

Role of the educational extension program in promoting sustainable farming practices for wheat farmers of Hammam Al-Alil district, Nineveh Governorate

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Abstract

The final purpose of this study is to use of educational extension for wheat cultivation by farmers in Hammam Al-Alil district in general and to determine relationship between the amount of wheat farmers' use of suggested agricultural methods and the succeeding independent factors (age, educational attainment, holding size, information sources). The items were presented the of scientific suggestions which arranged for wheat farmers according to their importance. The descriptive method was using in this study and it was includes all wheat farmers with a total of 412 farmers in the villages of (Menira, Qabr Al-Abd and Kenitra) belonged to Hammam Al-Alil district, Nineveh Governorate. A simple random sample consisting of (103) farmers was selected representing (25%) of total number of respondents distributed across into three targeted villages. The data collected by a special questionnaire consisting of three parts after verifying with its validity and reliability. The data were collected from 103 respondents (after excluding initial sample of 20 respondents). The data were statistically analyzed by using the SPSS program. The results showed that wheat farmers' attitudes towards educational extension program were moderate and tended to be declining, indicating that farmers have a critical need for educational extension in order to improve their knowledge of wheat production. The items on conducting of mechanical harvesting process at the appropriate time came in first place while the paragraph on marketing the produce in bags after purification came in last place. Also, this results showed that educational extension played a vital role in an increasing area planted with wheat among farmers in Hammam Al-Alil. The more information sources available to wheat farmers. The more they apply scientific suggestions which was the better. Therefore, the results showed that adherence to educational extension programs had a significant impact on the variables of farm size and information sources. The findings of this study recommend opening educational training courses for farmers in wheat cultivation in the Hamam al-Alil district. It also recommends that the local administration provide facilities for farmers to lease agricultural land in order to increase wheat productivity. Also, the recommendations were made to the Agricultural Extension Center in Nineveh Governorate to activate its role by working on distributing extension bulletins and agricultural magazines to educate and develop the knowledge of wheat farmers in order to increase crop incomes in terms of both quantity and quality.

Keywords: Wheat farmers, Annual income, Farm holding, Educational extension, Hamam Al-Alil

Introduction and Research Problem :

The wheat crop is the primary strategic crop for achieving food security, yet its traditional cultivation faces numerous challenges related such as water depletion, soil degradation, and climate change. Therefore, agricultural extension programs emerge as a vital and pivotal tools for

transferring scientific knowledge and technological innovations from research centers to farmers' fields. The programs aim to build the capacity of wheat farmers and guide them toward adopting climate, smart practices such as water conservation in irrigation, the judicious use of fertilizers and pesticides and soil

conservation agriculture. The role of educational extension extends beyond simply increasing productivity and improving crop quality. Also, it forms the cornerstone of achieving sustainable development by striking the necessary balance between preserving natural resources for future generations and enhancing the economic returns and resilience of rural communities. The development of agriculture in our current holds a special and exceptional place among the fundamental issues that many countries around the world, including Iraq, strive to achieve. This development aims to achieve food security by increasing production in terms of both quantity and quality, ensuring that their populations have access to the food they need to enjoy a healthy and active life (1). Iraq is among the countries that have confronted the problem of food security and the modest levels of production in it. Therefore, since the last quarter of the twentieth century, this issue has been given an appropriate amount of attention as one of the vital and fateful issues that topped the list of priorities because it constitutes the cornerstone and the first line of defense in the face of the risks and challenges of economic, political and social security in addition to keeping pace with the development and present and effective participation in the progress of the international community (2). The interest in the agricultural sector as a factor in achieving food security comes through the main position that the agricultural sector occupies in the structural environment of the economy or its data, which led to the increased interest of the Ministry of Agriculture in providing financial support to research centers for what they can reach in terms of modern and developed technologies, especially in the field of wheat cultivation. In addition to applying the scientific recommendations provided to farmers by the advisory institution (3; 4). Considering that any increase in grain production is the basic pillar for achieving self-sufficiency. Reports (5) As a result of abundant rainfall during the 2019-2020 agricultural season and an increase in

