Original Research Article

The cognitive needs of potato growers for the verities and fertilizers in Kafr Al-Zayat center in Al-Gharbia Governorate, Egypt

Abstract

The research is mainly aimed to identify the level of knowledge need of the respondents with regard to the technical recommendations for potato crop varieties, as well as to identify the level of knowledge need of farmers respondents with regard to the technical recommendations for fertilizing the potato crop, and to determine the relationship between the degree of cognitive need for the respondents of technical recommendations for potato crop varieties, as a dependent variable, and all independent variables studied. It also aims at determining the relationship between the degree of cognitive need for respondents of the technical recommendations for fertilizing the potato crop, as a dependent variable, and all independent variables studied, as well as identifying the sources from which respondents derive their information about the potato crop. Besides, it aims to identify the problems encountered by the respondents concerning the varieties and fertilization of the potato crop.

This research was conducted in three villages randomly selected from 35 villages Kafr Al-Zayat area in Al-Gharbia Governorate, namely, Qasta, Abeg, and Dalgmon, the sample size is 115 researchers with 10% of the total research, and an interview questionnaire was used to collect data during March 2019. Tabular presentation of frequency has been used for viewing and analyzing the data, along with, percentages, range, arithmetic average, standard deviation, and use of chi- square test of independence, and Pearson's simple correlation coefficient.

The most notable findings were as follows:

- The majority of respondents are of moderate cognitive knowledge of the technical recommendations for potato crop varieties by 71.3%.

- The majority of respondents are of moderate cognitive knowledge of technical recommendations for fertilizing the potato crop by 69.6%.

- Correlation relationships of varieties lurks in a moral relationship at the probability level of 0.01 between the degree of respondents cognitive need for technical recommendations for potato crop varieties and the degree of education of the respondents.

- Correlation relations for fertilization is shown in a moral relationship at the probability level of 0.01 between the degree of respondents cognitive need of technical recommendations for fertilizing the potato crop and between the degree of education of respondents, and the average productivity of the potato crop.

Keywords: cognitive needs, potato, growers, verities, fertilizers

Introduction and research questions

Potato is a widely grown vegetable crop and one of the main food crops served on the table all over the world. It occupies second place in importance after yields. Egypt has a comparative and competitive advantage in potato production, and seeks to increase productivity for export in order to obtain hard currency, and provide food security for domestic consumption and manufacture **[1]**. Data indicates that the area of potato cultivation in Egypt was 376,631 Faddens in 2016 and Egypt produces about 4 million tons annually worth more than 10 billion Pounds and this area is estimated to be about 15% of the total area allocated to vegetable cultivation **[2]**. Potato ranked second in 2018, of Egypt's exports reaching 4.7 million tons, including 759,100 tons of potatoes **[3]**

Abu al-Khair states that on comparing potato crop to rice crops as a grain crop, which is depended on as food, we find that the potato season ranges between 100 to 110 days, and each Fadden needs 2000 m3 of water for irrigation and gives off productivity of 15-20 tons directly suitable for food, while the same area of rice needs 6000 m3 of the water, which is three times the amount of water potato needs. Rice also needs an agricultural

season and a half more than potato does, just to produce 4.1 tons of barley rice. Then it needs to be peeled and bleached to produce 3 tons net white rice equivalent to 20% of potato production, which called for attention to potato cultivation as a way out of the food and water crisis **[4].**

Egypt relies on the import of a quantity of potato seeds annually to grow the summer season, where the production of a new variety requires high costs and long years of effort, from 11-12 years, to produce a variety that outdoes the current ones, satisfies farmers and consumers, and be free of diseases, especially viral ones **[5]**.

Hassan emphasizes that without the use of quality seeds in agriculture, it is not possible to get a good profitable crop no matter how much attention given to other agricultural processes. Therefore best seeds must be obtained from the most reliable sources, as quality seeds are characterized by being pure and free of grass seeds, and thus it has high germination rate, free of pathogens carried inside the seeds or on their surface, and identical to their class, as the class must [be] high-yield, quality, and compatible with the environmental conditions and farming methods present in the area in which it is cultivated **[6].**

The kind of seeds is one of the main factors, which determines the productivity of potato crop and the Kind means qualities that affect productivity such as genetic composition of the class, physiological age, pre-germination before agriculture, resistance to diseases, and health of the seeds i.e. free of physiological, fungal, bacterial and viral diseases. Varieties are determined according to the purpose of agriculture, whether for export, domestic consumption, manufacturing, or for the production of seeds **[5].**

