

The level of knowledge of potato growers with the scientific recommendations related to the cultivation of the crop in the village of Raqqa in the Samarra district / Salah al-Din governorate and its relationship to some variables

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Abstract

The research community included all of the farmers in Raqqa village, a total of (80) farmers, after excluding the initial test sample of (20) farmers. A random sample of 75% of the research community was drawn, and thus the number of individuals sampled in the research became (60) farmers. Data was gathered through a personal interview utilizing a two-part questionnaire form designed for this purpose. The first segment contained various independent elements connected to farmers, including (Age, educational level, crop area, number of years of crop cultivation, type of land ownership, Willingness for change and desire for innovation) While the second half covered seven categories to assess potato producers' understanding of scientific advice linked to crop cultivation, namely (Selecting the cultivar, preparing the land and suitable soil, planting date and method, irrigation, fertilizing, ripening and harvesting, marketing and storage). Whereas the study's findings revealed that awareness of scientific advice in agricultural production fields is average and tends to drop. People with low and medium expertise made up (75%) of the responses. The study also discovered a link between knowledge level and both (Age, educational level, crop area, number of years of crop cultivation, Type of agricultural land ownership, Willingness for change and desire for innovation).

Keywords: Potato farming, agricultural extension, knowledge level



Introduction

Agriculture has been and continues to be the foundation of all civilizational progress, human stability, wealth, and security for human existence since its discovery on the planet. Agriculture was the earliest human craft. As he acquired food, clothes, and shelter from it, and as a result of it, he maintained his health and excelled in his luxury until his life grew difficult and he began to discover what he didn't know about his surroundings and his world. He recognized that his first industry, agriculture, is the mother of industries and its backbone, and that his life and the lives of his offspring after him are inextricably linked to it.(3). Government organizations, particularly in developing nations, have paid close attention to rural community development projects. This is owing to various nations', including Iraq's, perception that agricultural growth is the foundation for development as a vital stage in the development of society as a whole (2). The growth of the agricultural region is a complex process that encompasses many items and difficulties that must be solved (18) .Farmers are trying to decide whether to encourage innovation, and this choice may show that they are exposed to competing messages about innovation. They also want to prevent or lessen cognitive dissonance and get over these issues . (14) The lack of information and its availability in the field of technology is a big issue since farmers are unable to access the essential knowledge, skills, and extension services to boost

agricultural productivity.(11) The potato crop was chosen because of its economic and nutritional value. Potato is one of the world's most significant strategic crops, ranking fourth (8) .The potato's native habitat is in South America, notably in Bolivia and Peru close to the Andes Mountains, and it was during the Spanish rule of Peru between 1532 and 1572 that it first spread to the rest of the world (10) .The potato crop belongs to the Solanaceae family, and it is one of the horticultural crops, which includes 90 genera and 200 species (11) . Potatoes play an essential part in developing nations' food security; potatoes, rice, wheat, and corn contribute 50% of the world's dietary energy needs. Developing nations currently outnumber industrialized countries in worldwide potato output (17). The potato crop's flexibility through thousands of years hints to its potential role as a climate-smart crop, particularly given its short vegetative phase, water usage efficiency, and yield capacity per unit of input (12) . Based on its importance, potato farming has expanded its area at the global and Arab levels, covering more than 20 million hectares spread across numerous nations. Including the Arab area, which is represented by Iraq, Jordan, Syria, and Saudi Arabia. For example, but not limited to, the area farmed with potatoes in Iraq, Jordan, Syria, and Saudi Arabia in 2007 was 9, 0.88, 7, 4 dunums, with an average output of 6, 704 tons per dunum, respectively (11) .It is regarded one of the key vegetable crops that recently

