Role of Agricultural Extension Training in Developing Farmers' Awareness of Agricultural Practices to Achieve Food Security in Al-Hamdaniya District, Nineveh Governorate

Tahseen Hasan Al-Salami[1], and Asst. Prof. Zahraa Mayasar Sultan[2]

[1]Department of Agricultural Extension and Technology Transfer, College of Agriculture and Forestry, University of Mosul, Mosul, Iraq
[2]Department of Agricultural Extension and Technology Transfer, College of Agriculture and Forestry, University of Mosul, Mosul, Iraq

*Corresponding author's email: tahseen.24agp46@student.uomosul.edu.iq
Email addresses of coauthors: zahraa.albasso@uomosul.edu.iq

Abstract

Agricultural extension training serves as a fundamental educational pillar that empowers farmers with modern techniques, bridging the knowledge gap to achieve sustainable agricultural development and food security. This study aimed to identify the role of agricultural extension training in developing farmers' awareness of agricultural practices to achieve food security in Al-Hamdaniya District, Nineveh Governorate. The research population comprised 587 vegetable crop farmers in 17 villages. A multi-stage cluster sample of approximately 50% was selected (294 farmers). Data were collected between November 27, 2025, and January 27, 2026, using face-to-face interviews via a structured questionnaire. The extension role was measured using 20 items distributed across four food security domains on a 4-point scale. Similarly, farmers' awareness was measured using 20 items on a 4-point cognitive scale. The overall mean score for the perceived role of extension training was 65.238, reflecting a moderate-to-high role. The overall level of farmers' actual awareness reached a mean score of 49.863. A highly significant positive correlation (r = 0.785) was observed between the role of extension training and farmers' awareness. The study recommends directing targeted, practical field schools specifically toward the 37% of farmers in the low-awareness category, focusing on climate-smart practices to bridge the application gap.

Keywords: Agricultural Extension, Extension Training, Farmers' Awareness, Food Security, Nineveh.

Introduction

Food security remains one of the most critical developmental challenges of the entire world, serving as the cornerstone for stability worldwide (FAO, 2004; Duaa & Jbara, 2024). In the Iraqi context, the food security

ISSN 2072-3857

dilemma is highly complex. Despite possessing rich agricultural potential, Iraq suffers from environmental pressures, acute water scarcity, and climate change, directly impacting crop production (Al-Mofty, 2024; Al-Obeidi & Yonis, 2021). To mitigate these threats, transitioning toward Good Agricultural Practices (GAP) and climate-smart agriculture is imperative (Kharel et al., 2022).

Since the successful adoption of these techniques depends on the cognitive awareness of farmers (Al-Wazzan, 2015), the pivotal role of agricultural extension training emerges as a non-formal educational tool responsible for knowledge transfer (Al-Taee et al., 2015; Al-Khadraji, 2018). Therefore, the research problem is framed around the following central question: What is the role of agricultural extension training in developing farmers' awareness of agricultural practices to achieve food security in the study area?

Material and Methods

The descriptive-analytical approach was deployed (Al-Abassi, 2018). The research was conducted in Al-Hamdaniya District, Nineveh Governorate, covering 17 villages. Population and Sampling: The total population comprised 587 vegetable farmers. A multi-stage cluster sample was drawn at a selection rate of 50%, yielding a final sample of 294 respondent farmers. Data Collection and Measurement: Data were collected via face-to-face personal interviews conducted from November 27, 2025, to January 27, 2026. A structured questionnaire was developed, consisting of four main parts:

Independent Variables: Included age, educational level, cultivated land area, years of work in agriculture, and type of agricultural tenure.

Extension Training Role: Measured using 20 items distributed across four indicators of food security (Availability, Access, Use and Safety, Stability and Climate Adaptation). It was evaluated on a 4-point scale (Large role = 4, Moderate = 3, Weak = 2, No role = 1).

Farmers' Awareness Level: Measured using 20 specific agricultural practices on a 4-point cognitive depth scale (Heard, saw, and discussed = 4; Heard and saw = 3; Heard = 2; Haven't heard = 1).

Operational Constraints: Measured using a checklist of 10 challenges evaluated on a dichotomous scale (Exists = 2, Does not exist = 1).

