

IMPACT OF PLANT PROTECTION TRAINING PROGRAMMES ON KNOWLEDGE LEVEL OF GROUNDNUT GROWERS

D. M. Kakkad¹, V. M. Parmar² and M. G. Nandaniya³

1 Asst. Prof., Dept. of Agricultural Extension and Communication, ASPEE College of Agriculture, JAU, Khapat-Porbandar

2 Asst. Prof., Dept. of Horticulture, ASPEE College of Agriculture, JAU, Khapat-Porbandar - 360579

3 Asst. Prof., Dept. of Entomology, ASPEE College of Agriculture, JAU, Khapat-Porbandar -360579

Email : dmakkad@jau.in

ABSTRACT

Groundnut is a prominent crop in the Porbandar district of Gujarat; hence, the present study was undertaken to assess the impact of plant protection training programmes on the knowledge level of groundnut growers. The study was conducted in two talukas of Porbandar district, namely Porbandar and Ranavav. A multistage random sampling technique was adopted, wherein five villages were randomly selected from each taluka and ten groundnut growers from each village, resulting in a total sample size of 100 respondents. The knowledge level of the same respondents was measured before and after imparting training on plant protection measures in groundnut. An ex post facto research design was used to assess the impact of the training programme. The findings revealed a substantial improvement in the knowledge level of groundnut growers after participation in the plant protection training programme. Before training, the majority of respondents belonged to the low (54.00 per cent) and medium (30.00 per cent) knowledge categories, with only 2.00 per cent having high knowledge and none in the very high category. After training, a significant shift was observed, with 56.00 per cent of respondents attaining a high level of knowledge and 29.00 per cent reaching a very high level, while the proportion of farmers in low and very low knowledge categories drastically declined. Multiple regression analysis indicated that social participation, source of information, innovativeness, risk orientation and scientific orientation significantly influenced the knowledge gain of respondents. The regression model explained 48.80 per cent variation in knowledge gain among the respondents. The results clearly indicate that plant protection training programmes were highly effective in enhancing the knowledge level of groundnut growers, thereby emphasizing the importance of need-based training interventions for sustainable groundnut production.

Keywords: groundnut growers, plant protection training and knowledge level

INTRODUCTION

Groundnut (*Arachis hypogaea* L.) is one of the most important oilseed crops in India, occupying approximately 5–6 million hectares with an annual production of around 9–10 million tonnes. India contributes nearly 15–20 per cent of the global groundnut area and plays a vital role in ensuring food security, edible oil supply and farmers' income (FAOSTAT, 2023; Directorate of Groundnut Research, 2022). The crop is predominantly cultivated in semi-arid and tropical regions due to its adaptability and multiple uses as food, feed and industrial raw material. However, the average productivity of groundnut in India (about 1800–2000 kg/ha) remains lower than its potential yield (ICAR-DGR, 2022).

Despite its economic importance, groundnut productivity is severely constrained by biotic stresses, particularly insect pests and diseases, which account for yield losses ranging from 15 to 40 per cent and may reach up to 70 per cent under severe infestation (Sharma & Bhatnagar,

2019). Therefore, effective plant protection measures are crucial to sustain productivity and enhance farm profitability.

In recent years, agricultural extension systems have increasingly emphasized capacity building of farmers through training programmes aimed at improving their knowledge and adoption of scientific plant protection practices. Studies indicate that adoption of integrated pest management (IPM) practices through training can enhance crop yield by 10–25 per cent and significantly reduce indiscriminate pesticide use (Singh *et al.*, 2020). Training programmes also result in a substantial increase (30–60 per cent) in farmers' knowledge levels, thereby improving their decision-making abilities and promoting safe and efficient pest management practices (Kumar & Meena, 2021).

However, the effectiveness of such programmes depends largely on the extent to which they enhance farmers' understanding and practical application of plant protection technologies. Hence, assessing the impact of training

programmes is essential to evaluate their effectiveness, identify gaps and improve future extension strategies. In this context, the present study aims to examine the impact of plant protection training programmes on the knowledge level of groundnut growers. The findings are expected to provide valuable insights for policymakers, extension personnel and training institutions in designing need-based and result-oriented training modules for sustainable groundnut production.