reached Iraq, if its cultivation aided economically in the early 1960s, particularly the spring and fall harvests, whose production is utilized for consumption and tubers, (15). Potatoes are important because they have a high nutritional value and include a high percentage of carbs, proteins, fibers, and many other components that are helpful to people. It is one of the most practical commercial crops because to its high pricing in global and local markets and rising demand for its consumption, and the leftover potato tubers are utilized as animal feed (1) . According to what was previously stated, the production of the potato crop in Iraq is lower than that of its neighbors. This decrease is the result of a number of influencing factors, the most important of which are the level of knowledge, attitudes, and skills that farmers have in the area of cultivating potato crops. It is necessary for farmers to be informed of suggestions and agricultural information and to use it as indicated. Farmers should also adhere to traditional agricultural practices, from tillage to marketing, as new scientific and technological approaches are not used by potato producers to serve the crop. As a result, despite the potato crop's importance in terms of food and consumption, as well as its value as a source of money, However, the marketing component of it was not equal to this importance as a consequence of the lack of interest in this component brought on by the marketing power's inferiority (9). According to the Arab Organization

for Agricultural Development, agricultural extension has a low and weak efficiency in the process of transferring and communicating agricultural recommendations and awareness by providing them with knowledge and making them aware of the recommendations.(6). As a result, agricultural extension carries this obligation as one of the most essential change agents capable of bringing about desired behavioral changes in potato producers' understanding through suggestions and agricultural information for this crop . (13) Additionally, to create the best programs to raise the bar for knowledge and information It is necessary to determine the level of farmer's knowledge of scientific recommendations in the field of potato cultivation so that choices are made in a clear and precise manner to create the required plans and strategies for them . (5) Due to these factors, the current study focused on evaluating the degree of knowledge of potato producers in the village of Raqqa, Samarra district, and Salah al-Din Governorate, as well as the breadth of farmers' understanding of scientific advice in the disciplines of (Choosing the cultivar, preparing the land and suitable soil, planting date and method, irrigation, fertilization, ripening and harvesting, marketing and storage) And to be aware of the most significant issues they encounter when growing, producing, and marketing potatoes in the study region. You may also determine the relationship between the degree of knowledge among potato



producers and each of the following independent variables. (age, level of education, area, area cultivated with crops, average productivity, number of years of crop cultivation, type of land tenure, Willingness for change and desire for innovation)

Therefore, the following inquiries are the main emphasis of this research:

- 1- What is the level of potato growers' knowledge of scientific recommendations related to cultivation operations?
- 2- What is the link between various independent factors and the knowledge level of potato growers?

Research Aims

- 1- Determining the level of knowledge of potato growers with scientific recommendations related to the cultivation of the crop in the village of Raqqa in the Samarra district and its relationship to some variables in general
- 2- Determining the descending order of the research fields according to the level of knowledge of the potato crop grower.
- 3- To identify the correlation between the knowledge level of the potato grower in the village of Raqqa / Samarra district and the following independent variables (age, educational level, crop area, number of years of crop cultivation, type of land ownership, readiness for change and desire for openness).
- 4- Identifying the most important problems facing potato farmers in Al-Raqqa village in Samarra

district, and arranging them in descending order.

Research Assumptions

There is no significant correlation between the level of knowledge of the potato grower and the scientific recommendations related to crop cultivation in the village of Raqqa in the Samarra district / Salah al-Din governorate, and each of the following independent factors (age, educational level, area cultivated with the crop , the number of years of cultivation of the crop, Type of agricultural land ownership , the Willingness for change and desire for innovation)

Research Importance

- 1-The study's findings highlight the characteristics that inspire potato farmers to embrace contemporary agricultural technology, which assists employees in the Salah al-Din Governorate's agricultural extension agency in developing potato farming and developing other better extension programs in the future
- 2-Determining the degree of expertise of potato producers in Salah Al-Din Governorate in order to get access to extension programs that would allow them to expand their operations
- 3-Determine the gaps and shortcomings in extension programs relating to potato farming, service, and marketing in Salah al-Din Governorate.

- 4-Understanding the data and information connected to the potato crop and how to obtain it in order to offer it to farmers.
- 5-Determining the extent to which farmers are willing to modify their understanding in this subject.
- 6-Identifying and precisely identifying the challenges that potato farming faces in Salah al-Din Governorate in order to make the required suggestions to alleviate them. And recommending acceptable options for consideration by the relevant authorities, particularly the extension body. To benefit the largest number of potato farmers .

