

TURKISH JOURNAL OF AGRICULTURE AND FORESTRY-Turk J Agric For
E-ISSN: 1303-6173
ISSN: 1300-011X

Volume 44 number 6

**The reality of the use of chemical fertilizers in Hammam Al-Aaleel
area/ Nineveh Governorate/ Iraq**

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Abstract : This research aimed at identifying the use of chemical fertilizers by farmers in the area of Hammam Al-Aaleel / Nineveh province/Iraq in general and in each field and item in the research, identify the relationship between the use of chemical fertilizers by farmers and the independent variables included in the research. The Hammam Al-Aaleel region-It was selected as region for research. The total number of farmers in research region (350 farmer). A simple random sample was taken with (20%), the final research sample was (70 farmers). The researcher designed a questionnaire form in order to obtain research data. It consisted of two main parts: The first part included (personal, social, economic, and communication information for the respondents): as following (age, Education achievement, number of years of fertilizers using, number of years of work in agriculture, size of cultivated land, sources of information that used in the using of chemical fertilizers). The second part includes (5 axes) related to the use of chemical fertilizers, it includes (53 items) distributed on the research axes, namely: The field of determining the type of chemical fertilizers used in agriculture (9 items). The field of determining the quantities and date of adding chemical fertilizers (17 item). The way of using chemical fertilizers in agriculture (10 items). The field of benefits of the use of chemical fertilizers in agriculture (10 items). The field of the disadvantages of the use of chemical fertilizers (7 items). The data collection, lasted from 1/10/2018 to 1/12/2018. After the completion of data collection from the farmers and the use of many statistical methods in the analysis of data:(percentages, range, mean, person correlation coefficient, spearman's correlation coefficient). The results showed, the use of chemical fertilizers in general and in the fields and of research is low tends to be medium. Also, the results showed there is a significant correlation between the use of chemical fertilizers and the variables (age, Education achievement, number of years of fertilizers use, number of years of work in agriculture, sources of information used in the use of chemical fertilizers). The author recommended,

that it is necessary to raise awareness among farmers in using the chemical fertilizers in Hammam Al-Aaleel in order to educate them about the use of chemical fertilizers.

Key words: Chemical fertilizers, Iraq, reality, Hammam Al-Aaleel area.

Introduction and research problem

Fertilizers are used as a soil additive to help the plant grow. Farmers use several types of fertilizers to produce abundant crops. Farmers use fertilizer to produce strong, large flowers and abundant vegetables in home gardens. Green is dense and greener (2018, Moustafa). Fertilization is the material used to improve the properties of soil and feed crops to increase production by supplying nutrients directly or indirectly to plants to improve their growth and increase their production in quality and quantity. Fertilizers are called fertilizers, i.e., substances that increase soil fertility from the soft nutrients of plants that can be absorbed by plants (Sidney, 2011; Rifai, 2010). Fertilizers contain nutrients that are essential for plant growth. Some fertilizers are made from organic materials, such as animal manure or sewage waste, and others from metal or plant-based compounds used to fertilize crops.

Man used fertilizer for thousands of years, even at times when he did not know how useful it was to plants, and before humans realized the importance of plant nutrition for a long time. He observed that animal dung, wood ash and some other minerals help the plant grow strongly. During the 19th and early 20th centuries, researchers discovered that some chemical elements were necessary for plant nutrition (Sidney, 2011; Taha, 2011). Today, farmers use large amounts of fertilizers annually around the world. The increase in production was due to the addition of fertilizers, about a quarter of the world's crop production. Without fertilization, larger tracts of land should be cultivated and larger labor employed to produce the same quantity. Fertilizers generally include two organic and chemical varieties (2005).

The availability and ease of use of chemical fertilizers, the steady increase in population, the continuous and increasing demand for food, and the description of many countries in the world, including Iraq with food deficits (Mazar, 2009), led, of course, to the so-called food gap. This phenomenon and technological changes have led to excessive use, economic inefficiency and productivity in many cases to negative factors and situations as mentioned (Abidi, 2000).

Chemical fertilizers are one of the inputs of agricultural production (Muwail, 2005).