OBJECTIVES

To study the impact of plant protection training programmes on knowledge level of groundnut grower

METHODOLOGY

The present study was undertaken to assess the impact of plant protection training programmes on the knowledge level of groundnut growers in Porbandar district of Gujarat state. An ex post facto research design was employed to evaluate the effectiveness of the training programme, as the variables under study had already occurred and were not under the direct control of the researcher. The study was conducted in Porbandar district of Gujarat, where groundnut is a major cultivated crop. Two talukas, namely Porbandar and Ranavav, were purposively selected due to the predominance of groundnut cultivation and the implementation of plant protection training programmes in these areas. A multistage random sampling technique combined with purposive sampling was adopted for the selection of respondents. In the first stage, five villages from each selected taluka were randomly chosen, making a total of ten villages. In the second

stage, ten groundnut growers from each selected village were randomly selected. Thus, the final sample comprised 100 groundnut growers who had participated in the plant protection training programme. Primary data were collected from the selected respondents using a structured and pre-tested interview schedule.

The knowledge level of the respondents regarding plant protection practices in groundnut was measured before and after the training programme. The knowledge test consisted of relevant questions covering recommended plant protection measures, pest and disease identification, pesticide use and integrated pest management practices. The collected data were coded, tabulated and analyzed using suitable statistical tools. Descriptive statistics such as frequency, percentage, mean and standard deviation were used to describe the knowledge levels of respondents. The impact of the training programme was assessed by comparing pre-training and post-training knowledge scores using paired sample t-test to determine the significance of change. Further, multiple regression analysis was employed to identify the factors influencing knowledge gain among respondents. The knowledge gain index was considered as the dependent variable, while age, education, annual income, land holding, gender, social participation, source of information, training exposure, economic motivation, innovativeness, risk orientation and scientific orientation were considered as independent variables. The coefficient of determination (R^2), regression coefficients (β), t-values and F-test were used for interpretation of the regression model and significance of variables.

RESULTS AND DISCUSSION

Profile of respondents

Table: 1: Profile of the groundnut grower farmers

Profile of Respondents		
(1) Age		
Category	Frequency	Per cent
Young (up to 35 years)	27	27.00
Middle (36–50 years)	37	37.00
Old (above 50 years)	36	36.00
(2) Education		
Illiterate	0	0.00
Functionally literate	4	4.00
Primary (1st–8th)	9	9.00
Middle (9th–10th)	4	4.00
High school (11th–12th)	66	66.00
College/post-graduation	17	17.00

(3) Annual Income						
Up to ₹ 50,000	0	0.00				
₹ 50,001–1,00,000	8	8.00				
₹ 1,00,001–1,50,000	10	10.00				
₹ 1,50,001–2,00,000	15	15.00				
Above ₹ 2,00,000	67	67.00				
(4) Land Holding						
0.01–1.00 ha	23	23.00				
1.01–2.00 ha	32	32.00				
2.01–4.00 ha	38	38.00				
4.01–10.00 ha	7	7.00				
Above 10.00 ha	0	0.00				
(5) Gender						
Male	93	93.00				
Female	7	7.00				
Transgender	0	0.00				
(6) Organization						
Milk cooperative society	74	74.00				
Farmers Interest Group (FIG)	30	30.00				
Agricultural service cooperative society	2	2.00				
Farmers’ Producer Organization (FPO)	2	2.00				
(7) Training received						
No training	10	10.00				
1–2 trainings	78	78.00				
3–5 trainings	12	12.00				
Above 5 trainings	0	0.00				
(8) Source of information						
Source	Frequency			Per cent		
	Always	Sometimes	Never	Always	Sometimes	Never
Village level worker / Extension officer	25	62	13	25.00	62.00	13.00
KVK / University	90	10	0	90.00	10.00	0.00
Neighbors	21	67	12	21.00	67.00	12.00
Relatives / Friends	26	62	12	26.00	62.00	12.00
Progressive farmers	21	62	17	21.00	62.00	17.00
Television	21	64	15	21.00	64.00	15.00
Newspaper	16	64	20	16.00	64.00	20.00
Exhibition / Agricultural fair	38	46	16	38.00	46.00	16.00
Internet / WhatsApp	24	63	13	24.00	63.00	13.00

With respect to age, 37.00 per cent of the respondents belonged to the middle age group (36–50 years), followed by 36.00 per cent in the old age group (above 50 years) and 27.00 per cent in the young age group (up to 35 years).

Regarding educational status, the majority of respondents (66.00 per cent) had education up to high school level (11th–12th standard). College or post-graduation education was reported by 17.00 per cent of the respondents. Primary education was observed among 9.00 per cent, while 4.00 per cent each were functionally literate and educated

up to middle school level. No respondent was found to be illiterate.