Procedural Definitions

- 1- Cognitive level : It is the result of potato producers' expertise in all crop cultivation, service, and marketing activities that rely on understanding and awareness of these processes.
- 2- Scientific recommendations : It is a collection of scientific and extension recommendations connected to the cultivation, production, service, and marketing of potatoes, prepared by the Ministry of Agriculture's research and extension institutions and the competent authorities.

Research Methodology

scripture method. It is a means of describing and recognizing phenomena, explaining situations and behaviors, or analyzing and comparing

them This method verifies the comparison and hence focuses on strengthening agricultural extension efforts through communication skills issues.

Search Area

The village of Al-Raqqa, which is a part of the Samarra District and Salah Al-Din Governorate, is where the research will take place. Al-Raqqa was chosen for the research for the following reasons.

- 1- The village's big population of farmers.
- 2- In addition to other vegetable crops, the farmers in these regions should focus on developing the potato crop.
- 3- The lack of prior research on the village's potato producers' educational requirements.

Research Community

The research community included the farmers of Al-Raqqa village / Samarra district, all of whom are (80)* farmers . A random sample of (75%) was drawn from the farmers after excluding the initial test sample of (20) farmers. Thus, the number of individuals sampled in the research became (60) farmers.

*Saladin Agriculture Directorate / Division of Agricultural Statistics, 2023

Prepare Questionnaire Form

The questionnaire is the primary instrument and one of the most fundamental techniques of gathering information for this study. After reviewing the literature, sources, and previous studies, and soliciting the opinions of experts and specialists in



agricultural extension, educational and psychological sciences, horticulture experts, and potato crop cultivation specialists, the questionnaire was divided into three parts as follows:

First part: This section contained information on the workers' personal and job qualities, specifically (age, level of education, area cultivated with the crop, number of years of cultivation of the crop, type of land ownership, Willingness for change and desire for innovation) .

Part Two : test of knowledge level : The researcher read scholarly books on potato growing as well as pamphlets and other scientific sources. He prepared the exam questions required for his research after consulting the opinions of experts and specialists in the Department of Horticulture at the College of Agriculture - University of Tikrit to identify the key areas in the cultivation, production, and marketing of the potato crop. The domains included a number of test items to measure the level of knowledge and according to the importance of each domain . And (seven) major potato-growing regions were located, and a scale that initially had (52) elements was created. It was written after reviewing earlier study on the issue of farmers' understanding of scientific advice in the development of potato crops, where several paragraphs were changed and rewritten to fit the data. The researcher added further paragraphs, bringing the total to (39), and these paragraphs are organized into seven categories, namely:

- 1- Category selection. (4) Paragraph.
- 2- The field of land preparation and suitable soil (5) paragraph.
- 3- The field of planting date and method (3) paragraphs.
- 4- Irrigation field (6) paragraph. .
- 5- The field of fertilizing (9) paragraphs.

6- The field of maturation and reaping (4) paragraph.

7- The field of marketing and storage (8) paragraph.

The third part : It includes the identification of (13) difficulties that are believed to be among the most serious issues confronting potato producers in the hamlet of Raqqa / Samarra area. A five-point scale with the choices (very large, large, medium, few, and very little) was placed in front of each of them. They were assigned numerical values, which are (1, 2, 3, 4, 5) respectively. The problems were organized in descending order based on their average significance. The questionnaire was provided to a committee of expert academics from the Agricultural Extension Department and the Horticultural Protection and Landscape Engineering Department For the goal of confirming the apparent veracity and content's accuracy The questionnaire items were changed or added to in accordance with their instructions. The questionnaire was then put to the test for the first time on May 16, 2023, with the help of 20 farmers who weren't part of the final study sample. This was done to ensure that the questionnaire was legitimate. Stability was determined using the alpha Crombach coefficient, which has a value of (0.85). As a result, the form had a high degree of stability, and it became final once its value reached 0.70 or higher, at which point it was deemed acceptable and suitable. The respondents' information was gathered between June 1 and June 27, 2023.