Potato is a vegetable crop that is heavily fertilized, because it responds to fertilization and yields a rewarding economic return. Yet it is a soil-stressing crop, and late-maturity varieties require larger amounts of fertilizer than those required by early-maturing varieties due to their increased growth time and increased yield **[7]**

Mohammed states that the need for fertilization arises as a result of many factors, the most important of which are: (1) population growth and limited arable land and water resources, (2) concentration of vegetable crops cultivation, resulting in the depletion of certain nutrients and symptoms of shortage became visible, (3) The development of genetic engineering and plant breeding has produced new varieties and hybrids that largely need nutrients compared to the old varieties and hybrids. (4) In some types of lands such as alkaline and salty

ones, it is difficult for the roots of the plant to absorb elements of phosphorus, iron, zinc, manganese, copper and boron, because they are in a non-dissolved form and fixed to the soil, and thus inaccessible and unsuitable. Therefore it became imperative to add these elements through fertilization. (5) Dependency on organic fertilizers is declining. (6) Development of the chemical fertilizer industry and improvement of its quality. It is more purely produced, which leads to the result that it no longer contains significant quantities of minor elements that were mixed with it as impurities in order to meet the need of the plant **[8]**.

The use of fertilizers in terms of quantities and types depends on several factors affecting the farmer's decision to buy and use them, including their prices, quality, availability in markets, the yield of the crop, the cultivated item, as well as soil fertility and properties, along with some other elements related to farmers themselves, like their income, education level, previous experience in agriculture, and their tendency towards the use of fertilizers **[9].**

Swanson [10] states that identifying extension needs and educational objectives associated with them, helps to plan mentoring programs accepted by the guided farmers. While **Gupta [11]** explained that the assessment of needs is the process of measuring the cognitive and performance gaps of the individual. This process includes comparing the current situation of the individual to the desired one, as well as identifying problems, along with understanding and realizing the behaviors and mechanisms that must change in order to reach the desired situation and how to effect the change and finally support the procedures and actions required for change. Moreover the process of assessing the needs aims to solve the current problem, avoid it in the future, and create future. Opportunities and develop learning **(Al-Shafei et al)[12]** believe that the knowledge any educational extension program contains must be developed to meet real needs of targeted groups and should be related to a specific area in order to achieve the goal of the extension program. Hence, it is necessary to know the level of knowledge of the targeted group first in certain fields, to know where they stand in their current knowledge.

Through field work it turns out that there is a knowledge gap among potato farmers of different varieties and types of fertilizers traded in the market, i.e. between the current situation and the ideal or desired situation. There is a strong desire among farmers to complete their cognitive needs of varieties known for abundant crop yielding and its export and storage quality under the conditions of the Egyptian environment, in the light of the spread of many items with unknown technical recommendations, as well as the appropriate fertilization for varieties and costs. It is worth mentioning the varieties and fertilization have the greatest impact in different stages of production, and increase of productivity, efficiency and quality of harvesting, marketing and storage.

The above mentioned highlights call for the importance of studying the cognitive needs of the technical recommendations for the class and fertilizer of the potato crop. Such needs are always renewable as the annually changing varieties, as well as the continuously diversifying countless imported and local fertilizers and nutrients. As they have the greatest impact on productivity and harvesting, marketing and storing of potato crops. Hence, came the idea of this research, where the researcher considered studying this problem to know the level of the cognitive need for technical recommendations of classes and fertilizers for the potato crop, and the variables depend on them, the sources from which the respondents derive their information about the potato crop, and varieties and fertilization problems, to produce results that can help build extension programs or develop existing ones and meet the needs of potato farmers and work to increase production.

Research objectives

In light of the above mentioned and in line with the problem of research, the following objectives have been formulated:

1- Identifying the level of cognitive need of the respondents in relation to the technical recommendations for potato crop varieties.

2- Identifying the level of cognitive need of the respondents in relation to the technical recommendations for fertilizing the potato crop.

3- Determining the relationship between the degree of cognitive need for the respondents of technical recommendations for potato crop varieties as a dependent variable and the independent variables studied: the degree of education of the respondents, the agricultural cycle, average productivity of potato crop, the total area of farming, the area cultivated with potato crop, availability of seeds, availability of fertilizers, appropriateness of prices of imported potato seeds, appropriateness of fertilizers prices, purpose of potato cultivation, the degree of exposure to extension.

