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Empowering Groundnut Farmers: 'Extent of Adoption of Cluster Frontline Demonstrations (CFLDS) by Beneficiary and Non-Beneficiary Farmers in Chittoor District of Andhra Pradesh

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ABSTRACT: The research was carried out in the Chittoor district of Andhra Pradesh, focusing on two locations: Krishi Vigyan Kendra, Kalikiri, and Rashtriya Seva Samithi - Krishi Vigyan Kendra (RASS-KVK), Karakambadi. A total of 120 participants were included in the study. The findings indicated that among the CFLDs (Cluster Front Line Demonstrations) beneficiary farmers more than half (51.67%) exhibited a high level of adoption of the recommended groundnut cultivation practices. Medium adoption was observed in 45.00% of the beneficiaries, while a low extent of adoption was seen in only 3.33% of them. In contrast, among the non-beneficiary farmers, half (50.00%) showed a medium, level of adoption of the recommended groundnut cultivation practices. Low adoption was observed in 41.67% of the non-beneficiaries, while a high extent of adoption was seen in 8.33%. Some of the challenges faced by famers are demonstration should be repeated regularly, low cost technology needs to be introduced, KVKs should arrange a buyback of seed to get immediate returns to the farmers, KVK scientists should visit farmers fields on a frequent basis. This study would give a direction to the implementation agencies of CFLDs to overcome any lacuna if any for the better execution of the demonstrations.

Keywords: Cluster Frontline Demonstrations, Beneficiary farmers, non-beneficiary farmers, Krishi Vigyan Kendras and extent of adoption.

INTRODUCTION

Groundnut, referred to as the "king" of oilseeds, holds immense importance as both a staple food and a cash crop in our country. It is renowned for its affordability and serves as a valuable source of essential nutrients. Additionally, groundnut is commonly known as the "wonder nut" and the "poor man's cashew nut." In India, groundnut plays a prominent role in the overall production of oilseeds. As of 2020, it is cultivated across 6.9 million hectares, resulting in a total production of 9.35 million metric tonnes (source: www.indiastat.com). Gujarat, Rajasthan, Andhra Pradesh, Karnataka, and Madhya Pradesh are the primary states where groundnut cultivation thrives in India. Among these, Andhra Pradesh holds a significant position, contributing approximately one-third of the nation's groundnut cultivation area and ranking third in terms of production. Within Andhra Pradesh, Chittoor district secures the second position in terms of cultivation area and the third position in production.

Agricultural innovations and the spread of new technology are crucial for achieving food security and improving farmers' livelihoods. To unlock their full potential, farmers in agriculture, livestock, and aquaculture sectors require access to new technology, appropriate resources, and relevant information. To address this, the Indian Council of Agricultural Research (ICAR) has established a vast network of Krishi Vigyan Kendras (KVKs) across rural districts in the country. KVKs, as district-level front-line extension systems, play a critical role in assessing and refining technology. To promote the adoption of successful innovations, large-scale demonstrations are conducted to showcase their effectiveness within the farming community. In 2017-18, the Ministry of Agriculture and Farmers' Welfare, Government of India, launched the "Cluster Frontline Demonstrations of Oilseeds" project as part of the National Mission on Oilseeds and Oil Palm (NMOOP). This initiative was carried out through eleven ICAR-Agricultural Technology Application Research Institutes (ATARI) across the

country. The responsibility of conducting Cluster Front Line Demonstrations (CFLDs) under the National Food Security Mission (NFSM) was assigned to Krishi Vigyan Kendras (KVKs) in order to demonstrate the productivity potential of newly released technologies across different farming systems and locations. These KVKs also organize farming and extension activities that involve farmers and extension workers to disseminate various technologies. The supervision of these demonstrations and activities is undertaken by scientists from Krishi Vigyan Kendras, State Agricultural Universities (SAUs), and Regional Agricultural Research Stations. The objective of this study is to analyze the adoption level of recommended groundnut cultivation practices among beneficiary farmers in comparison to non-beneficiary farmers, while also examining the benefits derived from these practices.