Measurement of Independent Factors



The following independent factors are measured:

- 1-The age : It was calculated based on the respondent's age at the time of data collection.
- 2-The educational level : The following scale was assigned to him: (illiterate, reads and writes, elementary, intermediate, preparatory, institute, college), and the digital alternatives for the categories are (7, 6, 5, 4, 3, 2, 1), respectively.
- 3-Area cultivated with potatoes: It was calculated as the number of dunums planted with the potato crop for the 2023 winter season
- 4-Number of years of potato cultivation : it was measured by the respondent's number of years of potato farming. When gathering the data
- 5-Type of agricultural land ownership :The following weights were allocated to it (4, 3, 2, 1) based on how one owned agricultural property (ownership, contract, rent, or participation).
- 6-Willingness for change and desire for innovation : This variable was tested using ten questions, with three choices (agree, neutral, disagree) presented in front of each item. These choices were assigned the following values (3, 2, 1), and so the level of this variable ranged between (10) and (30).

Measuring the level of knowledge of potato growers:

After all questions had been answered, there were 39 total test items. When a responder answered a question properly, they received the specified numerical score of (1), but when they replied incorrectly, they received a score of (0). The ultimate result, which is determined by adding together the scores for each test item, indicates the respondent's cognitive ability.

Statistical procedures:

After collecting, unpacking, and tabulating the data, it was analyzed using statistical analysis software (SPSS) (Statistical Package Social Science) and the statistical procedures listed below. (range, frequency distribution and percentages, standard deviation (s.d), simple correlation equation (Pearson), Spearman's ordinal correlation coefficient)

Results and Discussion

First objective: Determining the level of knowledge of potato growers with scientific recommendations related to the cultivation of the crop in the village of Raqqa in Samarra district / Salah al-Din governorate

The results revealed that potato growers got the highest numeric value (27) degrees and the lowest value (10) degrees, with an arithmetic mean of (18.13) degrees and a standard deviation of (4.98). with the largest percentage in the medium group (38.4%) and an average of (18.60) degrees. Table (1) shows how the respondents were divided into three groups based on their degree of knowledge and the size and duration of the topic.



Table 1. The distribution of respondents based on their level of expertise in potato crop farming fields

categories	the number	%	Average level of knowledge
Low (10-15)	22	36.6 %	12.95
Medium (16 - 21)	23	38.4%	18.60
High (21-27)	15	25%	25
the total	60	% 100	
$\bar{X} = 18.13$		S.D=4.98	

According to Table 1, 36.6 percent of respondents had a poor cognitive level, with an average score of (12.95) degrees. And (38.4%) of them have an average of (18.60) degrees, putting them in the middle group. And (25%) of them have a high cognitive level, with a median of (25) degrees. According to the table above, the majority of potato growers in the hamlet of Raqqa in the Samarra district / Salah al-Din governorate have an average level of expertise that is gradually declining. This might be

attributed to a lack of interest in using new technology in potato crop farming, as well as a lack of access to information sources and a willingness to adapt.

The second objective :

Determining the descending order of research fields according to the level of knowledge of potato crop growers.

According to the weight %, the study fields were organized in descending order, and the findings are displayed in Table No. 2.

Table 2. Shows the research fields in descending order

fields of study	Average level of knowledge	The number of paragraphs	weight percentage	ranked
fertilizing	3.133	9	78.32	1
planting date and method	2.25	3	75	2
Selecting the cultivar	2.533	4	63.25	3
preparing the land and suitable soil	3.016	5	60.32	4
irrigation	2.833	6	47.21	5
marketing and storage	3.383	8	42.28	6
ripening and harvesting	0.983	4	24.57	7

According to Table No. 2, the field of (fertilizing) placed first with a weight percentage of (78.32) As a consequence of experience and knowledge of the most recent advancements in this field . While (maturity and harvesting) came in last

with a weight of (24.57) This might be due to the extension system's limited role in organizing training courses and seminars to discuss the best procedures and methodologies used to determine the maturity and harvest of the potato crop.