cultivated areas, Iraq achieved a significant production leap with wheat production reaching approximately 4.75 million tons compared to the previous agricultural season of 2018. The Ministry of Planning and Development Cooperation, in cooperation with the Ministry of Agriculture began in 2008 to include this crop in a five-year plan to improve the agricultural situation for the years 2010-2014 (6). One of the outcomes of this plan was the launch of the government's agricultural initiative in 2008 to include developing the production and productivity of wheat crop among its work priorities, as it is a strategic crop. Although Iraq is one of the original sites of wheat and is one of the countries that have the factors for the success of growing the crop, its productivity is still low. The average wheat yield per hectare during the period (1959-1989) was approximately 680 kilograms per hectare (equivalent to roughly 170 kg per dunam). However, 2009 witnessed exceptional and contradictory conditions that impacted grain production. Iraq suffered a severe drought and a shortage of irrigation water, leading to the destruction of vast areas of rainfed wheat in the north and a decline in the country's total production to approximately 1.35 to 1.7 million tons (7 and 8) which is lower than the global production rates and even neighboring countries. For example, the average production of wheat in Egypt is estimated at 8000 kg/hectare and in China at 6000 kg/hectare (9) which prompted the government to say that the most important reason related to the decrease or increase in production and productivity of wheat is the farmer, as he is the first responsible for applying or not applying the scientific recommendations recommended for the success of its cultivation correctly. Agricultural economists in Iraq have indicated that wheat cultivation is still relatively primitive and that farmers do not adhere to appropriate planting dates and do not use improved seeds, etc. (6). As for Al-Ajeeli (10) who indicated that farmers are not interested in applying scientific

recommendations related to agricultural operations in general in wheat production. Since the farmer is primarily responsible for implementing scientific recommendations related to wheat cultivation and service operations cultivation through educational Extension Programs that contribute to improving and expanding it's the information, capabilities, and attitudes of farmers to make the best use of the resources and capabilities available to them (3 and 11). Standing on the extent of farmers' utility of educational suggestions stems from reality, so the research project aims To identify the role of the educational extension program in promoting sustainable farming practices among wheat farmers in the following areas: land preparation, planting in suitable soil, field tillage, fertilization, weed control, plant disease control, insect control, irrigation, harvesting, and marketing Hammam al-Alil District, Nineveh Governorate. , ranking the areas of the educational extension program's role in promoting sustainable farming practices according to their importance in providing scientific recommendations to wheat farmers in some villages of Hammam al-Alil district in Nineveh Governorate, Nineveh Governorate and determine the relationship between the role of the educational extension program in each of the practices that promote sustainable farming among wheat farmers in Hammam al-Alil District, Nineveh Governorate, and each of the following independent variables: age, educational level, farm size, and information sources, the quantities produced from it do not meet more than 30% of the country's need (12). Statistics indicate a decline in the productivity of this crop during these years (2004, 2005, 2006). Where it reached (215,210,188 kg/dunum respectively (9).The reason for the low productivity of this crop may be due to the farmers not following the scientific recommendations in growing this crop.Hence, this study aimed to answer the following questions:

- What is the role of the educational extension program in promoting sustainable farming practices among wheat farmers in the following areas: land preparation, planting in suitable soil, field tillage, fertilization, weed control, plant disease control, insect control, irrigation, harvesting, and marketing Hammam al-Alil District, Nineveh Governorate.?

- What is the ranking the areas of the educational extension program's role in promoting sustainable farming practices according to their importance in providing scientific recommendations to wheat farmers in some villages of Hammam al-Alil district in Nineveh Governorate?

- What is the relationship between the role of the educational extension program in each of the practices that promote sustainable farming among wheat farmers in Hammam al-Alil District, Nineveh Governorate, and each of the following independent variables: age, educational level, farm size, and information sources?

Research objectives:

1.To identify the role of the educational extension program in promoting sustainable farming practices among wheat farmers in in the following areas: land preparation, planting in suitable soil, field tillage, fertilization, weed control, plant disease control, insect control, irrigation, harvesting, and marketing Hammam al-Alil District, Nineveh Governorate.

2.Ranking the areas of the educational extension program's role in promoting sustainable farming practices according to their importance in providing scientific recommendations to wheat farmers in some villages of Hammam al-Alil district in Nineveh Governorate.

3.Determine the relationship between the role of the educational extension program in each of the practices that promote sustainable farming among wheat farmers in Hammam al-Alil District, Nineveh Governorate and each of the following independent variables: age,

educational level, farm size, and information sources.

Research hypotheses:

There is no correlation between the role of the educational extension program in promoting sustainable farming practices among wheat farmers in Hammam Al-Alil district / Nineveh Governorate and the set of independent factors (age, educational level, landholding size, and information sources).