RESEARCH METHODOLOGY

For this study, Chittoor district in Andhra Pradesh was purposively selected due to the researcher's familiarity with the district as a native. This familiarity facilitated a comprehensive investigation through personal observations, taking into account the social conditions, local language, cultural aspects, and interactions with relevant personnel such as officers and KVK scientists. Specifically, Krishi Vigyan Kendra in Kalikiri and Rashtriya Seva Samithi - Krishi Vigyan Kendra (RASS-KVK) in Karakambadi, both located in Chittoor district, were purposively selected for the study. Two mandals adopted by each KVK were also selected purposively. Within each selected mandal, three villages were selected using a purposive sampling technique, resulting in a total of six villages. To ensure a representative sample, 10 CFLDs beneficiary farmers and 10 non-beneficiary farmers were randomly selected from each of the chosen villages, totaling 120 respondents.

To assess the variable, a questionnaire was designed, and the frequency of responses was examined on a three-point scale, representing complete adoption, partial adoption, and no adoption. Each response was assigned a corresponding score of 3, 2, or 1, respectively. Based on the mean and standard deviation, the scores were further categorized as high adoption, medium adoption, or low adoption. The mean scale value was utilized to measure the distribution of respondents based on the extent of adoption and technologies.

$$\text{Mean } \bar{x} = \frac{\Sigma x}{n}$$

where,
x = Mean
Σx = Sum of scores
n = Number of respondents

$$\text{Standard Deviation}(\sigma) = \sqrt{\frac{1}{n}\left(\Sigma x^2 - \frac{(\Sigma x)^2}{n} \right)}$$

where,
σ = Standard Deviation
$\sum x^2$ = Sum of squared deviations from the mean
n = Number of observations

$$\text{Mean scale value} = \frac{P_1 \times 3 + P_2 \times 2 + P_3 \times 1}{N}$$

Where,
P_1=Frequencyofrespondentof1stpreference
P_2=Frequencyofrespondentof2ndpreference
P_3=Frequencyofrespondentof3rdpreference
N =Totalnumber ofrespondent

RESULTS AND DISCUSSION

The adoption of recommended groundnut cultivation practices was evaluated, and the findings from Table 1 provide valuable insights. Among the CFLDs beneficiary farmers majority of them adopted dharani variety (mean scale value 4.72) followed by Seed treatment (mean scale value 4.58),Sowing time and spacing (mean scale value 4.44). while the application of gypsum(mean scale value 4.43), major pests in the crop (mean scale value 4.40), seed rate (mean scale value 4.39),water management during critical stages of growth (mean scale value 4.33), post-emergence weeding(mean scale value 4.31) and fertilizer application (mean scale value 4.31), major diseases in the crop (mean scale value 4.23), control measures for major insect pests (mean scale value 3.91) while control measures for major diseases (mean scale value of 3.80),stage of harvesting(mean scale value 3.75),iron deficiency treatment (mean scale value 3.61), pre-emergence weeding (mean scale value 3.50),poison bait (mean scale value 3.33), sowing practices (with mean scale value 3.22), bird perches (with mean scale value 3.14), pheromone traps (mean scale value 3.11), intercropping (mean scale value 2.67), and wild boar (mean scale value 2.56).References provided for further reading include Meena *et al.* (2021); Parihar *et al*. (2021); Choudhary *et al.* (2022); Hashim *et al.* (2022); Madhushekar *et al.*(2022); Rambabu *et al*. (2022); Shankar *et al.* (2022) show casing the existing research in this domain.

Table 1. Response analysis of CFLDs beneficiary farmers and CFLDs non-beneficiary farmers according to the extent of adoption on the recommended groundnut cultivation practices. (n=120)