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Excessive addition of these fertilizers to the soil in excess of plant needs and at times unsuitable for crop growth leads to an imbalance in the soil between plant nutrients and creates an unbalanced environment for developing plants as well as potential damage to soil biodiversity. The excessive use of chemical fertilizer by farmers has negative effects on humans, plants and the environment (Abdel Salam, 2011). It leads to a series of serious diseases. As well as affect agricultural soil, which reduces the quality and fertility because the surplus from the need of the plant remains stored in the ground accumulates and lead to salinity of the earth. As their accumulation in the plant leads to a poor quality crop and decoration at the same time as well as its negative effects on environmental pollution (Al-Hiti, 2011; Safadi, 2008). Therefore, the fertilizer needs of the cultivated crop should be determined without excessive amounts of chemical fertilizers added. (2005). Avoid excessive damage (Abdul, 2005). The effective use of chemical fertilizers depends to a large extent on several factors, including the cognitive level as a process that includes a range of activities and events aimed at making behavioral changes in the rural family through the delivery of recommendations and solutions for agricultural productivity problems and modern technologies to address one or more of their system problems The farmer (Altalb, 2017; Elabed, 2000).

Here comes the role of agricultural extension in raising awareness among farmers of the importance of determining the appropriate fertilizers rates for each crop without excessive use, and thus get the most benefit from chemical fertilizers added and preserve the environment from pollution and access to a clean food product free of contaminants for the health of human as well as Get a Star, 2009). ; Altalb, 2017).

The process of development of sustainable development, the effective and peaceful use of fertilizers depends on several factors, including the scientific and sound use of fertilizers from different farmers in different agricultural operations and crop cultivation, and as such, the researcher wanted to investigate the reality of the use of fertilizers by farmers, The Hammam area was chosen as vernal area of the research.

- Research Objectives

- Identify the using of chemical fertilizers in general by farmers in the region of Hammam Al-Aaleel - Nineveh province - Iraq in general (in all fields).
- Realize the use of chemical fertilizers for farmers in each field of research.
- Know using chemical fertilizers by farmers in each of the research item.
- Make corrlation between the chemical fertilizers using for farmers and the independent variables included in the research.

The Method of Conducting Research**- Research Methodology**

The descriptive approach was used in this research because it provides us with descriptive data about the reality that we want to study and accurately.

Region and sample of Research:

the region of Hammam Al-Aaleel - Nineveh province was selected as region for research. The total number of farmers in research region who use chemical fertilizers are (350 farmer) (This data provided by the Agricultural Division in the Hammam Al-Aaleel / Nineveh province). It was taken a simple random sample from farmers with (20%) and the final research sample reached (70 farmers) who the data was collected from them.

- Preparing and designing the questionnaire:

For the purpose of obtaining data, researcher was designed a questionnaire form. It consisted of two main parts: the first part included (personal, social, economic, and communication information for the respondents): are: (age, Education achievement, number of years of fertilizers using, number of years of work in agriculture , size of cultivated land, sources of information that used in the using of chemical fertilizers).

The second part includes (5 fields) related to the use of chemical fertilizers, it includes (53 item) distributed on research fields, namely:

1. The field of determining the type of chemical fertilizers used in agriculture (9 items).
2. The field of determining the quantities and date of addition of chemical fertilizers (17 items).
3. The field way of using chemical fertilizers in agriculture (10 items).
4. The field of the benefits of the use of chemical fertilizers in agriculture (10 items),
5. The field of the disadvantages of the use of chemical fertilizers (7 items).

The fact of using of chemical fertilizers by farmers was measured through a scale (apply always, apply sometimes, apply rarely, not apply). (4,3,2,1) respectively, and through collecting the farmer's answers about all the fields and items of this research, we will obtain the final degree for the farmer, which represents (the reality of the use of chemical fertilizers by farmer in general and in each field of the fields search).

The independent variables were measured: as following:

The age variable was measured by number of years of respondent at the time of collecting research data. The variable (Education achievement) was measured by a scale consisting of (6 alternatives): not read and write, a primary school graduate, a middle school graduate, high school graduate, a college graduate and more). it gave the nomaric values respectively (1, 2, 3, 4, 5). The variables (number of years of fertilizers use and number of years of work in agriculture) were measured by giving (one degree per year). The variable sources of information used in the use of chemical fertilizers, was measured by a

scale consisting of (3 alternatives), which were (often, sometimes, do not get) and were given the following grades (3, 2, 1), respectively, The following information (personal experience, relatives and neighbors, agricultural television programs, agricultural radio programs, agricultural division, agricultural guide, agricultural handouts, agricultural extension magazines, agricultural extension posters, etc.) which the farmer use about using of chemical fertilizers. In order to verify the validity of the research tool (questionnaire) from the linguistic side. The items and fields of research were presented to specialists in the agricultural extension and specialists in the field of chemical fertilizers in order to find out the safety of the research items from the linguistic scientific side.