4- Determining the relationship between the degree of cognitive needs of respondents for technical recommendations for fertilizing the potato crop as a dependent variable and the independent variables studied mentioned in the previous point.

5- Identifying the sources from which respondents derive their information about the potato crop.

6- Identifying the problems faced by respondents in relation to the varieties and fertilizing of potato crop.

Research Hypotheses

To achieve the third and fourth objectives of the study, the following research hypotheses were set:

1- There is a correlation between the degree of cognitive needs of the respondents (farmers) of the technical recommendations for potato crop varieties as a dependent variable and each of the following independent variables: the degree of education of respondents, the average productivity of the potato crop, the total farming area, and the potato cultivated area, the purpose of potato cultivation.

2- There is a correlation between the degree of cognitive needs of respondents with the technical recommendations for fertilizing the potato crop as a dependent variable and all the independent variables mentioned above.

3- There are significant differences between the level of cognitive needs of respondents with technical recommendations for potato crop varieties as a dependent, and each of independent variables such as: the

agricultural cycle, availability of seeds, availability of fertilizers, appropriateness of prices of imported potato seeds, appropriateness of fertilizers prices, and the degree of exposure to extension contact.

4- There are significant differences between the level of cognitive needs of respondents for the technical recommendations for fertilizing the potato crop as a dependent variable, and each of the independent variables such as: the agricultural cycle, availability of seeds, availability of fertilizers, appropriateness of prices of imported potato seeds, appropriateness of fertilizers prices, and the degree of exposure to extension contact. These assumptions were tested using null hypotheses.

Significance of the research

First and foremost, the potato crop has great socio-economic importance on the map of Egyptian agriculture export, consumption, classification, and productivity. It must rank among the highest priorities of Egyptian agriculture programs for it to reach the highest productivity level. This primarily depends on the quality of cultivated seeds and appropriate fertilization. This will only be possible through planning and developing some programs in potato cultivation areas, so as to identify the recommendations for each class, the purpose of its cultivation, and appropriate fertilization program to keep pace with the development of production and climate changes in the agricultural environment. Besides, the findings of this research can contribute to the planning of such programs, and provide farmers with extension recommendations for good and updated varieties of imported seeds and the purpose of cultivation and appropriate fertilization needs.

Procedural definitions

1- The degree of cognitive need of respondents (farmers) for technical recommendations for the varieties and fertilizing of potato crop: it means the lack and deficiency of knowledge of the respondents with regard to the technical recommendations for the varieties and the fertilizing of the potato crop.

Research Limitation

Due to the widespread and multiplicity of potato varieties greatly in recent years in Egypt generally, and in Gharbeya Governorate particularly, it is difficult for farmers to know all these varieties and their technical

recommendations, fertilization requirements, their production methods and marketing conditions, the research has been limited to varieties grown in the area subject matter.

Research Methodology

This research was conducted in Al Gharbia governorate, as it is considered one of the main governorates cultivating and producing potato crop both for domestic consumption and export. Also, the area of cultivation is approximately 27 thousand Fadden in the 2018/19 season. **[13]**.

Kafr Al-Zayat town was chosen being the oldest potato-producing center, and it was the International Potato Center until recently, a number of export stations and potato storage refrigerators. The area of potato cultivation has been 9,150 Fadden since 2018/2019. Three villages were randomly selected from 35 other villages. The chosen villages are Qussta, Abeij and Al-Daljamun **[13]**

Sample of research

This research includes all the potato farmers of the three selected villages. They are 1146 farmers, 667 farmers in the Village of Qussa, 327 farmers in the village of Abig, and 152 farmers in the village of Al-Djamoun. To determine the sample of research 10% of the total research was taken, thus, the total sample is 115 respondents distributed on the three villages: the first village has 67 respondents, the second one has 33 respondents, and the third one has 15 respondents. Respondents were selected randomly and systematically from potato farmers' inventory, which is prepared by agricultural cooperative society each year **[14]**

Data collection tools

A questionnaire was designed as a tool for collecting data from respondents (farmers) through a personal interview, whose terms are in line with achieving the research objectives. The questionnaire included four sections: personal, social and economic data for the respondents, and a set of technical recommendations for the varieties and fertilization of the potato crop, which were extracted from the references and technical publications that were made available to the researchers. The resources from which the farmers get their information about the potato crop are also included. The questionnaire is concluded with an open-ended question to identify the

problems facing the farmers with varieties and fertilization of the potato crop. The questionnaires were presented to researchers specialized in vegetables at the Horticultural Research Institute to review and check the technical recommendations to give a final draft. Then a preliminary test was conducted for the survey on a sample of (30) respondents from the farmers from the selected 3 villages (10) respondents from each village. The test resulted in modification of the wording of some questions, a final draft was therefore prepared, and it became a valid tool for collecting field data, which was collected in the interviews during March 2019.