Sr. No.	Extent of Adoption	CFLDs beneficiary farmers (n=60)					CFLDs non-beneficiary farmers (n=60)				
		CA	PA	NA	Mean scale value	Rank	CA	PA	NA	Mean scale value	Rank
1.	**Sowing time** Kharif: June-July 31st	45 (75.00%)	10 (16.67%)	5 (8.33%)	4.44	3	30 (50.00%)	15 (25.00%)	15 (25.00%)	3.75	4
2.	**Varieties** Kharif: Dharani	50 (83.33%)	10 (16.67%)	0 (00.00%)	4.72	1	10 (16.67%)	14 (23.33%)	36 (60.00%)	2.61	17
3.	**Seed rate** Kharif: 50-60 kg acre^{-1}	40 (66.67%)	18 (30.00%)	2 (3.33%)	4.39	6	31 (51.67%)	9 (15.00%)	10 (16.67%)	3.36	10
4.	**Seed treatment** Imdiachloprid – 2 ml kg^{-1}, Tebuconazole – 1 g kg^{-1}	50 (83.33%)	5 (8.33%)	5 (8.33%)	4.58	2	20 (33.33%)	10 (16.67%)	30 (50.00%)	3.06	12
5.	**Sowing** Bullock drawn seed drill/Tractor drawn seed drill	18 (30.00%)	20 (33.33%)	22 (36.67%)	3.22	16	12 (20.00%)	11 (18.33%)	37 (61.67%)	2.64	16
6.	**Spacing** (Kharif: 30 × 10 cm)	45 (75.00%)	10 (16.67%)	5 (8.33%)	4.44	3	30 (50.00%)	20 (33.33%)	10 (16.67%)	3.89	2
7.	**Inter cropping** (Groundnut + Redgram / castor @ 7 : 1/11 : 1)	16 (26.67%)	4 (6.67%)	40 (66.66%)	2.67	19	10 (16.67%)	15 (25.00%)	35 (58.33%)	2.64	16
8.	**Fertilizer application** (Kharif: NPK: 8-16-20 Kg acre^{-1})	40 (66.67%)	15 (25.00%)	5 (8.33%)	4.31	8	30 (50.00%)	11 (18.33%)	19 (31.67%)	3.64	5
9.	**Gypsum (200 kg acre^{-1})**	45 (75.00%)	10 (16.67%)	5 (8.33%)	4.43	4	28 (46.67%)	13 (21.66%)	19 (31.67%)	3.58	7
10.	**Iron deficiency** ($FeSO_4$ 1 kg + 200 g citric acid in 200 lit per acre)	20 (33.33%)	30 (50.00%)	10 (16.67%)	3.61	13	20 (33.33%)	10 (16.67%)	30 (50.00%)	3.06	12
11	**Water management Critical stages of crop Flowering**	45 (75.00%)	10 (16.67%)	5 (8.33%)	4.33	7	30 (50.00%)	10 (16.67%)	20 (33.33%)	3.47	8
	Pegging	40 (66.67%)	15 (25.00%)	5 (8.33%)			29 (48.33%)	7 (11.67%)	24 (40.00%)		
	Pod development	43 (71.67%)	7 (11.66%)	10 (16.67%)			25 (41.67%)	10 (16.67%)	25 (41.66%)		
12.	**Pre-emergence weeding:** (Pendimethalin 30% @ 1.3 - 1.61 acre^{-1} Butachlor 50% @ 1.25 - 1.5 l acre^{-1})	20 (33.33%)	26 (43.33%)	14 (23.33%)	3.50	14	16 (26.67%)	30 (50.00%)	14 (23.33%)	3.39	9
13.	**Post emergence weeding:** (Imazetayr 10% - 300 ml or Quizalofop ethyl 5% - 400 ml / 200 lit of water)	40 (66.67%)	15 (25.00%)	5 (8.33%)	4.31	8	30 (50.00%)	10 (16.67%)	20 (33.33%)	3.61	6
14.	**Name of major insect pests** 1. Red hairy caterpillar	45 (75.00%)	10 (16.67%)	5 (8.33%)	4.40	5	29 (48.33%)	8 (13.33%)	23 (38.33%)	3.80	3
	2. Root Grub	39 (65.00%)	16 (26.67%)	5 (8.33%)			31 (51.67%)	13 (21.67%)	16 (43.33%)		
	3. Aphids and Jassids	46 (76.67%)	10 (16.67%)	4 (6.66%)			35 (58.33%)	10 (16.67%)	15 (25.00%)		
15.	**Control measures for major insect pests Red hairy caterpillar-** (Methyl parathion 50% E.C. quinalphos 25 E.C. – 400 ml / 200 lit acre^{-1})	30 (50.00%)	20 (33.33%)	10 (16.67%)	3.91	10	15 (25.00%)	10 (16.67%)	35 (58.33%)	2.86	14
	Root grub- (Phorate granules 10 g – 6 kg acre^{-1})	31 (51.67%)	15 (25.00%)	14 (23.33)			14 (23.33%)	11 (18.33%)	35 (58.33%)		
	Aphids and Jassids- (Dimethoate - 400m / Novuluron – 400 ml/ Imidacloprid-60 ml / 200 lit acre^{-1})	35 (58.33%)	15 (25.00%)	10 (16.67%)			20 (33.33%)	10 (16.67%)	30 (50.00%)		
16.	**Name of major diseases** 1. Tikka leaf spot	40 (66.67%)	12 (20.00%)	8 (13.33%)	4.23	9	43 (71.67%)	7 (11.66%)	10 (16.67%)	4.14	1
	2. Peanut bud necrosis	41 (68.33%)	9 (15.00%)	10 (16.67%)			41 (68.33%)	12 (20.00%)	7 (11.67%)		
	3. Collor rot	42 (70.00%)	10 (16.67%)	8 (13.33%)			30 (50.00%)	20 (33.33%)	10 (16.67%)		
17.	**Control measures for major diseases Tikka leaf spot** (Mancozeb – 400 g + Carbendazim – 200 g / 200 lit acre^{-1})	35 (58.33%)	10 (16.67%)	15 (25.00%)	3.80	11	25 (41.67%)	14 (23.33%)	21 (35.00%)	3.11	11
	Peanut bud necrosis (Imidacloprid 600 fs – 2 ml / 4 ml)	30 (50.00%)	20 (33.33%)	10 (16.67%)			20 (33.33%)	11 (18.33%)	29 (48.33%)		
	Collor rot (Mancozeb – 500 g / 200 lit)	25 (41.67%)	21 (35.00%)	14 (23.33%)			15 (25.00%)	12 (20.00%)	33 (55.00%)		
18.	**Poison bait** (Rice bran 10 kg + jaggery 2 kg + water 2 lit + chlorpyrifos 750 ml / thiodicarb 300 g acre^{-1})	15 (25.00%)	30 (50.00%)	15 (25.00%)	3.33	15	20 (33.33%)	10 (16.67%)	30 (50.00%)	3.05	13
19.	**Wild boar** (Sarees/ Barbed wire)	2 (3.33%)	28 (46.67%)	30 (50.00%)	2.56	20	9 (15.00%)	10 (16.67%)	41 (68.33%)	2.44	18
20.	**Pheromone traps** (4 number per acre)	21 (35.00%)	10 (16.67%)	29 (48.33%)	3.11	18	22 (36.67%)	8 (13.33%)	30 (50.00%)	3.11	11
21.	**Bird perches** (10 numbers per acre)	19 (31.67%)	15 (25.00%)	26 (43.33%)	3.14	17	15 (25.00%)	10 (16.67%)	35 (58.33%)	2.78	15
22.	**Stage of harvesting**	35 (58.33%)	5 (8.33%)	20 (33.33%)	3.75	12	30 (50.00%)	11 (18.33%)	19 (31.67%)	3.64	5