The reability of the fields and items of research was found by using the (split-half method) by finding Pearson correlation coefficient between individual and matrices to find the reability of half of scale. Thus, the reability of the total scale was found by using the spearman Brown coefficient, The coefficient of reability of the items was (0.90).

- Collection of research data:

The data collection process was conducted through the personal interview, through the assistance of some staff in the division of Hammam Al-Aaleel, the data collection lasted, from 1/10/2018 to 1/12/2018.

- Statistical methods:

After the completion of data collection from the farmers, the data were extracted and tabulated and then used many statistical methods in the analysis of research data, the most important (frequencies, percentages, range, mean, Pearson correlation coefficient, Spearman's correlation coefficient).

Results and Discussion

This part includes discussion of the of research results according to the sequence of the research objectives.

1. Identify the use of chemical fertilizers ingeneral by farmers in the area of Hammam Al-Aaleel / Nineveh province / Iraq in general (in all fields).

The results showed that the highest numerical value (actual answer) obtained by the respondents on the research items in general (171), the lowest numerical

value (55) and an average of (107) numerical value. The farmers were divided into three categories according to their use for chemical fertilizers in general. As shown in Table (1).

Table 1: Dstribution of respondents to categories according to their use of chemical fertilizers in general.

Categories	The number	Percentage
Low (55-93)	28	40

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E-ISSN: 1303-6173
ISSN: 1300-011X

Medium (94-132)	22	31,430
High (133- 171)	20	28,570
Overall	70	100

Mean (107) numeric value

Table 1, shows that most farmers fall in the low category (55-93), where it reached (40%), and the lowest percentage was in the high category (133-171), which accounted for (28,570%). This indicates that farmers in general use the chemical fertilizers in low tends to meduim rate in the district of Hamam Al-Alil. This may be due to their low knowledge of the importance of fertilizers in improving the quality of cultivated crops and the quality of agricultural soils.

2. Identify the use of chemical fertilizers by farmers in each field of the research: as following:

- The field of determining the type of chemical fertilizers used in agriculture:

The results showed that the highest numerical value (actual answer) obtained by farmers in this field is (31) and the lowest value is (14) with an average of (21). The farmers were divided into three categories in this field, as shown in Table (2).

Table 2:Distribution of respondents to categories according to this field.

Categories	The number	Percentage
Low (14-19)	35	50
Medium (20-25)	25	35,70
High (26- 31)	10	14,30
Overall	70	%100

Mean (21) numeric value

Table 2, shows that the highest percentage of farmers fall in the low category, where it accounted for (50%). And the lowest percentage in the high category with (14.30). This means that the use of chemical fertilizers by farmers in this field is low rate tends to mediuim. As a result of the lack of information they have in this field with regarding to the use of chemical fertilizers.

- Field of determining of quantities and date of addition of chemical fertilizers:

The results show that the highest numerical value (actual answer) obtained by farmers in this field is (60) and the lowest value (20) and an average of (39).

The respondents were divided into three categories in this field, as shown in Table (3).

Table 3: Distribution of respondents to categories according to this field.

Categories	The number	Percentage
Low (20-33)	39	55,70
Medium (34- 47)	20	28,60
High (48 - 61)	11	15,70
Overall	70	%100

Mean (39) numeric value

Table 3, shows that the highest rate of farmers fall in the low category where it accounted for (55,70%). The lowest percentage is in the high category, it formed (15,70%). This means that the reality of the use of chemical fertilizers in the field of determining the quantities and date of addition of chemical fertilizers by farmers is low tends to medium. As a result of the lack of information they have in this field with regard to the use of fertilizers.

- The field of how to use the chemical fertilizers in agriculture:

The results of this study showed that the highest numerical value (actual answer) obtained by farmers in this field is (38) and the lowest value is (18) and an average of (26). The respondents were divided into three categories, as shown in Table (4).

Table 4: Distribution of respondents to categories according to this field.