Third objective

To identify the correlation between the level of knowledge of potato growers in the village of Raqqa / Samarra district and the set of independent variables

- 1- **The age :** The responders looked to be between the ages of (68) and (24)

Table 3. displays the number and percentage of responses by age group

categories	the number	%	Average level of knowledge	Rs
Young (24 – 38)	39	65 %	16.82	0.518 **
average age (39 – 53)	16	26.6 %	18.87	
the elderly (54 – 68)	5	8.4 %	26	
the total	60	100 %		
$\bar{X} = 37.36$ S.D=10.50 **it is significant at the level of (0.01)				

According to the above data, (65%) of the respondents are between the ages of 24 and 38. And that (26.6%) of respondents fall into the second age group (39-53) and (8.4%) of respondents fall into the third age group (54-68). The Pearson correlation coefficient was utilized to find the association between the cognitive ability of the respondents and age, which amounted to (0.518**), which is significant at the level of (0.01). As a result, we reject the statistical hypothesis in favor of the alternative research hypothesis, which states: (There is a significant correlation between the level of knowledge of potato crop farmers in the village of Raqqa / Samarra district and age) . The elderly may have agricultural expertise and may not take chances in employing contemporary agricultural

years old, with an average age of (37.36) years. Table (3) shows how the responses were divided into three categories based on the range and length of the category.

practices, as well as their commitment to old conventional farming ways.

2- Educational level:

The respondents were classified into seven educational levels (illiteracy, reading and writing, elementary, intermediate, preparatory, institute, and college), as shown in Table (4). It is clear that a high percentage of those who completed elementary school and a lack of illiteracy among respondents, which might be attributed to the research area's distribution of schools at various stages. Spearman's correlation law was used to discover the correlation between the cognitive level of the respondents and their educational degree, and it reached (0.318*),

Table 4. depicts the distribution of responses by educational level and the arithmetic average of knowledge level.

Educational level	the number	%	Average level of knowledge	R
Illiterate	0	0 %	0	*0.318
read and write	3	% 5 %	24	
elementary	42	% 70 %	16.33	
graduate				
intermediate	4	% 6.6 %	13	
graduate				
high school	0	0 %	0	
graduate,				
institute	4	6.6 %	24	
graduate				
college	7	11.8 %	26	
graduate				
	60	100 %		

*it is significant at the level of (0.05)

which is significant at the level of (0.05). For this reason, we support the alternative hypothesis while rejecting the statistical hypothesis that states . There is a significant correlation between the level of knowledge of potato crop farmers in the village of Raqqa / Samarra district and the educational level. The reason for this is that the learners may read the cultivation and service guidance pamphlets, as well as their understanding of agricultural

suggestions and how to implement them, so boosting their level of knowledge in the field of potato crop cultivation.

3- Area cultivated with potatoes:

According to the results, the biggest area planted with potatoes is (17) dunums, and the lowest area planted with potatoes is (2) dunums, for a total of (8.18) dunums. As indicated in Table (5), the responses were divided into three categories based on the extent

Table 5. categorizes respondents based on the area planted with the potato crop

categories	the number	%	Average level of knowledge	Rs
A small area (2-7) acres	30	50%	15.8	0.591 **
Medium area (8-13) acres	18	30%	18.66	
A large area (14-19) acres	12	20%	21.16	
the total	60	100%		

$\bar{X} = 8.55$

S.D=4.73

**it is significant at the level of (0.01)



According to the above table, the majority of respondents fell into the first group, which is the area farmed for the potato crop varies from (2-7) dunums at a rate of (50%), with an average level of expertise of (15.8) degrees. The third group, in which the area planted for the potato crop runs from (14-19) dunums, has the lowest percentage of responders (20%), with an average level of expertise of (21.16) degrees. Pearson's law was utilized to detect a connection between the respondents' knowledge level and the area farmed with the potato crop, as its value was (0.591**) degree, which is significant at the level of (0.01). Therefore, we reject the statistical hypothesis and accept the alternative hypothesis, which states (There is a significant correlation between the level of knowledge of potato crop

farmers in the village of Raqqa / Samarra district and the area cultivated with the crop) This may be due to an increase in the areas cultivated with the potato crop, which may be associated with good financial and administrative capabilities that encourage farmers to seek out modern agricultural techniques, as adopting them leads to an increase in potato crop production and profit.