The distribution of respondents according to annual income revealed that 67.00 per cent earned above ₹2,00,000 per annum. About 15.00 per cent of respondents had an annual income between ₹1,50,001 and ₹2,00,000, followed by 10.00 per cent in the income group of ₹1,00,001–₹1,50,000 and 8.00 per cent in the ₹50,001–₹1,00,000 category. None of the respondents reported an annual income of up to ₹50,000.

In terms of land holding, 38.00 per cent of the

respondents possessed land between 2.01 and 4.00 hectares, followed by 32.00 per cent with land holdings of 1.01–2.00 hectares. Small landholders (0.01–1.00 hectare) constituted 23.00 per cent, while 7.00 per cent owned land in the range of 4.01–10.00 hectares. No respondent possessed land above 10 hectares.

The gender-wise distribution showed that 93.00 per cent of respondents were male and 7.00 per cent were female. No transgender respondents were recorded.

With regard to organizational membership, 74.00 per cent of respondents were members of milk cooperative societies, while 30.00 per cent were associated with Farmers Interest Groups (FIGs). Membership in agricultural service cooperative societies and Farmers' Producer Organizations (FPOs) was reported by 2.00 per cent of respondents each.

Training exposure results indicated that 78.00 per cent of respondents had received 1–2 trainings, followed by 12.00 per cent who had attended 3–5 trainings. About 10.00 per cent of respondents had not received any training and none had attended more than five training programmes.

The results indicated that KVK/University was the most frequently used source of information, with 90.00 per cent of respondents always using it. Exhibition and agricultural fairs were always used by 38.00 per cent of respondents. Village level workers, relatives/friends and internet/WhatsApp were mostly used sometimes by more than 60.00 per cent of respondents. Neighbors, progressive farmers, television and newspapers were also predominantly used on a sometimes basis. The results are in line with the studies of Vinaya *et al.* (2013).

Table 2 : Improvement in respondents' socio-psychological attributes after the intervention.

(n=100)

Category	Before		After	
Economic Motivation	Frequency	Per cent	Frequency	Per cent
Very low level (Up to 10.80)	0	0.00	0	0.00
Low level (10.81 – 15.60)	35	35.00	4	4.00
Medium level (15.61 – 20.40)	39	39.00	50	50.00
High level (20.41 – 25.20)	24	24.00	41	41.00
Very high level (Above 25.20)	2	2.00	5	5.00
Innovativeness	Frequency	Per cent	Frequency	Per cent
Low level (Up to 6.67)	82	82.00	27	27.00
Medium level (6.68 – 8.33)	12	12.00	52	52.00
High level (Above 8.33)	6	6.00	21	21.00
Risk Orientation	Frequency	Per cent	Frequency	Per cent
Very low level (Up to 4.80)	2	2.00	0	0.00
Low level (4.81 – 9.60)	6	6.00	0	0.00
Medium level (9.61 – 14.40)	54	54.00	44	44.00
High level (14.41 – 19.20)	32	32.00	52	52.00
Very high level (Above 19.20)	6	6.00	4	4.00
Scientific Orientation	Frequency	Per cent	Frequency	Per cent
Very low level (Up to 10.80)	0	0.00	2	2.00
Low level (10.81 – 15.60)	13	13.00	0	0.00
Medium level (15.61 – 20.40)	42	42.00	45	45.00
High level (20.41 – 25.20)	38	38.00	51	51.00
Very high level (Above 25.20)	7	7.00	2	2.00

The results showed an improvement in respondents' socio-psychological attributes after the intervention. Economic motivation shifted from low (35.00 per cent) to medium and high levels (50.00 per cent and 41.00 per cent, respectively). Innovativeness increased markedly, with respondents in the medium and high categories rising from

18.00 per cent before to 73.00 per cent after. Risk orientation also improved, as respondents in the high category increased from 32.00 per cent to 52.00 per cent. Scientific orientation showed a positive shift, with respondents in high level increasing from 38.00 per cent before to 51.00 per cent after the intervention.

These findings are consistent with previous studies, which demonstrated that training programmes significantly improve socio-psychological attributes of farmers (Ghosh & Pandey, 2024; Sharma & Singh, 2023; Sharma et al., 2022; Prajapati et al., 2025; Jalu et al., 2023; Patel et al., 2023).

Impact of plant protection training programmes on knowledge level of groundnut growers

The results revealed a substantial improvement in

the knowledge level of respondents after the intervention. Before the intervention, 68.00 per cent of respondents were in the very low to low knowledge categories, whereas after the intervention, 85.00 per cent were in the high to very high knowledge categories. The mean knowledge score increased from 35.75 to 72.90 and the calculated t value (15.91) indicated a highly significant difference between before and after knowledge levels.