Categories	The number	Percentage
Low (18-24)	31	44,23
Medium (25- 31)	27	38,57
High (32 - 38)	12	17,10
Overall	70	100%

Mean (26) numeric value

Table 4, shows that the highest rate of farmers in the low category (18-24) where it was (44.23%). And the lowest rate fall in the high category (32 - 38) it take (17.10%). This means that the reality of fertilizers use by farmers is low tends to medium, as a result of the lack of information they have in this field with regard to the use of fertilizers.

- Field of the benefits of the use of chemical fertilizers in agriculture.

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E-ISSN: 1303-6173
ISSN: 1300-011X

The results showed that the highest numerical value (actual answer) obtained by farmers in this field is (34) and the lowest value (24), and an average of (28). The respondents were divided into three categories in this field, as shown in Table (5).

Table 5: Distribution of respondents to categories according to this field.

Categories	The number	Percentage
Low (24-27)	28	40
Medium (28- 31)	24	34,30
High (32 - 35)	18	25,70
Overall	70	100%

Mean (28) numeric value

Table 5, shows that the highest rate of respondents was in the low category, which accounted for (40%) and the lowest percentage in the high category, with (25.70%). This means that the reality of the use of chemical fertilizers by farmers regarding benefits of using chemical fertilizers in agriculture is low tends to medium. As a result of low information they have in this area with regard to the use of fertilizers.

- The disadvantages of using chemical fertilizers:

The results of this study show that the highest numerical value (actual answer) obtained by farmers in this field is (25) and the lowest value is (12) and an average of (18). Farmers were divided into three categories in this field, as shown in Table (6).

Table 6: Distribution of the respondents to categories according to this field.

Categories	The number	Percentage
Low (12-16)	30	42,85
Medium (17- 21)	23	32,85
High (22 - 26)	17	24,30
Overall	70	100%

Mean (17) numeric value

Table 6, shows that the highest percentage of respondents fall in the low category, where it reached (42.85%). while the lowest percentage within the high category, which accounted for (24.30%). This means that the use of fertilizers by farmers is low tends to medium in this field. Because of the lack of information they have in this field in the subject of the use of fertilizers.

3. Identify the use of chemical fertilizers by farmers in each items of the research:

Table 7: Distribution of farmers to categories according to their use of chemical fertilizers in each items.

No	Items	Mean	Centric weight %
1.	I interest in the process of fertilizing crops because they constitute 50% of the agricultural process.	3.60	90
2	Avoid excessive use of chemical fertilizers because they turn into nitrate and poisoned drinking water	3.50	87,5
3	The date of adding of manure is determined by the nature of the fertilizer itself (being fast or slow to dissolve in water).	3.30	82,5
4	I avoid fertilization in very cold atmosphere.	3.15	78,75
5	Phosphate fertilizers are added in one batch.	3.10	77,5
6	Avoid the excessive use of chemical fertilizers because they are deposited with groundwater:	3.00	75
7	Be sure to fertilize because it helps improve the qualities of agricultural products.	2.93	73,25
8	Phosphate fertilizers are added before or during cultivation due to their low melting with water and do not move quickly.	2.88	72
9	Avoid the excessive use of nitrogen fertilizers because they encourage the growth of the bushes in the water of the rivers and the mezzanine.	2.83	70,75
10	Potassium fertilizers are mixed with soil after addition.	2.77	69,25
11	Potassium Fertilizer is added before planting so that the plant can benefit from growth.	2.76	69
12	The amount of fertilizer used is determined according to the instructions on the compost bag.	2.72	68
13	Make sure to fertilize because it helps increase agricultural production.	2.66	66,5
14	The type of compost used is determined according to soil tolerance for compost.	2.55	63,75
15	Nitrogen fertilizers are added in separate batches.	2.50	62,5
16	Avoid excessive use of chemical fertilizers because they cause food poisoning.	2.47	61,75