Materials and methods :

Research technique: The descriptive approach become used on this studies. It is an appropriate studies approach and affords actual descriptive information about the fact required to be investigated and the reality is defined appropriately.

Research area :

The field of study is limited to Nineveh Governorate, specifically in Hammam Al-Alil district, which includes a large number of farmers who work in wheat cultivation.

Research community and sample:

This study included all wheat farmers in the Munira, Qabr al-Abd, and Quneitra villages registered for the Agriculture Division of Hammam Al-Alil .The total number of farmers was 412, from which a random sample of 25% was selected, resulting in a sample of 103 respondents distributed across for three villages.

Data collection tool: The questionnaire form turned for using to collect data and its details of three parts: -

The first part: Independent factors: It included some personal characteristics of the respondents which are (Age, education level, size of the farm holding, information sources).The Age was measured by giving each year a score. As for the

level of education, it was measured by alternatives (illiterate, reads and writes, primary, intermediate, preparatory, college), and they were given numerical codes (6, 5, 4, 3, 2, 1), as for the variable of the farm holding size, it was measured by giving each dunum a score. As for the variable of sources of information, it was measured by a three-point scale consisting of (6) paragraphs and its alternatives were (always, sometimes, rarely) and these alternatives had been given numerical values (3, 2, 1) respectively.The second component includes the dependent variable that's level of utility of wheat farmers towards to scientific hints in a few villages of Hamam Al-Alil district/Nineveh Governorate/Iraq and it was measured by a (four-point) scale consisting of (23) paragraphs and its alternatives were (I apply greatly, I apply moderately, I apply slightly, I do not apply) and they had been given numerical values (4, 3, 2, 1) respectively.The validity and reliability of the tool have been confirmed and validity means of the degree to which the dimensions satisfy the unique functions and makes use of for which it turned into designed (13).While reliability means "the stability of the results if the scale is repeated after a period on the same group of individuals after a period of 15 days" (14) and So can affirm the obvious validity.The questionnaire form became provided to specialists and professionals within the Department of Agricultural Extension of the College of Agriculture and Forestry on the University of Mosul and it received the approval of the arbitrators at a rate of (80%) which indicates its validity to measure what it was designed for.To find stability a random survey sample (test-pre) was selected with a size of (20) farmers from the research sample which was excluded from final research sample, which amounted to (103) respondents, to ensure the clarity of the questions, and the stability coefficient for the scale items was found, The usage of the Cronbach's alpha coefficient (Alpha-Gronbach) offers the minimal predicted fee for the stableness coefficient (15), so the stability value was (0.92), which is an acceptable value

(16 and 17). After ensuring the validity and stability of the questionnaire form. Data were collected from 103 respondents (after apart from the initial pattern of (20 respondents). After collecting data, it was transcribed into organized tables by using Excel and analyzed by SPSS statistical software (18). The results as follows.

Results and Discussion

First goal: To identify the role of the educational extension program in promoting sustainable farming practices among wheat farmers in the following areas: land preparation, planting in suitable soil, field tillage, fertilization, weed control, plant disease

control, insect control, irrigation, harvesting, and marketing Hammam al-Alil District, Nineveh Governorate.

The results showed that degrees of wheat farmers' conformity to scientific recommendations in some villages of Hammam Al-Alil district/Nineveh Governorate/Iraq were between (40-92) with a theoretical scale value of (23-92), an average of 66.5, and a standard deviation of 12.74. As indicated in table (1), the respondents' degrees for the level of practical implementation were separated into three categories.

Table 1. Shows the dispersion of farmers in accordance of the farmers degree.

Categories	Number	Percentage
Low category (40-56).	23	%22.33
Medium category (57-73).	45	%43.69
High category (74-and above).	35	%33.98
Total	103	%100

$\bar{X} = 12.74$ S.D.=66.5.

According to the findings (Table 1), the largest percentage of respondents were turned into within the medium category that attaining 43.69%, accompanied through the excessive class at 33.98%. Therefore, the level of utility of scientific suggestions by wheat farmers in some villages of Hammam Al-Alil district, Nineveh Governorate, Iraq is described as medium tending to increase, and perhaps the reason for this is that farmers have good information in the field of wheat cultivation as they possess information in this field.

The second objective: Ranking the areas of the educational extension program's role in promoting sustainable farming practices according to their importance in providing scientific recommendations to wheat farmers in some villages of Hammam al-Alil district in Nineveh Governorate. The result of this objective can be illustrated by using the arithmetic mean shown in Table (2).