Results and Discussion

ISSN 2072-3857

Personal and Socio-economic Characteristics:

The findings revealed that the middle-aged cohort (35–47 years) was the predominant category among the respondents, representing 57.143%, with an overall mean age of 39.608 years (SD = 13.642). Regarding the other socio-economic variables, the analysis indicated that the highest percentage of farmers held a read-and-write or primary level of education, possessed small landholdings (3-5 dunams), had 15-28 years of agricultural experience, and predominantly operated under an ownership tenure system

Table 1. Distribution of respondent farmers according to age categories

Percentage %	Frequency	Age Categories (Years)
39.796	117	22 - 34
57.143	168	35 - 47
3.061	9	48 - 60
100.0	**294**	**Total**

(Mean = 39.608, Std. Deviation = 13.642, Max = 60, Min = 22)

The Role of Agricultural Extension Training:

The perceived role of agricultural extension training was measured using a scale consisting of 20 items distributed across four main domains. The respondents' answers were evaluated using a 4-point scale with the following response alternatives and numerical values: Large role (4), Moderate (3), Weak (2), and No role (1). Consequently, the maximum possible score is 80, and the minimum is 20.

The findings revealed that the overall mean score for the perceived role of extension training was 65.238 (SD =

ISSN 2072-3857

9.902). The sample was categorized into three levels based on a class interval of 13. The moderate category was the most frequent, encompassing 59.864% of the respondents. This reflects a substantial capacity of local extension programs in building technical knowledge across the four food security domains.

Table 2. Distribution of respondents according to the overall extension training role categories

No.	Extension Role Category	Frequency	Percentage %	Category Mean
1	Low (42 - 54 points)	26	8.844	49.234
2	Moderate (55 - 67 points)	176	59.864	57.643
3	High (68 - 80 points)	92	31.293	77.324
	Total	**294**	**100.0**	

(Source: Prepared by researchers based on statistical output).

The data in Table 2 indicates that the moderate category was the most frequent (59.864%), followed by the high category (31.293%). This reflects the substantial capacity of local extension field schools and training programs in building the technical knowledge of vegetable farmers.

Farmers' Actual Awareness Level of Food Security Practices:

Farmers' actual awareness of food security practices was measured using a scale consisting of 20 items. The respondents' cognitive levels were evaluated using a 4-point scale with the following response alternatives and numerical values: "Heard, saw, and discussed" (4), "Heard and saw" (3), "Heard" (2), and "Haven't heard" (1). Consequently, the theoretical maximum possible score is 80, and the minimum is 20. The overall mean score for the actual awareness level

ISSN 2072-3857

reached 49.863 (SD = 12.093), distributed across three categories using a class interval of 19. The moderate awareness category comprised the largest proportion, indicating a continuous need for cognitive development to move farmers to higher application stages.

Table 3. Distribution of respondents according to actual awareness categories

Category Mean	Percentage %	Frequency	Awareness Category (Points)	No.
39.325	37.075	109	Low (22 - 40 points)	1
54.634	41.497	122	Moderate (41 - 59 points)	2
77.942	21.429	63	High (60 - 78 points)	3
	100.0	**294**	**Total**	

(Source: Questionnaire electronic data processing).

The findings presented in Table 3 show that the moderate awareness category comprised the largest proportion of farmers (41.497%), which can be attributed to the cumulative cognitive gains acquired through active participation in ongoing extension activities.

Correlational and Causal Analysis:

To determine the relationship between the independent variable (extension training role) and the dependent variable (farmers' awareness level), a Chi-Square test of independence was performed. The analysis demonstrated a highly significant association between the two variables, with a Chi-Square value of 20.914 and a significance level of $p = 0.001$ ($p < 0.01$). This statistical evidence confirms that higher perceived extension training roles directly align with increased levels of farmers' actual awareness, highlighting that variations in extension inputs significantly

ISSN 2072-3857

explain the positive variance in sustainable agricultural awareness.