4- Number of years of potato cultivation:

The largest number of years of potato crop production for respondents looked to be (27) years, and the lowest number appeared to be (4) years, with an average of (12.95) years. According to this variable, the respondents were divided into three groups, as indicated in Table (6).

Table 6. illustrates the distribution of responses based on the number of years of potato crop production and the arithmetic mean of knowledge level

categories	the number	%	Average level of knowledge	rs
Little experience (4-11) years	32	53.4%	16.15	0.527**
Medium experience (12-19) years	13	21.6%	16.75	
Significant experience (20-27) years	12	% 20	25.25	
the total	60	100%		

$$\bar{X} = 12.95$$

$$S.D=4.65$$

**it is significant at the level of(0.01)

According to Table (5), 53.4% of respondents are between the ages of (4 – 11) . The proportion of respondents in the second group (12-19) years is (21.6%), while the greatest percentage of respondents in the third category (20-27) years is (20%).sing Pearson's law, a

connection between the respondents' degree of knowledge and the number of years the potato crop had been cultivated was discovered. It reached (0.527**), which is significant at the level of (0.01) . Therefore, we reject the statistical hypothesis and accept the alternative hypothesis, which states



(There is a significant correlation between the level of knowledge of potato crop farmers in the village of Raqqa / Samarra district and the number of years of cultivation of the crop) .This may be due to the fact that cultivators of potato crops tend to get more expertise, knowledge, and abilities with time,

which enhances the yield of high-quality seeds.

5- Type of agricultural land ownership

According to the kind of possession, which (include ownership, contract, lease, and participation,) the respondents were split into three groups, as shown in Table (7).

Table 7. The percentages of responders by kind of agricultural holding

categories	the number	%	Average level of knowledge	r
ownership	12	20 %	18	0.019
contract	5	8.3 %	16	
rent	0	0 %	0	
participation	43	71.7 %	18.41	
the total	60	100 %		

Table (7) revealed that the involvement category had the highest level of knowledge for farmers, with an average (18.41) degrees. The Spearman rank correlation equation was used to determine the relationship between the respondents' knowledge level and the area farmed with the potato crop, and its value was (0.019) degree. Because it is not statistically significant, we accept the statistical hypothesis that says There is no significant relationship between the

type of land ownership and the degree of expertise of potato crop producers in Al-Raqqa village / Samarra district. The alternative hypothesis is rejected.

6- Willingness for change and desire for innovation :

The values showing Willingness for change and desire for innovation among respondents in potato farming varied from (10-30), and they were classified into three groups, as indicated in Table (8).

Table 8. presents the number and percentage of respondents who are willing to change and desire innovation at the cognitive level

Categories	the number	%	Average level of knowledge	rs
Low (16-10)	10	16.6 %	15.5	** 0.525
Medium (23 - 17)	39	65 %	17.35	
High (30-24)	11	18.4 %	23.27	
the total	60	100 %		

$$\bar{X} = 19.71$$

$$S.D=4.22$$

**it is significant at the level of(0.01)



Table (8) revealed that the respondents' greatest level of knowledge was the group most sensitive to change, with an average knowledge of (23.27) degrees. Pearson's law was utilized to detect a connection between respondents' knowledge level and readiness to change, as its value was (0.525**) degrees and it is significant at the level of (0.01). As a result, the statistical hypothesis is rejected and the alternative hypothesis is accepted. that states There is a significant correlation between the level of knowledge of potato crop farmers in Al-Raqqa village / Samarra district and between Willingness for change and desire for innovation The cause might be due to the farmer's receptivity to modern sources of knowledge The cause might be due to the farmer's receptivity to modern sources of knowledge, which demonstrated the necessity for change and its inevitability, as well as the fact that there is no rise in productivity without positive change

Fourth objective :

Identifying the most important problems facing potato farmers in the village of Raqqa, Samarra district, and arranging them in descending order:

The challenges confronting potato producers in the research region were organized in decreasing order according to the arithmetic mean, and the actual scores for the problems

varied from 2.76 degrees to 4.36 degrees, on a scale with a greatest degree of 5 and a lowest degree of 1, as shown in Table..(9) depicts the variety and complexity of challenges encountered by Al-Raqqa village farmers while producing the potato crop. (Lack of electric power) was listed top among the difficulties. As a result, farmers cannot run water pumps to irrigate their crops, and the quantity of diesel generators and their high cost are reduced. Either problem (lack of financing and credit or the complexity of the credit process) is the one that occupies the final positions. This indicates that farmers obtain the necessary financing from government and private banks, as well as the availability of government assistance to assist farmers in improving and increasing their output, and that the agricultural equipment company secures production requirements in accordance with the agricultural plan.

Table 9. Ranking of the problems facing the cultivation of the potato crop in the village of Raqqa / Samarra district

the numbe r	problems	very large		large		medium		few		very little		average	Rank
		n	%	n	%	n	%	n	%	n	%		
1	Lack of electric	30	50	18	30	12	20	0		0		4.36	1



	power														
2	The rise in seed prices	32	53.3	10	16.6	16	26.6	1	1.6	1	1.6	3.85	2		
3	the existence of wildlife that damages the agriculture	29	48.3	12	20	12	20	6	10	1	1.6	3.83	3		
4	The lack of a supportive party to improve potato production	26	43.3	23	38.3	9	15	2	3.3	0		3.81	4.5		
5	Inadequate government funding for advanced farming technology	22	36.6	19	31.6	14	23.3	4	6.6	1	1.6	3.81	4.5		
6	The scarcity of high-quality chemical fertilizers, as well as their exorbitant pricing,	18	30	17	28.3	20	33.3	4	6.6	1	1.6	3.8	6		
7	Unavailability of seeds	23	38.3	20	33.3	14	23.3	3	5	0		3.76	7		
8	Labor costs are quite high	14	23.3	32	53.3	11	18.3	3	5	0		3.55	8		
9	All types of fuel are unavailable	23	38.3	18	30	16	26.6	3	5	0		3.31	9		
10	the insufficiency of irrigation water	21	35	17	28.3	16	26.6	5	8.3	1	1.6	3.28	10		
11	Fertilizers are in short supply.	12	20	21	35	23	38.3	4	6.6	0		3.16	11		
12	Competition from imported crops	21	35	21	35	14	23.3	4	6.6	0		3.01	12		
13	lack of financing and credit or the complexity of the credit process	16	26.6	15	25	21	35	6	10	2	3.3	2.76	13		

Conclusion

1- The findings revealed that the overall degree of farmers' awareness of scientific guidelines linked to potato crop production in the

research region is defined as average and is declining. We conclude that they require assistance and training to close the skills and



knowledge gap in the field of potato crop farming.

- 2- The study's findings revealed a substantial relationship between the farmer's level of knowledge and scientific suggestions linked to potato crop production and the factors. (Age, educational level, crop area, number of years of crop cultivation, , Willingness for change and desire for innovation)We conclude from this that it is critical to consider these criteria when planning the implementation of extension training courses for the potato crop in the research region.
- 3- The findings revealed that potato producers in the research region face considerable challenges, capped by a difficulty. (Lack of electric power) We conclude that farmers require the availability of electrical electricity in order to continue producing the potato crop.

Recommendations

- 1- The need to activate the role of the Agricultural Training Extension Center affiliated with the General Authority for Agricultural Extension and Cooperation in the research area by establishing agricultural extension training courses to increase their information and knowledge.
- 2- Considering the parameters investigated in the study area's planning and execution of extension training programs.
- 3- Making adequate financial loans to potato producers
- 4- Providing various facilities to potato farmers at reasonable

prices, such as (seeds of good varieties, pesticides, fertilizers, and plastic houses).

- 5- Holding specialized training guidance courses to provide potato farmers with skills and knowledge related to potato cultivation techniques.
- 6- Using various extension methods and methods to disseminate modern agricultural techniques for the potato crop, such as field demonstrations in farmers' fields and preparing radio and television programs.

7-

Conflict of interest

The authors declare no conflict of interest.

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