The Impact of Personal and Economic Characteristics of Wheat and Barley Farmers on their Adoption of Conservation Agriculture Technology

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Abstract

The study aimed to identify the level of adoption of conservation agriculture technology by wheat and barley farmers, to rank the paragraphs of each conservation agriculture technology domain according to their relative importance to farmers, and to identify the correlational relationship between the farmers' adoption level of conservation agriculture technology and the following variables (age, educational level, number of years working in agriculture, cultivated land area). The research community included all farmers applying conservation agriculture technology in Tel Keif district, numbering (430) farmers. A sample of (40)% of the total community was taken, approximately (172) respondents. After excluding the reliability sample of (30) respondents from the main research sample, data was collected using a questionnaire form consisting of two parts: The first part included questions for measuring the independent variables of the respondents, while the second part included a set of domains to measure the farmers' level of adoption of conservation agriculture technology. The study data was analyzed using likert skill the (SPSS) program, and the results showed that the farmers' level of adoption of conservation agriculture technology is moderate. The results also indicated a significant correlation between the farmers' level of adoption of conservation agriculture technology and the number of years working in agriculture. The researcher recommends developing plans for extension programs and other specialized programs to persuade as many farmers as possible to adopt this modern technology.

Keywords: Conservation agriculture, Adoption of agricultural technologies, Reality of implementation, Likert quad scale.

Introduction

The World Food and Agriculture Organization (FAO)defines conservation agriculture as an agricultural system that encourages the maintenance of permanent soil cover and the reduction of soil disturbances (soil tillage(

Diversifying plant species (agricultural cycle) also enhances biodiversity and natural biological processes, whether above or below the soil surface Which contributes to increasing the efficiency of water and nutrient use and improving crop production and sustainability [8].Countries worldwide, regardless of their social, economic, and political levels, strive to promote, develop, and advance their various agricultural sectors for numerous reasons, especially in light of the scarcity of necessary food for populations. This necessitates planning and implementing many development programs to provide

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adequate food security for the people of these countries. [1]. The development and modernization of the agricultural sector heavily rely on the dissemination and adoption of modern agricultural technology and research findings. This is because the dissemination and adoption of this technology, its reach to farmers, their understanding, and conviction in it, lead to optimal economic utilization of resources and an increase in production rates [5]. The success of agricultural systems in general depends on the success and optimal utilization of available resources, both natural and artificial, by employing human skills and capabilities and working groups. The results are obtained in the form of food materials. This success can be achieved by increasing the cultivated land area, also known as horizontal expansion, but this has become somewhat difficult due to the scarcity of natural surface and groundwater resources, as well as the decline and fluctuation of rainfall rates during their seasons and their poor distribution during a single agricultural season [16 .[

With the recent conditions of drought and desertification that have spread in the region, there has been an urgent need to adopt new agricultural methods and techniques in crop cultivation. This involves using agricultural methods, applications, and means that achieve the desired increase in production per unit area by preserving the soil's large reserves of water and nutrients and making the most of rainfall [11]. Conservation agriculture, or no-tillage, is considered an alternative and promising system to traditional agriculture. It aims to improve and increase the productivity of field crops, including wheat and barley, especially in light of the decline and scarcity of annual rainfall rates and its irregularity, which has led to an increasing demand for food[19]. Conservation agriculture has many advantages and benefits resulting from its application by farmers. These include controlling wind and water erosion of the soil, effective control of weeds and harmful plants, improving the number and activity of microorganisms, and enhancing the quantity and quality of organic matter in the soil. Consequently, it will increase soil fertility and improve the quality and structure of the land [13]. It also reduces the need for agricultural machinery, saves energy and fuel, and reduces the need for labor, as it does not require trained labor. Furthermore, it improves productivity in the long run and provides very large financial returns, among other benefits [4]. This system manages rainwater harvesting more effectively than any other system, especially the traditional one. Crops grown using conservation agriculture are more tolerant of critical environmental conditions such as water scarcity and low humidity, in addition to achieving significant economic returns [9]. The area of agricultural land adopting conservation agriculture has significantly multiplied in recent years. It has spread and expanded most rapidly in Latin America, especially Argentina, Brazil, and Paraguay, where about 60% of agricultural land applies conservation agriculture. There are other countries with large areas of agricultural land that apply conservation agriculture, such as America, Canada, and Australia. The importance of conservation agriculture is also spreading in a number of other countries, such as Central Asia, Southeast Asia, and some countries in Africa and Europe [7]. The effectiveness of this system has been proven across various agricultural environments, as it has been tested in numerous farms and fields in Iraq using all irrigation methods, whether sprinkler or drip irrigation [10 .[