Quantitative processing of dependent variables

1- First dependent variable: the total degree of cognitive need of the respondents (farmers) for the most important technical recommendations related to the varieties of potato crop. In order to determine this degree, the varieties of potatoes cultivated in the area of research were restricted to (11) varieties of potatoes (Berne, Kara and Aspunta, Gelatica, Mundo, Daimond, Bamba, cylan, Hermes, Walidi, Rosetta and Crusoe). Therefore, a scale was designed, only limited to these items, and it included (15) clauses pertaining to their most important technical recommendations. Therefore, respondents were asked 15 questions, including (65) items of information to respond to, in order to determine the total degree of their knowledge of technical recommendations for potato crop varieties. One point was given for each correct response, while each wrong response was given zero point, reaching the maximum level of knowledge (65) degrees and a minimum of zero. The score was calculated for cognitive needs of the farmers by the equation used by [14] total degree of cognitive needs of farmers = the maximum level of knowledge (65) - the degree obtained by respondents. To determine the level of cognitive need of respondents for the most important technical recommendations for potato crop varieties, the grades for each clause answered by respondent were collected and divided by the number of respondents to obtain an average for each clause. The average was then divided by the maximum score multiplied by 100 scoring to get average%. According to percentages of the average of this degree, the level of cognitive need of respondents could be divided into three levels: high level of cognitive need 70% and above, moderate level of cognitive need from 50% to 70%, and a low level of cognitive need less than 50%.

2- Second dependent variable: the total degree of cognitive need of the respondents for the most important technical recommendations related to the fertilization of potato crop. In order to determine this degree, a scale was designed to include (14) clauses pertaining to the most important technical recommendations related to the fertilization of potato crop. Therefore, respondents were asked 14 questions, including (46) items of information to respond to, in order to determine the total degree of their knowledge of technical recommendations for potato crop fertilization. One point was given for each correct response, while each wrong response was given zero point, reaching the maximum level of knowledge (46) degrees and a minimum of zero. The score was calculated following the same method as the previous one mentioned in First Dependent Variable.

Data analysis

Tabular presentation of frequency has been used for viewing and analyzing the data, along with, percentages, range, arithmetic average, standard deviation, and use of chi- square test of independence, and Pearson's simple correlation coefficient to determine the relationship between the two dependent variables and other independent variables.

RESULTS AND DISCUSSION

First: The level of cognitive need of Respondents for the technical recommendations for potato crop varieties:

Table 1 show that about 86.1% of the respondents have low to medium cognitive level for technical recommendations for potato varieties, indicating the need to provide farmers with knowledge and awareness of the technical recommendations for potato crop varieties with more extension activities.

Table 1. Distribution of Respondents in accordance with the Level of knowledge of the technical recommendations for potato crop varieties

The level of cognitive need for recommendations	No	%
Low (less than 25)	17	14.8

Moderate (25-42)	82	71.3
High (more than 42)	16	13.9
Total	115	100
Range 47-7 arithmetic mean 33.8 standard deviation 8.47		

236

237 The data in Table 2 indicate that the cognitive needs of the respondents are high, when it comes to technical
238 recommendations for potato varieties resistant to blights, potato varieties sensitive to blights, and varieties Multi-
239 purpose potatoes, export potato varieties, and manufacturing potato varieties. The average levels of cognitive
240 need in percentage are 88.70%, 84.20%, 78.26%, 76.81%, and 72.46%, respectively. The results of Table 4
241 indicate that the level of cognitive need of respondents for technical recommendations for potato crop varieties
242 as a whole was moderate, with a general average of 57.84%.