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17	Be sure to fertilize as it helps increase the water efficiency of the crop.	2.45	61,25
18	Avoid fertilization in a very warm atmosphere.	2.42	60,5
19	Be sure to fertilize as it helps feed crops.	2.40	60
20	Avoid excessive use of chemical fertilizers as they cause child diseases.	2.38	59,5
21	Avoid excessive use of nitrogen fertilizers as they threaten fish stocks.	2,25	56,5
22	The date of adding manure is determined by the availability of irrigation water.	2,20	55
23	Avoid adding all fertilizers at once.	2,15	53,75
24	The date of addition of compost is determined depending on the nutrient needs of the soil.	2.10	52,5
25	Be sure to make Potassium fertilization because it helps to increase crop production.	2.08	52
26	Spray chemical fertilizers on the ground in two directions.	2.05	51,25
27	The type of fertilizer used is determined by the type of bushes that appear on the farm.	2.00	50
28	The type of fertilizer used in accordance with the recommendations of the agricultural extension specialist is determined.	1.90	47,50
29	Chemical fertilizers are added in dry dispersion.	1.85	46,25
30	Be sure to make nitrogen fertilization because it helps to increase sugars in the plant.	1. 82	45,50
31	Wash the plant immediately after fertilization.	1.75	43,75
32	The type of fertilizer used is determined by the degree of fertilizer efficiency.	1.70	42,50
33	The type of fertilizer used is determined according to soil type.	1.67	41,75
34	The type of fertilizer used is determined by the type of crop grown.	1.61	40,25
35	The type of manure used is determined according to environmental conditions.	1.57	39,25

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36	Date of adding manure based on soil type.	1.55	38,75
37	The type of compost used is determined according to soil need for compost.	1.53	38,25
38	The amount of fertilizer used depends on the crop requirement for fertilizer.	1.51	37,75
39	The type of fertilizer used is determined according to the plant's need for fertilizer.	1.45	36,25
40	The type of fertilizer used is determined according to the plant's need for fertilizer.	1.43	35,75
41	Store chemical fertilizers in designated and dry places.	1.41	35,25
42	Be sure to fertilize as it helps to improve the physical and chemical properties of agricultural land.	1.39	34,75
43	Chemical fertilizers are added in solution.	1.37	34,25
44	Be sure to make nitrogen fertilization because it helps to increase vegetative growth of the plant.	1.35	33,75
45	Potassium fertilizer is added in one batch.	1.33	33,25
46	Fertilizers are added to the plant at their specified time without delay.	1.31	32,75
47	Avoid the excessive use of chemical fertilizers because they cause cancer (stomach and intestines) through the water of the rivers and insulators.	1.25	31,25
48	Wear special clothing during fertilization.	1.23	30,75
49	Solid fertilizers are added in prose form.	1.21	30,25
50	Spraying chemical fertilizer depends on the climate situation	1.19	29,75
51	The amount of chemical fertilizers for spraying is determined based on fertilizers effectiveness	1.17	29,25
52	The amount of fertilizers used is determined by the concentration of compost.	1.15	28,75
53	The amount of fertilizers used depends on the purpose of adding fertilizer.	1.13	28,25

It is clear from Table (7) above that the first three items that took the first order in the use of fertilizers are (interest in the process of fertilizing crops because they constitute 50% of the agricultural process, avoid excessive use of chemical fertilizers because they turn into nitrate and poisoned drinking water, the date of addition of manure is determined by the nature of the fertilizer itself (being fast or slow to dissolve in water). This means that farmers in the area of the bath have knowledge regarding the use of fertilizers, especially on the importance of the use of fertilizers in agriculture, as well as mixing fertilizers recommended concentrations, The method as well of solid fertilizers.

4. Determine the correlation between the use of chemical fertilizers by farmers and the independent variables included in the research:

The researcher used Pearson's simple correlation coefficient and spearman's to find correlation coefficient:

➤ **The Age:**

The results of this study showed that the highest age of farmers (fertilizers users) is (70 years) and the lowest age (30 years) with an average of (49 years). The farmers were distributed according to their age to three categories, as shown in Table (8):

Table 8: Distribution of respondents to categories according this variable and their relationship with their use of chemical fertilizers.

Categories of age	The number	Percentage	Correlation coefficient (r)
Low (12-16) year	30	42,85	0.65 **
Medium (17- 21) year	23	32,85	
High (22 - 26) year	17	24,30	
Overall	70	100%	

Mean (49) numeric value

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E-ISSN: 1303-6173
ISSN: 1300-011X

Table 8, showed that the highest rate of farmers was in the medium category, reaching (32,85%). The results of the data analysis showed that there was a significant positive correlation between the use of chemical fertilizers and the age variable. The coefficient of simple correlation Pearson (0.65**). This means that the older farmers use chemical fertilizers more than youngest farmers. As a result of their knowledge in the importance of chemical fertilizers in agriculture as well as their knowledge of the methods of using fertilizers on agricultural crops as a result of his years of experience.