CA- Complete Adoption, **PA-** Partial Adoption, **NA-** No Adoption

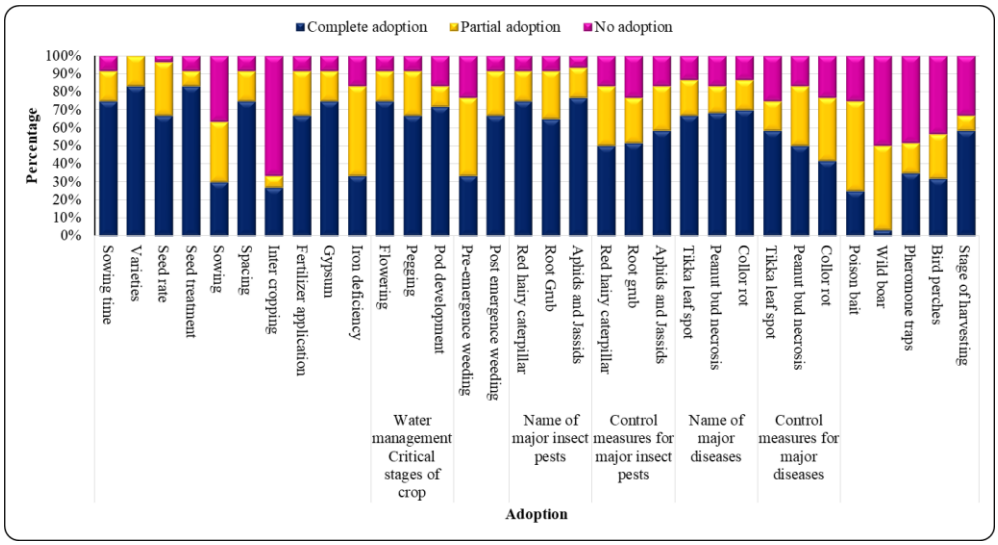

Fig. 1. Response analysis of CFLDs beneficiary farmers according to the extent of adoption on the recommended groundnut cultivation practices.