Hence, the role that agricultural extension must play emerges as a system to bridge the gap between scientific agricultural discoveries and their implementation fields, and to transfer research results to farmers [3]. This is achieved by disseminating many new ideas and technologies that farmers should be aware of and apply in general crop cultivation, and specifically in wheat and barley cultivation [2]. This is because agricultural extension is

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considered one of the most prominent and important rural development agencies, playing a significant and primary role in the process of transferring agricultural technologies and modern knowledge aimed at advancing the agricultural sector [17]. Based on the importance of the foregoing, understanding the reality of farmers' application of conservation agriculture technology related to wheat and barley cultivation is fundamental to building reality-based extension programs. Therefore, it was important to identify the level of farmers' adoption of conservation agriculture technology in wheat and barley production due to its great benefit and importance in bringing about desired behavioral changes in farmers' knowledge, skills, and attitudes.

Research Aims:

- Identify the level of adoption of conservation agriculture technology by wheat and barley farmers .
- Rank the paragraphs of each domain of conservation agriculture technology according to their relative importance to farmers .
- Identify the correlational relationship between the level of farmers' adoption of conservation agriculture technology and each of the following variables (age, educational level, number of years working in agriculture, cultivated land area .(

Research hypotheses :

- There is no significant correlation between the reality of the impact of personal and economic characteristics of farmers and age .
- There is no significant correlation between the reality of the impact of personal and economic characteristics of farmers and educational level .
- There is no significant correlation between the reality of the impact of personal and economic characteristics of farmers and the number of years working in agriculture .
- There is no significant correlation between the reality of the impact of personal and economic characteristics of farmers and the cultivated land area .

Materials and Methods:

This study was conducted on farmers in TelKeif district, Nineveh Governorate / Republic of Iraq. The study population included all farmers who applied conservation agriculture technology in the research area, numbering (430) farmers. To determine the optimal sample size for the research, Thompson's equation .[18] was used. This equation indicated that the optimal sample ratio is (40%) of the total population, approximately (172) respondents, who were selected by simple random proportional sampling. After excluding the reliability sample of (30) respondents, the final sample became (142). To achieve the research objectives in terms of collecting the required data, a questionnaire form was designed, which is considered one of the most important tools for collecting information and data from the targeted respondents. It consisted of a number of statements and informational questions for the respondents to answer [6]. The questionnaire form consisted of two parts: The first part related to questions for measuring the independent variables of the respondents, which included (age, educational level, cultivated land area, type of land tenure, attitude towards conservation agriculture). The second part included a set of (32) Axie distributed across three study domains, which were distributed as follows (no-tillage domain: 12 paragraphs, crop rotation domain: 10 paragraphs, economic importance domain: 10 paragraphs .(

To measure the stability of the axes and paragraphs included in each axis, the Fachronbach coefficient was used to measure

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internal consistency and the stability of the scale Through the Likert

quadrilateral scale (applied to a large degree, applied to a medium degree, applied to a small degree, not applied) (1,2,3,4) respectively .