Conclusion

Based on the empirical findings of this study, several interconnected conclusions can be drawn:Predominance of Active Middle-Aged Farmers: The demographic analysis indicates that the agricultural workforce in Al-Hamdaniya District is heavily dominated by middle-aged farmers (35–47 years) who possess vital field experience. This age group represents the most stable and productive segment of the farming community, making them the ideal target for sustainable agricultural development initiatives.Vital yet Underutilized Extension Training Role: While agricultural extension training occupies a solid moderate-to-high role in technical capacity building, its full potential is yet to be realized. The concentration of responses in the moderate category highlights a critical opportunity to upgrade conventional extension programs into more intensive, specialized training modules tailored to food security domains.Substantial Cognitive Deficit in Food Security: The fact that more than one-third of the surveyed farmers still possess a low level of actual awareness regarding food security practices represents a serious bottleneck. This cognitive gap indicates that theoretical knowledge is not diffusing rapidly enough, posing a risk to localized food availability and sustainability.Interdependence between Extension Inputs and Awareness: The highly significant Chi-Square association (Chi-Square = 20.914, p = 0.001) proves that farmers' awareness is not independent of extension efforts. This strong correlation leads to the conclusion that strategic improvements in the quality and delivery of extension training programs will directly and systematically elevate farmers' cognitive and practical capabilities in food security.Operational and Supply-Chain Barriers Take Precedence: The structural diagnosis of constraints reveals that the primary bottlenecks hindering extension effectiveness are field-level operational challenges, led by the unavailability of high-quality inputs (seeds and fertilizers) and the high costs of modern practices. Conversely, institutional funding constraints were ranked much lower by the farmers. Therefore, extension training cannot achieve its goals in isolation without resolving these direct supply-chain and financial burdens.

Recommendations

ISSN 2072-3857

In light of the aforementioned findings and conclusions, the following recommendations are proposed to enhance the role of extension training and develop farmers' awareness to achieve food security:

Transition to Practical and Experiential Learning: The Ministry of Agriculture, represented by the Ninavah Agricultural Directorate and the Extension and Training Center, should transition from conventional lecture-based training to hands-on, experiential methodologies, such as Farmer Field Schools (FFS). This is crucial given that the highest percentage of farmers hold primary or basic literacy levels.

Prioritize the Active Age Cohort and Youth: Extension programs should strategically target the dominant middle-aged cohort (35-47 years) and younger farmers in training workshops. Empowering this receptive group with climate-smart agricultural techniques ensures they can act as pioneering "model farmers" within their villages.

Establish Integrated Inputs-Extension Networks: To address the top-ranked constraint (unavailability of high-quality inputs), the extension apparatus must coordinate with the Agricultural Cooperative Society and government entities to ensure that recommended inputs (e.g., high-yield seeds, organic fertilizers) are accessible, affordable, and distributed concurrently with the training programs.

Provide Subsidized Subsidies for Modern Practices: To mitigate the second-ranked barrier (high costs of recommended practices), the government and the Agricultural Bank should introduce subsidized loan programs or direct financial support specifically designated for purchasing modern irrigation technologies and climate-adaptation equipment.

Enhance Communication Channels and Motivation: Action must be taken to minimize the excessive administrative burdens placed on extension agents, allowing them more time for direct field visits. Additionally, financial and professional incentives should be enhanced to boost agents' motivation, thereby strengthening periodic communication and trust between extension offices and local farmers.

Design Specialized Food Security Training Modules: The Extension Center should formulate specialized, continuous training curricula focusing evenly on the four pillars of food security (Availability, Access, Utilization, and Stability), ensuring that training contents address the actual, realistic environmental and climate challenges faced by farmers in Al-Hamdaniya District.

ISSN 2072-3857

References

1) **Al-Abassi, M. (2018).** Research Methods in Extension and Social Sciences. Dar Al-Maarefa for Printing and Publishing, Baghdad, Iraq.
2) **Al-Khadraji, J. (2018).** The impact of extension programs on reinforcing household food security in rural areas. Journal of Rural Studies, 19(1): 330-345.
3) **Al-Mofty, S. (2024).** Environmental degradation, climate changes and its impact on vegetable crop production in Nineveh. International Journal of Agriculture, 12(1): 350-365.
4) **Al-Obeidi, O., & Yonis, M. (2021).** The status of food gap and import dependency in Iraq. Iraqi Journal of Agricultural Economics, 27(2): 260-278.
5) **Al-Taee, M., et al. (2015).** Extension training as a human process to confront modern technical developments. Journal of Sustainable Agricultural Sciences, 43(3): 915-930.
6) **Al-Wazzan, M. (2015).** Variation in environmental and agricultural awareness levels among farmers. Journal of Agricultural Development, 8(4): 2300-2315.
7) **Duaa, A. N., & Jbara, O. K. (2024).** An economic study of the factors affecting the food security coefficient of the rice crop in Iraq for the period (2003-2020). Iraqi Journal of Agricultural Sciences, 55(3), 1209-1220.
8) **FAO. (2004).** Agricultural extension and food security: institutional challenges and rural development. Food and Agriculture Organization, Rome, Italy.
9) **Kharel, M., Dahal, B. M., & Raut, N. (2022).** Good agriculture practices for safe food and sustainable agriculture in Nepal: A review. Journal of Agriculture and Food Research, 10, 100447.

ISSN 2072-3857