Table:3: Distribution of respondents according to their level of knowledge before and after intervention (n=100)

Sr. No.	Category	Before		After	
		Frequency	Per cent	Frequency	Per cent
1	Very low level of knowledge (00.00 to 20.00)	14	14.00	2	2.00
2	Low level of knowledge (20.00 to 40.00)	54	54.00	6	6.00
3	Medium level of knowledge (40.00 to 60.00)	30	30.00	7	7.00
4	High level of knowledge (60.00 to 80.00)	2	2.00	56	56.00
5	Very level of knowledge (80.00 to 100.00)	0	0.00	29	29.00
	Mean	35.75		72.90	
	t-test	15.91			

These results align with previous research, which documented significant knowledge enhancement among farmers after participation in training programmes on

improved cultivation technologies, value addition and entrepreneurship (Soni & Kamaliya, 2016; Ghosh & Pandey, 2024; Vinaya et al., 2017).

Table 4: Multiple regression analysis of factors influencing knowledge gain among groundnut growers

Sr. No.	Independent Variables	Regression Coefficient (β)	Standard Error	t-value
X ₁	Age	-0.176	0.102	-1.721
X ₂	Education	-2.577	1.613	-1.598
X ₃	Annual income	-0.000015	0.000009	-1.661
X ₄	Land holding	-1.459	1.376	-1.060
X ₅	Gender	0.995	5.283	0.188
X ₆	Social participation	8.200	2.326	3.525**
X ₇	Source of information	2.531	0.847	2.989**
X ₈	Training received	2.677	2.101	1.274
X ₉	Economic motivation	-1.001	0.716	-1.399
X ₁₀	Innovativeness	-4.085	1.054	-3.875**
X ₁₁	Risk orientation	-5.903	0.878	-6.720**
X ₁₂	Scientific orientation	-1.220	0.365	-3.341**
		R ²	0.488	
		Adjusted R ²	0.455	
		F-value	14.85**	

** = Significant at 1 per cent level of probability

The findings presented in Table 3 revealed that the coefficient of determination (R^2) was 0.488, indicating that the selected independent variables jointly explained 48.80 per cent variation in the knowledge gain index of respondents. The calculated F-value (14.85) was found to be highly significant at 1.00 per cent level of probability, which indicated good fit of the regression model.

Among the selected independent variables, social participation, source of information, innovativeness, risk orientation and scientific orientation were found to exert significant influence on the knowledge gain index of respondents. Social participation and source of information exhibited positive and significant relationships with knowledge gain, implying that respondents having greater social involvement and better access to extension and communication sources acquired more knowledge through the training programme.

Innovativeness, risk orientation and scientific orientation showed significant but negative regression coefficients under the present regression model conditions. This may be attributed to the fact that respondents possessing higher innovativeness, scientific orientation and risk-taking ability might already have had comparatively higher pre-training knowledge levels, resulting in relatively lower incremental knowledge gain after the intervention.

The remaining variables, namely age, education, annual income, land holding, gender, training exposure and economic motivation, did not show significant influence on the knowledge gain index. This indicates that the training programme was uniformly effective across different categories of respondents irrespective of their socio-economic background. The findings of the present study are in line with the findings reported by Ghosh and Pandey (2024) and Sharma and Singh (2023),

CONCLUSION

The findings clearly indicate that the intervention had a significant positive impact on the knowledge level of the respondents. A major shift was observed from very low and low knowledge categories before the intervention to high and very high knowledge categories after the intervention. The substantial increase in mean knowledge score from 35.75 to 72.90, along with a high t value (15.91), confirms that the intervention was highly effective in enhancing respondents' knowledge.

RECOMMENDATIONS

- (1) The findings of the study indicate that plant protection training programmes significantly improve the

knowledge level of groundnut growers. Therefore, Agricultural Universities, Krishi Vigyan Kendras (KVKs) and extension agencies should organize regular and need-based training programmes on plant protection technologies to enhance farmers' knowledge and adoption of scientific practices.

- (2) Government departments and extension organizations should strengthen farmer capacity building through demonstrations, field trainings and digital advisory services so that improved plant protection practices can be widely disseminated among groundnut growers for sustainable crop production.

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CONFLICT OF INTEREST

I have declared that there is no conflict of interest regarding the publication of this research work.

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