243 **Table 2. Level of cognitive need averages of technical recommendations for potato crop varieties**

Items of technical recommendations for potato varieties	Maximum level of cognitive need	Average of cognitive need	Average %	Level	Order
1-Potato cultivated in research area	11	7.217	65.61	Moderate	7
2-Local consumption potato varieties	2	0.869	43.48	Low	10
3- Export potato varieties	3	2.304	76.81	High	4
4- Manufacturing potato varieties	3	2.174	72.46	High	5
5- Multipurpose potato variety	3	2.425	78.26	High	3
6- early and medium maturity potato varieties	3	1.278	42.0	Low	11
7- Medium/ late maturity potato varieties	8	5.061	63.26	Moderate	9
8- Characteristics of good seeds	6	3.896	64.93	Moderate	8
9- planning for different varieties	2	0.461	23.05	Low	15
10-farming distances for different varieties	2	0.557	27.85	Low	14

11- varieties best be cultivated in summer season	2	0.722	36.09	Low	12
12- varieties best be cultivated in winter season	3	0.922	30.73	low	13
13- varieties best be cultivated in two seasons	6	4.174	69.57	Moderate	6
14-Varieties resistant to blights	5	4.435	88.70	high	1
15-Varieties sensitive to blights	6	5.052	84.20	high	2
General Average:	2.77		57.84	Moderate	

Second: The level of cognitive need of respondents for technical recommendations for the potato crop fertilization:

It is clear from table 3 that about 82.6% of the respondents have low and medium cognitive level for technical recommendations for potato fertilization, which indicates the need to intensify the efforts of extension efforts to provide farmers with information on technical recommendations for fertilizing potato varieties to cope with current development of types of fertilizers and methods of fertilization.

Table 3. Distribution of respondents in accordance with the total points of cognitive need for the technical recommendations for fertilizing the potato crop

points of cognitive need for recommendations	No	%
Low (less than 19)	15	13
Moderate (19-31)	80	69.6
High (more than 31)	20	17.4
Total	115	100
Range 8-36 points arithmetic mean 25.3 standard deviation 6.26		

The data provided in Table 4 indicate that the cognitive needs of the respondents are high for technical recommendations for the addition of bio fertilizers, compost, magnesium fertilizer its equivalent , spray fertilization reserves and mineral fertilizers compound (N P K), foliar fertilization with micro elements, and the addition of amino acids. The percentages of the average of the cognitive need of the respondents 92.87%, 88.70%, 86.96%, 81.22%, 78.96%, 77.39%, and 72.17% respectively. The results of Table 4 show that the level of cognitive need for researchers for technical recommendations for fertilizing the potato crop as a whole is moderate, with a general average of 60.81%.

Table 4. Level of cognitive need and averages of technical recommendations for fertilizing potato crop items

Items of technical recommendation for potato crop fertilization	Maximum cognitive need	Average cognitive need	Average %	Level	Order
1-Organic manure	2	0.452	22.60	low	13
2- Compost	1	0.887	88.70	high	2
3-azotobacter mineral fertilizers and equivalents	4	1.104	27.61	low	12
4- phosphate fertilizers and equivalents	2	0.687	34.35	low	11
5-potassium fertilizers and equivalents	3	1.390	46.33	low	10
6-agricultural sulfur and equivalents	1	0.174	17.39	low	14
7-magnesium fertilization and equivalents	3	2.609	86.96	high	3
8- calcium fertilizers	2	1.104	55.22	moderate	9
9- N P K	5	3.948	78.96	high	5
10- Foliar fertilization with micro elements	3	2.321	77.39	high	6
11- spray fertilization reserve	5	4.061	81.22	high	4

12- adding amino acids	6	4.330	72.17	high	7
13- adding humic substance	4	2.783	69.57	Moderate	8
14-adding bio fertilizers	5	4.643	92.87	High	1
General average:	2.18	60.81		Moderate	

Third: The relationship between the degree of cognitive need of respondents for technical recommendations for potato crop varieties and some independent variables studied

As shown in table5, it has been shown that there is a moral relationship at the probability level of 0.01 to the degree of study of the research, where the value of the simple correlation coefficient is -0.441. It also shows a moral relationship at the probability level 0.05 for the purpose of growing the potato crop where the value of the simple correlation coefficient is -0.217, whereas the morale of this relationship has not been proven at either probability level 0.01, or 0.05 with variables of average potato yield productivity, total farmed area, area cultivated with potato crop. Based on these findings, the previous statistical assumption was rejected for each of the independent variables with a moral correlation and could not be rejected for the rest of the variables of the study.