Table (2): Ranking of items according to their importance by using the arithmetic mean for each item.

sequence	Items	Average of items	Rank
01	Dividing the land into plots of suitable dimensions.	3.28	5
02	Planting in saline-free soil.	3.26	6
03	Performing the ridge-laying process at the appropriate time	30	4
04	Performing the leveling process.	3.23	8
05	Giving the crop a sufficient number of irrigations at the appropriate time.	3.31	3
06	Performing the plowing process to the appropriate depth and twice perpendicular to each other.	3.24	7
07	Purify the seeds before planting.	3.33	2
08	Using of compound fertilizer at the appropriate time and in the recommended quantity.	2.59	11
09	Use urea fertilizer at the appropriate time and in the recommended quantity.	3.21`	9
10	Carry out mechanical harvesting at the appropriate time. 3.43 1	3.43	1
11	Perform the smoothing process.	2.58	12
12	Use chemical pesticides to control insects in the recommended quantity.	3.17	10
13	Use compound fertilizer at the appropriate time and in the recommended quantity	2.59	11

To illustrate the outcome of this objective by using the arithmetic mean (Table 2), the item of "Implementing the mechanized harvesting process in a timely manner" was topped list with an arithmetic mean of 3.436893. This may be attributed to the limited knowledge of wheat farmers in the Hammam Al-Alil region regarding mechanized harvesting and its widespread application in the fields. This was followed by the item "Conducting seed cleaning before planting" with an arithmetic mean of 3.33. This may be attributed to the wheat farmers in the Hammam Al-Alil region's knowledge of seed cleaning and its widespread application before planting. Finally the item "Marketing the crop in bags after cleaning" came in last place with an arithmetic

mean of 2.572816. This may be due to the fact that wheat farmers in the Hammam Al-Alil region have limited knowledge of bagging crops and do not frequently apply this practice during the harvesting process.

Third objective: Determine the relationship between the role of the educational extension program in each of the practices that promote sustainable farming among wheat farmers in Hammam al-Alil District, Nineveh Governorate, and each of the following independent variables: age, educational level, farm size, and information sources.

1.Age: Using the range shown in Table (3), the responses were divided into three groups.

Table 3. Farmers are allocated according on age.

Categories	Number	%	Pearson's correlation coefficient (r).	Sig	∞
Low category (19-36).	28	%27.18	-0.059	0.557	0.05
Medium category (37-54).	48	%46.60			
High category (55-72).	33	%26.22			
Total	109	%100			

To discover determine the relationship between the role of the educational extension program in each of the practices that promote sustainable farming among wheat farmers in Hammam al-Alil District, Nineveh Governorate, the age variable, Pearson's correlation coefficient turned into used which reached a value of (-0.059) that's a poor correlation. To discover the significance of the connection. The cost of ($P \leq 0.05$) become relied

upon which reached (0.557) which is the highest probability level (0.05). Thus, the relationship is considered insignificant at probability level of (0.05), so we accept the statistical hypothesis. This indicates that age has no relationship with the application level.

2.Education level: The farmers have been disbursed consistent with the training degree into six alternatives as proven in Table (4).

Table 4. Distribution of farmers in line with the schooling stage.

Categories	Number	%	Pearson's correlation coefficient (r).	Sig	∞
illiterate	7	6.8	-0.113	0.256	0.05
Reads and writes	19	18.44			
Elementary	25	24.27			
Intermediate	23	22.33			
Preparatory	12	11.65			
College	17	16.51			
Total	103	%100			

The examine showed that maximum percentage of respondents had been in the initial category (Reads and write) which changed into (24.27%), followed by the intermediate category, which was (22.33%). To discover determine the relationship between the role of the educational extension program in each of the practices that promote sustainable farming among wheat farmers in Hammam al-Alil District, Nineveh

Governorate, the and the educational level variable, Spearman's correlation value was used (-0.113) which is negative relationship. To verify significance of the probability value which was (0.256) which was greater than the significance level value (0.05). Therefore it is not significant at this level. Which we accept the null hypothesis.

3.Size of the farm holding: Three distinct groups were created from the responses according to size of the farm holding as shown in Table (5).

Table 5. Respondents were distributed based on the size of their farm holdings.