➤ **Academic achievement:**

The respondents were divided according to academic achievement into three categories. As in Table (9):

Table 9: The distribution of respondents to categories according this variable and its relationship to their use of chemical fertilizers.

Categories of age	The number	Percentage	Correlation coefficient (rs)
not reading and writing	2	2,857	0,59**
Reading and not writing	10	14,29	
A primary school graduate	25	35,71	
a middle school graduate	13	18,57	
high school graduate	10	14,29	
a college graduate and more	10	14,29	
Overall	70	100	

Table 9, showed that the highest proportion of farmers fall in the category of primary school graduates, reaching (35.71%), and the lowest proportion fall in the category of not reading and writing, which accounted for 2,857%. The results showed also, that there is

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E-ISSN: 1303-6173
ISSN: 1300-011X

a significant positive correlation between the use of chemical fertilizers and the variable of the educational achievement. The correlation coefficient of Spearman (0.59 **). This means that farmers with a higher level of academic use the fertilizers much greater, because the information they have about fertilizers and their uses in agriculture, they use fertilizers more than other farmers.

➤ **Number of years of work in agriculture:**

The results showed that the highest number of years worked in agriculture for farmers was (35) years and the lowest number (12) years with an average of (21 years). The respondents were divided according to the number of working years in agriculture to three categories, as in Table (10).

Table 10: The distribution of respondents to categories according this variable and its relationship with the use of farmers for chemical fertilizers.

Categories	The number	Percentage	Correlation coefficient (r)
Low (12-19) year	18	25,71	0.73**
Medium(20-27) year	30	42,86	
High (28 - 35) year	22	31,43	
Overall	70	100%	

Mean (21) numeric value

Table 10, shows that the highest proportion of farmers was in the meduim category ,where it reached (42.86). The results showed that there was a significant positive correlation between the use of chemical fertilizers and the variable number of years of work in agriculture. The correlation coefficient of Pearson (0.73**), when the greater the use of fertilizers by farmers for caltivation crops, as a result of their use in the cultivation of various crops in the field.

➤ **Size of cultivated land:**

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E-ISSN: 1303-6173
ISSN: 1300-011X

The results showed that the highest area of agricultural land owned by farmers (30 dunums), and the least size of land owned (1 dunum), an average of (14 dunum), and the respondents were divided into three categories according to the range and category length. As in Table (12):

Table 11: Distribution of respondents according to this variable and its relationship with the use of fertilizers by farmers

Categories (dunam)	The number	Percentage	Correlation coefficient (r)
Low (1-10)	50	71,43	0.043
Medium (11- 20)	12	17,14	
High (21 - 29)	8	11,43	
Overall	70	100%	

Mean (21) numeric value

Table 11, shows that the highest proportion of farmer falls in the low category (71.43%). The results showed also that there was no significant correlation between the use of fertilizers and the variable size of cultivated land. The value of pearson correlation coefficient (0.043), indicating that there is no significant correlation between fertilizers use and size of cultivated land it means that in different areas of cultivated land, farmers use fertilizers in crop cultivation.

➤ **Sources of information that used in the using the chemical fertilizers:**

Table 12: Distribution of respondents according to this variable and its relationship with the use of chemical fertilizers.

Categories	The number	Percentage	Correlation coefficient (rs)
Personal experience	15	20	0,52**
relatives and neighbors	12	17,142	
Agricultural television programs	2	2,857	
agricultural radio programs	1	1,428	
agricultural division	8	11,428	
agricultural guide	5	7,142	

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agricultural handouts	9	12,857	
agricultural extension magazines	8	11,428	
agricultural extension posters	10	14,285	
Overall	70	100%	

Table 12, shows that the highest proportion of farmers fall in the category of personal experience, where it reached (20%), and the lowest proportion is in the category of agricultural radio programs, which accounted for (1,428%). The results showed that there was a positive correlation between the use of chemical fertilizers and the variable of the sources of information important in the use of chemical fertilizers. The value of spearman's correlation coefficient is (0.52 **) was significant at the probability level (0.01). It mean that the farmers who have more information and knowledge about fertilizers used in agriculture, use fertilizer more than other farmers.