Table 5. the relationship between the degree of cognitive need of respondents for technical recommendations for potato crop varieties and some studied independent variables

Independent variables	Simple correlation coefficient
Educational level of respondents	**-0.411
Average productivity of potato crop	-0.163
Total farming area	-0.105

Total potato cultivated area	-0.155
Purpose of potato crop cultivation	*-0.217

**** Moral relationship at level 0.01** ***Moral relationship at level 0.05**

Fourth: Differences among respondents in their level of cognitive need for technical recommendations for potato crop varieties according to some independent variables studied

The data in table (6) shows that there are no significant differences among respondents in their level of cognitive need for technical recommendations for potato crop varieties as a dependent variable and the independent variables the agricultural cycle, availability of seeds, availability of fertilizers, appropriateness of prices of imported potato seeds, appropriateness of prices of fertilizers, and the extent of exposure to extension. It is not significant at 0.05. It is clear that the statistical hypothesis cannot be rejected, thus; the research hypothesis for these variables cannot be accepted.

Table 6. Differences among respondents in their level of cognitive need for technical recommendations for potato crop varieties according to some independent variables studied

Independent variables	chi- square
Agricultural cycle	3.370
Availability of seeds	5.483
Appropriateness of imported potato seeds crop prices	5.187
Availability of fertilizers	3.900
Appropriateness of fertilizers prices	5.884
Exposure to extension	8.362

Degree of freedom= 4

Fifth: the relationship between the degree of cognitive need of the respondents for technical recommendations for fertilizing the potato crop and some independent variables studied

As shown in table7, it has been shown that there is a moral relationship at the probability level of 0.01 to the educational level of respondents and the average productivity of potato crop , where the value of the simple correlation coefficient for both is -0.513. It also shows a moral relationship at the probability level 0.05 for the total area of potato crop cultivation and the purpose of growing the potato crop where the values of the simple correlation coefficient are -0.216 and -0.183 respectively. Furthermore, the morale of this relationship has not been proven at either probability level 0.01, or 0.05 with variables of total farmed area. Based on these findings, the previous statistical hypothesis was rejected for each of the independent variables with a moral correlation yet it could not be rejected for the rest of the variables of total farming area.

Table 7. The relationship between the degree of cognitive need of the respondents for technical recommendations for fertilizing the potato crop and some independent variables studied

Independent variables	Simple correlation coefficient
Educational level of respondents	**-0.513
Average productivity of potato crop	**-0.247
Total farming area	-0.123
Total potato cultivated area	*-0.216
Purpose of potato crop cultivation	*-0.183

**** Moral relationship at level 0.01** ***Moral relationship at level 0.05**

Sixth: Differences among respondents in their level of cognitive need for technical recommendations for potato crop fertilization according to some independent variables studied

The data in table (8) shows that there are no significant differences among respondents in their level of cognitive need for technical recommendations for potato crop fertilization as a dependent variable and the independent variables of agricultural cycle, availability of seeds, availability of fertilizers, and appropriateness of prices of fertilizers. It is not significant at 0.05. Thus, It is clear that the statistical hypothesis cannot be rejected, thus; the research hypothesis for these variables cannot be accepted.

Significant differences were found among respondents in their level of cognitive need for technical recommendations for potato crop fertilization as a dependent variable, and exposure to extension and appropriateness of prices of imported potato seeds as independent variables. The estimated chi 2 values are 22,963, 12,684, respectively. It is moral at the probability level of 0.01, 0.05. Based on this result, the fourth statistical hypothesis can be rejected, while the research hypothesis can be accepted. Such hypothesis states that there are significant differences among respondents in their level of cognitive need for technical recommendations for fertilizing the potato crop as a dependent variable and both the extent of exposure to extension, and the appropriate price of imported potatoes as independent variables.

Table 8. Differences among respondents in their level of cognitive need for technical recommendations for potato crop fertilizing according to some independent variables studied

Independent variables	chi- square
Agricultural cycle	7.885
Availability of seeds	4.040
Appropriateness of imported potato seeds crop prices	*11.001
Availability of fertilizers	0.312
Appropriateness of fertilizers prices	4.570
Exposure to extension	**22.820

**** Moral relationship at level 0.01 *Moral relationship at level 0.05 Degree of freedom= 4**

Seventh: Sources of information for farmers about potato crop

Table 9 data indicates that (100%) of respondents (farmers) They do not obtain their information about potato crop from any of the following sources: extension fields, horticultural care specialists at the Center, Gharbeya Vegetables and Fruit Association, Potato Producers Association, or the Faculty of Agriculture in the governorate. It has been shown that pesticide and fertilizers traders, experienced people, the Agricultural Cooperative Society and printed guidelines publications were always the sources of obtaining information: 60.9%, 52.2%, 8.7% and 6.1% respectively.

