demo	Rs. 1,41,890/-
		Check	Rs. 1,28,102/-
3.	Net Returns (Rs/ha)	Demo	Rs. 95,115/-
		Check	Rs. 78,475/-
4.	B:C Ratio	Demo	2.04
		Check	1.59

Impact of Frontline Demonstrations on Adoption of Improved Package of Practices: The Frontline Demonstrations have significantly impacted the adoption of the improved Package of Practices recommended for the groundnut crop. Most of the farmers followed an

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increased seed rate over the recommended seed rate which increased seed cost. After Frontline demonstrations 200% impact was observed. 35% for mechanical sowing with seed cum ferti drill. Earlier farmers used seed treatment but with dithane M-45 which was irrelevant to the location's diseasesafter the demonstration156%. After the introduction of the pre-emergence herbicidediclosulam, farmers have shifted from not using pre-emergence herbicides and using pendimethalin with 267% impact (% change), with respect to use of single super phosphate, murate of potash and gypsum 100% change, only 33% shift has been observed with reduction of application of pesticide. The influence of input dealers on the use of pesticides was strongly observed. Similar findings were observed with Patil *et al.* (2018), Rayudu *et al.* (2018), Alaguduraiet *al*. (2022), Rani *et al.* (2010).

Table No. 05: Impact of Front-Line Demonstration on Adoption of Improved Package of Practices in Groundnut

Technology Interventions	Number of Adopters		Change in no. of adopters	Impact (% change)
	Before Demonstration	After Demonstration		
Reduced Seed Rate	07	21	14	200
Mechanical Sowing	17	23	06	35
Seed Treatment with tebuconazole	09	23	14	156
Use of pre-emergence herbicide	06	22	16	267
Fertilizers (Use of SSP, MOP & Gypsum)	08	16	08	100
Reduction of Pesticide Application	12	16	04	33

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