These paragraphs and questions were prepared after the researcher reviewed relevant previous references and research, and a set of literature on the same topic. Content validity and face validity were extracted by presenting the questionnaire form to a group of specialized experts and reviewers in the field of conservation agriculture, represented by heads of departments at the Dryland and Conservation Agriculture Center at the University of Mosul, as well as a number of professors from the Field Crops Department at the University of Mosul, in addition to professors from the Agricultural Extension and Technology Transfer Department at the College of Agriculture and Forestry / University of Mosul. This was done to identify their observations and suggestions regarding the questions included in the questionnaire form to ensure the clarity of these paragraphs. And their suitability for the respondents, and to ensure the soundness of the wording of the questions contained in the questionnaire. All suggestions, observations, and modifications received from the experts were taken into consideration by making adjustments to some paragraphs, rephrasing some, and deleting others according to the modifications received from them. The paragraphs that were agreed upon by the reviewers at a rate of (85%) or more were relied upon. To measure the reliability of the paragraphs, a sample of (30) farmers was taken for the reliability sample, which was excluded from the total population. Cronbach's Alpha coefficient was used to find the reliability of the scale, which reached (0.95), a good value for reliability. Four alternatives were provided for answering the paragraphs of the scale measuring the impact of personal and economic characteristics of wheat and barley farmers on their adoption of conservation agriculture technology. These were (Apply to a great extent, Apply to a moderate extent, Apply to a small extent, Do not apply), and they were assigned the numerical codes (4, 3, 2, 1) respectively. The (SPSS) program, which is considered one of the most important statistical tools used in the research, was employed.

Results and discussion:

Aim 1: Identify the level of adoption of conservation agriculture technology by wheat and barley farmers .

To achieve this objective, the results showed that the highest value obtained by the respondents in their level of adoption of conservation agriculture technology was (256), while the lowest value obtained by the respondents was (64) on a four-point scale, with an arithmetic mean of (207) and a standard deviation of (8). The respondents were divided into three categories using the arithmetic mean and standard deviation. They were first summed together to extract the upper limit of the middle category, then the standard deviation was subtracted from the arithmetic mean in the second instance to extract the lower limit of the middle category,

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which falls between (199 - 215), as shown in Table No. (1 .(

Table No. (1) shows the distribution of respondents according to farmers' level of adoption of conservation agriculture technology.

No.	Categories	frequency	%	Arithmetic mean	S. d
1	(64-198) low	24	16.901	207	8
2	(199-215) medium	90	63.380		
3	(216-256) high	28	19.718		
	Total	142	100%		

Table No. (1) shows that the highest percentage of respondents falls within the moderate category (199 - 215), accounting for (63.380%). The high category, which falls between (216 - 256), ranked second with (19.718%). While the low category, which falls between (64 - 198), accounted for (16.901%). It is clear from the above that the majority of respondents fell into the moderate and high categories, which constitute approximately (83.098%). This means that the level of farmers' application of conservation agriculture technology is moderate, tending towards high. This may be due to the importance and novelty of this technology and the research area's unique application of conservation agriculture technology, given its significant benefits, such as reducing effort and cost, preventing soil erosion, and increasing organic matter in the soil and improving the quantity and quality of production .

Aim 2: Rank the paragraphs of each domain of conservation agriculture technology according to their relative importance to farmers .

Axie 1: No-Tillage: The results showed the ranking of paragraphs for this Axie. Table No. (2) indicates that the paragraph "I apply conservation agriculture because it integrates sowing operations without the need for tillage" came in first place with a weighted arithmetic mean of (3.975) and a percentage weight of (99.375). This may be due to its significant economic importance in reducing the time and effort expended in cultivating agricultural crops, in addition to the importance of no-tillage for its many benefits, such as preserving agricultural soils from erosion, whether water or wind erosion, as well as improving the physical and chemical properties of the soil and preserving the living organisms that live in it. And increasing its organic content, making it a living environment where microorganisms thrive, thereby increasing the soil's ability to retain moisture for long periods. This is illustrated in the following Table No. (2 .(

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Table No. (2) Ranking of paragraphs regarding farmers' application of conservation agriculture technology in the no-tillage domain.