Table 9. Sources of information for farmers about potato crop

Sources of information	Degree of exposure							
	Always		Sometimes		Rarely		None	
	No.	%	No.	%	No.	%	No.	%
Seminars	-	-	2	1.8	15	13	98	85.2
Extension fields	-	-	-	-	-	-	115	100
Printed guidelines	7	6.1	19	16.5	3	2.6	86	74.8
horticultural care specialists at the Center	-	-	-	-	-	-	115	100
Agricultural Cooperative Society	10	8.7	17	14.8	25	21.7	63	54.8
Agricultural television programs	-	-	25	21.7	10	8.7	80	69.6
Gharbeya Vegetables and Fruit Association	-	-	-	-	-	-	115	100
Potato export stations	-	-	7	6.1	20	17.4	88	76.5
Fertilizers and pesticide traders	70	60.9	22	19.1	12	10.4	11	9.6
Potato Producers Association	-	-	-	-	-	-	115	100
Experienced people	60	52.2	35	30.4	-	-	20	17.4
The internet	12	10.4	26	22.6	-	-	77	67
The faculty of Agriculture in the Governorate	-	-	-	-	-	-	115	100

N=115

Eighth: Problems facing respondents with varieties and fertilization of the potato crop

The results in table 10 indicate that there were fourteen problems related to the varieties and fertilization of the potato crop. They were mentioned by respondents in percentages ranging from 10.4%, 92.2% of the total sample respondents. The problems were arranged in descending order according to percent mentioned by respondents.

Table 10. Ranking of the problems facing respondents with varieties and fertilization of the potato crop according to the percentages respondents

	Problems	No.	Percent
1	High prices of imported seeds	106	92.2
2	High prices of all types of fertilizers	100	86.9
3	Lack of knowledge of respondents of the technical recommendations for potato varieties	89	77.4
4	Lack of knowledge of foliar fertilization, bio fertilizations and how to use them	71	61.7
5	Adulteration of most fertilization, especially foliar fertilization	67	58.3
6	Adulteration of imported seeds	60	52.3
7	Absence of a cooperative or contractual marketing system for potato crop to compete with greedy traders and exporters	53	46.1
8	Lack of reliable sources of production supplies in the absence of the role of agricultural cooperatives and potato producers	46	40
9	Absence of agricultural extension role in the production, marketing and preparation of guidelines and bulletins for each potato variety	43	33
10	Lack of real control over production supplies, especially imported seeds and pesticides.	37	32.2
11	The majority seeds types of are infected with the viruses and are not resistant to blights	35	30.4
12	Lack of information for farmers on price forecasts, or on varieties suitable for local marketing and export	31	26.9
13	High prices of potassium fertilizers	26	22.6
14	Lack of knowledge of appropriate ways to reduce adverse weather impacts on potato crop production or issuing warning for farmers of bad weather forecast	12	10.4

N=115

Recommendations

Based on the findings of this study, following is recommended:

1- The results show that the vast majority of respondents (farmers) are with moderate level of cognitive need for information on potato varieties and fertilizers. So the study recommends increasing extension efforts in potato growing areas, working to present field extension, pilot programs, seminars, and the preparation of technical bulletins for farmers to be updated with new recommendations for each variety and its fertilization needs, especially with the increase and multiplication of potato varieties and continuously varying fertilizers.

2- The results of the study show that pesticide and fertilizer traders constitute the main sources of information that meets the need of farmers for information related to the potato crop. Therefore the study considers the need to activate the role of agricultural extension to be the first source meeting the needs of farmers, to obtain reliable information.

3- The problems indicated by the respondents are mostly related to the varieties and the fertilization of the potato crop. Furthermore, the study recommends that the Ministry of Agriculture takes over the supervision of the process of importing and distributing seeds through agricultural cooperatives, the way it used to be in the past. It is crucial to establish a cooperative or contractual marketing system for the potato crop, to eliminate farmers' manipulation by traders and exporters. Packaging and distribution should be monitored, along with fertilizers, bio nutrients, micronutrients, and others, in order to eliminate adulteration, especially that the process of fertilizing the potato crop is becoming more expensive.

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