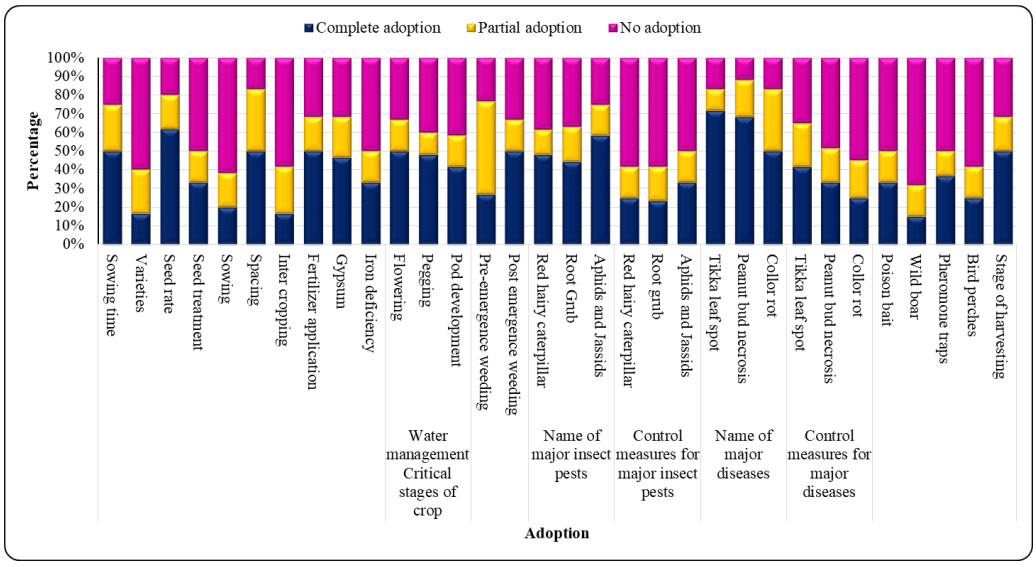

Fig. 2. Response analysis of CFLDs non-beneficiary farmers according to the extent of adoption on the recommended groundnut cultivation practices.

In contrast, regarding the extent of adoption among non-beneficiary farmers on the recommended groundnut cultivation practices was assessed and the data(Table 1) revealed that, most of the CFLDs non-beneficiary farmers know about the major diseases in groundnut (mean scale value 4.14) followed by spacing (mean scale value of 3.89), know about the major insect pests (mean scale 3.80), sowing time (mean scale value 3.75), stage of harvesting (mean scale value 3.64)fertilizer application (mean scale value 3.64) post emergence weeding (mean scale value 3.61), gypsum application (mean scale value 3.58), water management at critical stages(mean scale value 3.47), pre-emergence weeding (mean scale value 3.39), seed rate (mean scale value 3.36) ,control measures with major diseases and pheromone traps (mean scale value 3.11), iron deficiency and seed treatment(mean scale value 3.06), poison bait treatment (mean scale value 3.05) control measures for major insect pests (mean scale value 2.86), bird perches (mean scale value 2.78), sowing and intercropping (mean scale value 2.64), variety (mean scale value 2.61) and wild boar (mean scale value 2.44).These findings were inline with the findings of Meena *et al.* (2021); Parihar *et al.* (2021); Jat *et al.*(2022); Nagarjuna *et al.* (2022); Patro et al. (2022); Patel (2022); Prasad *et al.* (2022)

Extent of Adoption. Table 2 and Fig. 3, present the data illustrating the distribution of CFLDs beneficiary and non-beneficiary farmers in relation to the extent of adoption of recommended groundnut cultivation practices.

Analysis of the data in Table 2 and Fig. 3 reveals that more than half (51.67%) of the CFLDs beneficiary farmers exhibited a high level of adoption of the recommended groundnut cultivation practices, while (45.00%) showed a medium level of adoption, and only (3.33%) had a low level of adoption. In contrast, among CFLDs non-beneficiary farmers, (50.00%) demonstrated a moderate level of adoption, (41.67%) had a low level of adoption, and (8.33%) exhibited a high level of adoption.

Table 2: Distribution of CFLDs beneficiary farmers and CFLDs non-beneficiary farmers according to the extent of adoption on the recommended groundnut cultivation practices (n = 120).