No.	Paragraphs	Weighted Arithmetic Mean	Percentage Weight*	Paragraph Rank
1	I apply conservation agriculture because it integrates sowing operations without the need for tillage.	3.975	99.375	1
2	I apply conservation agriculture to increase production per unit of cultivated area.	3.766	94.15	3
3	I apply conservation agriculture for early crop cultivation.	3.323	83.075	9
4	I apply conservation agriculture to increase soil fertility.	3.652	91.3	5
5	Using conservation agriculture preserves biological and organic matter in the soil.	2.960	74	10
6	I apply conservation agriculture to reduce greenhouse gas emissions into the atmosphere.	2.567	64.175	11
7	I can plant wheat and barley immediately after harvest.	1.950	48.75	12
8	I apply no-tillage agriculture to protect the soil from high temperatures.	3.373	84.325	7
9	I apply conservation agriculture because it helps improve soil texture.	3.363	84.075	8
10	I apply conservation agriculture because it contributes to soil erosion control.	3.716	92.9	4
11	I apply conservation agriculture because it reduces fertilizer use.	3.602	90.05	6
12	Applying conservation agriculture improves seedling growth in the field.	3.896	97.4	2

Maximum Score = 4 Meanwhile, the paragraph "I can plant wheat and barley immediately after harvest" ranked last with a weighted arithmetic mean of (1.950) and a percentage weight of (48.75). This may be due to the difficulty of cultivating crops immediately after harvest, and perhaps because the soil may need time to regain its vitality, fertility, and improve its structure to be prepared for planting again. Additionally, water scarcity during summer periods and pests and diseases that require a period for treatment may be reasons why farmers cannot plant immediately after harvest .

Axie 2: Crop Rotation: The results showed the ranking of paragraphs for this.Axie. Table No. (3) indicates that the paragraph "I follow the conservation agriculture system to stop land degradation" came in first place with an arithmetic mean of (3.697) and a percentage weight of (92.425). This may be due to the respondents' adoption of conservation agriculture technology for its importance, especially in no-tillage and maintaining plant cover on the soil surface, which improves its quality and health. Therefore, protecting the soil from degradation, whether soil erosion, runoff, loss of nutrients, or a decrease and inhibition of its living organisms and biodiversity, in addition to The economic and

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environmental returns that can be obtained from applying conservation agriculture technology to contribute to increasing farmers' income. All these reasons led to farmers' adoption of conservation agriculture technology, as shown in the following Table No. (3 .(

Table No. (3) Ranking of paragraphs regarding farmers' application of conservation agriculture technology in the crop rotation domain.

No.	Paragraphs	Weighted Arithmetic Mean	Percentage Weight*	Paragraph Rank
1	I follow the conservation agriculture system to stop land degradation.	3.697	92.425	1
2	Using crop rotation limits weed spread.	2.805	70.125	5
3	I apply crop rotation to limit pest spread.	2.721	68.025	8
4	I apply crop rotation to increase soil fertility.	3.562	89.05	2
5	I regulate the timing and amount of fertilizer application to the crop.	2.796	69.9	6
6	I apply crop rotation to improve the chemical and physical properties of the soil.	2.741	68.525	7
7	Applying crop rotation ensures the smooth flow of nutrients in the soil.	2.592	64.8	9
8	I apply crop rotations to organize and arrange farm work.	2.269	56.725	10
9	I apply crop rotations to increase the number of organisms and microorganisms in the soil.	3.090	77.25	4
10	I use crop rotations to reduce the exacerbation of toxins released by some plants into the soil.	3.279	81.975	3

Maximum Score = 4 Meanwhile, the paragraph "I apply crop rotations to organize and arrange farm work" ranked last with an arithmetic mean of (2.269) and a percentage weight of (56.725). This may be because farmers rely on their experience and capabilities in arranging and organizing their agricultural work according to its priority. Most farmers may be unaware of the importance of organizing their agricultural work, especially those who use crop rotation in their fields, due to several reasons, including lack of awareness and knowledge, and insufficient information. Some may also consider it costly or complex .