Categories	Number	%	Pearson's correlation coefficient (r).	Sig	∞
Low category (less than 100 dunams)	81	78.64	0.014	0.889	0.05
Medium category (100-1000 dunams)	20	19.42			
High category (more than 1000 dunams)	2	1.94			
Total	103	%100			

This study showed that the highest percentage of respondents fell within the smallholding category, at 78.64%, followed by the medium-sized category at 19.42%. To discover determine the relationship between the role of the educational extension program in each of the practices that promote sustainable farming among wheat farmers in Hammam Al-Alil District, Nineveh Governorate, the and the farm size variable, Pearson's correlation coefficient was using

a value of 0.014. Upon checking the significance of the relationship, it was found to be less than the critical value of ($r = 0.889$) at a probability level of 0.05 probability value (0.05). Therefore, it is not relevant and we accept the null hypothesis which states (There's no enormous correlation among the two variables).

4.Sources of information: The respondents were distributed consistent with the variety into three classes as displayed in Table (6).

Table 6. Participants allocated consistent with the resources of statistical variable.

Categories	Number	%	Spearman's correlation Coefficient (r).	Sig	∞
Low category (12-20)	25	24.27	0.232*	0.018	0.05
Medium category (21-29)	62	60.20			
High category (30-over)	16	15.53			
Total	103	%100			

This study showed that the highest category of respondents exposed to information sources is the middle category with a percentage of (60.20), followed by the low category with a percentage of (24.27). To discover determine the relationship between the role of the educational extension program in each of the practices that promote sustainable farming among wheat farmers in Hammam al-Alil District, Nineveh Governorate, the and an information source variable reached a value of 0.147. The significance of the relationship was verified based on the probability value (sig), which reached 0.018 higher than 0.05 significance level. and thus it is significant. Therefore, we accept

researchresearch hypothesis, which asserts that there is a significant correlation between the two variables, and reject the null hypothesis. This may be attributed to the fact that the majority of farmers are those who are exposed to any information sources, so they have applied knowledge in this field.

Conclusions:

1. The role of the educational extension program in promoting sustainable farming practices among wheat farmers in Hammam al-Alil District, Ninewa Governorate, is good and is gradually increasing

thanks to their acquisition of scientific knowledge in wheat cultivation..

2.Wheat farmers in the Hamam Al-Alil area have greater information in the field of mechanical harvesting and apply it extensively.

3.Wheat farmers from the Hamam Al-Alil area have extensive information regarding seed purification and apply it extensively on seeds before planting.

4.Wheat farmers in the Hamam Al-Alil area have little information in the field of marketing the crop in bags and apply it infrequently during the harvesting process.

5.The ages of wheat farmers in Hamam Al-Alil ranged between (19-72) and there is no the relationship between the role of the educational extension program in each of the practices that promote sustainable farming among wheat farmers in Hammam al-Alil District, Nineveh Governorate, the age variable of scientific recommendations by wheat farmers.

6.Most wheat farmers in Hamam Al-Alil have an elementary and intermediate certificate and few of them have a bachelor's degree.

7.The education level of most wheat farmers in Hammam Al-Alil is low, and they lack information related to scientific recommendation for wheat cultivation.

8.Percentage greater than 75% of wheat farmers in Hammam Al-Alil had farm holdings of less than 100 dunums.

9.Most farm holdings of wheat farmers in Hammam Al-Alil,the better the extent of wheat farmers' utility of scientific pointers.

10.The majority of farmers are those who are exposed to information sources, and their percentage was greater than 60%.

11. The extra facts assets for wheat farmers in Hammam Al-Alil, the better the level of their utility of technical suggestions.

Recommendations:

1.The Nineveh Agriculture Directorate and the Extension Center in Nineveh Governorate should provide wheat farmers with information related to wheat cultivation.

2.The Nineveh Agriculture Directorate and the Extension Center in Nineveh Governorate should provide wheat farmers with information related to marketing the produce in bags during the harvesting process.

3.Open educational training courses in the field of wheat cultivation for farmers in Hammam Al-Alil

4.The Iraqi government should rent agricultural lands to wheat farmers in Hammam Al-Alil to increase wheat production because with the increase in farm holdings,To increases extent of wheat farmers for towards to technical applications .

5.The Extension Center in Nineveh Governorate should diversify the sources of information that wheat farmers are exposed to through extension bulletins, agricultural magazines, etc.

6.Study other variables that appear significant with the degree to which wheat growers implement scientific suggestions .

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