Conclusions

According to the research results we conclude the following:

- We conclude that the farmers in the area of Hammam Al-Aaleel using fertilizers in low rate, because of the lack of information for them on the importance and usefulness of the use of chemical fertilizers in agriculture.
- We conclude from this result that number of farmers using chemical fertilizers is low and tends to medium due to the low information about the use of fertilizers and its importance in raising the productivity of crops and improve soil properties.
- We conclude from the research the items that came in the first order according to the level of their use of chemical fertilizers, namely: (interest in the process of fertilizing crops because they constitute 50% of the agricultural process, avoid excessive use of chemical fertilizers because they turn into nitrate and poisoned drinking water, the date of addition

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of manure is determined by the nature of the fertilizer itself (being fast or slow to dissolve in water).

- We conclude from these that the variables (age, educational level, number of years of fertilizers use, number of years of work in agriculture, sources of information used in the use of chemical fertilizers) have an effective role in encouraging farmers to use fertilizers in agriculture.

Recommendations

Working on raising awareness among farmers in the field of using chemical fertilizers in Hammam Al-Aaleel to educate them about the importance of using chemical fertilizers properly and scientifically without any side effects on plants, environment and humans. This will be done by establishing training courses for farmers on topics related to the use of chemical fertilizers.

Acknowledgment

In the end of my article, I would like to say thank you to my Country (Iraq) and to (ministry of High Education and Scientific Research) in Iraq, also to University of Mosul and to College which I work (College of Agriculture and Forestry).

References

- Mostafa., Kh, (2018) Agricultural fertilizers. Arabic Scientific Archive. 1.
- Muwail A., Ahmad, 2015. Some Decisions Affecting the Use of Chemical Fertilizers in Al-Hasa Region, Saudi Arabia, Damascus University Journal of Agricultural Sciences: 37-85.
- Rifai H., Mohamed,(2010) Environmental Protection and Poverty, 3rd Environmental Protection Conference, Algeria.
- Abdel S., M. Abdel Salam, 2011. The Environment and its Problems, Environmental Education and Sustainable Development, Dar Al-Fikr Al Arabi, First Edition, Cairo, Egypt.
- El Abedi G., Spahy, (2000) Chemical fertilizers. Journal of Iraqi Agriculture. Issue IV.

TURKISH JOURNAL OF AGRICULTURE AND FORESTRY-Turk J Agric For
E-ISSN: 1303-6173
ISSN: 1300-011X

- Al-Hiti S., Fares, 2011. Desertification is understandable - its causes - its dangers – its fight. First Edition. Dar Al Yazouri Scientific Publishing and Distribution. Jordan
- Safadi I., Hamdi, and N. Al-Zaher (2008) Environmental health and safety. Dar Al Yazouri Scientific Publishing and Distribution.
- Taha S., 2011. Extension of fertilization procedures in improving the productivity and production of the agricultural system. Journal of Iraqi Agriculture, Issue 1: 10-19.
- Najem, Abdel Wahid Youssef (2009) Protect the environment from pollution. General Directorate of Agricultural Culture, Ministry of Agriculture and Land Reclamation, Egypt.
- Abdul T., M. 2005. An assessment of availability and use of chemical fertilizers for farming community in Tehsil phalia. International Journal of Agriculture and Biology, 6 (2): 407-415.
- Sidney H., C. (2011) Plant Products and Chemical Fertilizers, Publisher General Books. New York, USA.
- Waithaka M., M. 2007. Factor affecting the use of fertilizers and manure by small holders, the case of vihiga western Kenya, Journal WordApplied Sciences, 78 (2): 211-224.
- Mazar J. N., (2009) Farmers overuse of chemical fertilizers in grain crops and its relation with some variables. A case in the north china plain. Journal of Agrotechnical Economic, 20 (6): 36-42.
- Altalb A., A. Talb. (2017) The reality of using the mineral fertilizers by farmers in Janowski County of Poland, Asian Journal of Agricultural Extension, Economics & Sociology, 16 (2): 2-8.
- Altalb A., A. Talb. (2017) Farmers' Knowledge towards the Role of Extension Services in Agricultural Development in Opolski County, Lubelskie Province of Poland, Asian Journal of Agricultural Extension, Economics & Sociology, 15 (3): (1-8).
- Geisseler D., S. K. (2014) Long-term effects of mineral fertilizers on soil Microorganismse, A review. Soil Biology and Biochemistry. 75 (5):54-63.