Sr. No.	Extent of Adoption	CFLDs beneficiary farmers (n=60)		CFLDs non-beneficiary farmers (n=60)	
		Frequency	Percentage	Frequency	Percentage
1.	Low	2	3.33	25	41.67
2.	Medium	27	45.00	30	50.00
3.	High	31	51.67	5	8.33
Total		**60**	**100.00**	**60**	**100.00**
Mean		**52.00**		**43.4**	
SD		**4.55**		**4.90**	

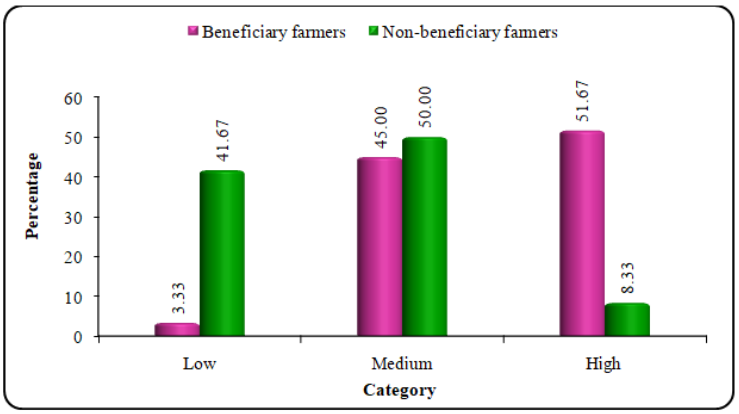

Fig. 3. Distribution of CFLDs beneficiary farmers and CFLDs non-beneficiary farmers according to the extent of adoption.

The extent of adoption of improved practices in groundnut cultivation was higher among beneficiary farmers compared to non-beneficiaries. This can be attributed to the active participation of beneficiaries in training programs conducted by scientists, as well as their continuous interaction with experts or KVK scientists throughout the field study. These interactions provided them with valuable knowledge and skills related to groundnut cultivation, leading to a greater willingness to adopt new practices. Additionally, the Kisan mobile advisories sent by KVKs played a crucial role in increasing the knowledge of beneficiary farmers and convincing them to embrace new technologies. Through these advisories, farmers were exposed to information about successful experiences and practices in groundnut cultivation, further reinforcing their confidence in adopting the recommended package of practices. Overall, the combination of training programs, continuous interaction with experts, and access to information through Kisan mobile advisories contributed to the higher extent of adoption of improved practices among beneficiary farmers in groundnut cultivation.

The lower adoption of groundnut cultivation practices among non-beneficiary farmers could be attributed to several factors, including a lack of technical guidance, limited interaction with extension personnel, inadequate exposure to mass media, and insufficient participation in training programs. These factors may have contributed to their limited knowledge and understanding of the recommended technologies. It is evident that a comprehensive and accurate comprehension of these technologies is crucial and acts as a prerequisite for the widespread acceptance and implementation of improved farming practices.

The findings were in line with the findings of Singh *et al.* (2018); Kakkad *et al.* (2019); Parihar *et al.* (2021); Singh *et al.* (2021); Pujari *et al.* (2022); Rambabu *et al.* (2022); Shankar *et al.* (2022); Srilakshmi *et al.* (2022).

CONCLUSIONS

To showcase the effectiveness of improved varieties and promote the adoption of advanced production management technologies for groundnut, cluster frontline demonstrations were meticulously carried out on farmers' fields. The primary objective was to convince the farming community of the immense potential and benefits associated with these innovations. Beneficiary farmers, who received comprehensive training and education on the technologies utilized in cluster frontline demonstrations, displayed a higher likelihood of embracing them. Through targeted programs and extension services, farmers gained valuable knowledge and a deeper understanding of the advantages offered by cluster frontline demonstrations. Additionally, beneficiary farmers received institutional support from various entities such as government agencies, research institutions, and non-governmental organizations. These collaborative organizations worked closely with farmers, providing vital technical assistance, facilitating access to essential resources, and ensuring continuous monitoring and evaluation. The combined efforts of these organizations created an enabling environment, making it easier for beneficiary farmers to readily adopt the technologies employed in cluster frontline demonstrations. This distinguished them from non-beneficiary farmers, as they had access to a wealth of support and resources that further facilitated the adoption process.

FUTURE SCOPE

The main aim of this research was to determine the extent of adoption of CFLDs in Chittoor district. The study's results will aid extension agents in developing various techniques that are suitable for the target clientele. It would give a direction to the implementation agencies of CFLDs to overcome any lacuna if any for the better execution of the demonstrations. The study would bring out the profile characteristics, extent of adoption of CFLDs on the beneficiary farmers, which could be utilized for further strengthening of CFLDs programme and enhance the productivity of Oilseeds in the Country.

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