Axie 3: Economic Importance: The results showed the ranking of paragraphs for this Axie. Table No. (4) indicates that the paragraph "I apply no-tillage agriculture to reduce labor" ranked first with an arithmetic mean of (3.985) and a percentage weight of (99.625). This may be due to the fact that reducing the number of laborers in agriculture using conservation agriculture technology will reduce the total production costs, especially in areas suffering from labor shortages. It may also reduce the working hours required to complete the necessary field operations, which in turn will significantly increase Production quantities without the need to increase the number of workers, which significantly enhances efficiency and productivity in

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agriculture. This is illustrated in the following Table No. (4 .(

Table No. (4) Ranking of paragraphs regarding farmers' application of conservation agriculture technology in the economic importance domain.

No.	Paragraphs	Weighted Arithmetic Mean	Percentage Weight*	Paragraph Rank
1	I apply no-tillage agriculture to eliminate excessive agricultural expenses.	3.975	99.375	2
2	I apply no-tillage agriculture to obtain early production.	3.756	93.9	6
3	For agricultural economics and reducing agricultural inputs, I applied the conservation agriculture system.	3.473	86.825	7
4	I use no-tillage agriculture to improve productivity.	3.910	97.75	5
5	I apply no-tillage agriculture to reduce labor.	3.985	99.625	1
6	I apply conservation agriculture to reduce moisture loss in the soil.	2.876	71.9	9
7	I apply no-tillage agriculture in different soil types.	2.846	71.15	10
8	I apply conservation agriculture to reduce fuel consumption in agriculture.	3.945	98.625	3.5
9	I apply conservation agriculture to reduce seed quantity.	3.945	98.265	3.5
10	I apply conservation agriculture to reduce environmental pollution.	3.030	75.75	8

Maximum Score = 4 Meanwhile, the paragraph "I apply no-tillage agriculture in different soil types" ranked last with an arithmetic mean of (2.846) and a percentage weight of (71.15). This may be due to several reasons, the most important of which is that the application of conservation agriculture generally reduces tillage regardless of its type, and farmers do not apply this technique in all types because the soil quality in the research area is limited to loamy soil .

Aim 3: Identify the correlational relationship between the level of farmers' adoption of conservation agriculture technology and each of the following variables (age, educational level, number of years working in agriculture, cultivated land area .(

.1Age: The study results showed that the lowest age of respondents was (26) years and the highest age was (67) years, with an arithmetic mean of (1.93) and a standard deviation of (0.659). Respondents were divided into three categories according to the actual range - class width rule. The highest percentage was within the middle age group (40 – 53) with a percentage of (52.113%). This was followed by the high age group (54 – 67) with a percentage of (26.761%). As for the low age group (26 – 39), it ranked last with a percentage of (21.127%). This is shown in Table No. (5 .(

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Table No. (5) shows the distribution of respondents according to the age variable and its relationship to the impact of personal and economic characteristics of farmers on adopting conservation agriculture technology.

Categories	frequency	%	Arithmetic mean	S. d	R value	P value
(26-39)low	30	21.127	1.93	0.659	0.151	0.778 N .S
(40-53) medium	74	52.113				
(54-67) high	38	26.761				
Total	142	100%				

N.S. = Not Significant

To find the correlational relationship between the reality of farmers' application of conservation agriculture technologies and the age variable, Pearson's simple correlation coefficient was used, which had a value of (0.151). This indicates a non-significant relationship between the two variables, with a p-value of (0.778). Therefore, we accept the null hypothesis which states that there is no significant correlational relationship between the reality of the impact of personal and economic characteristics of farmers on adopting conservation agriculture technology and age. This indicates that the age of the respondents, whether old or young, has no relation to their level of application of conservation agriculture technology. This may be due to the fact that more than three-quarters of the respondents are of middle and old age. Since conservation agriculture technology is newly applied and for the first time in the research area, the application of this technology is more likely to be by younger farmers than older ones. This is confirmed by .[14] that younger farmers are more willing, receptive, and apply modern agricultural ideas and innovations than older farmers .

.2Educational Level: This variable was divided into eight categories: (Illiterate, Can read and write, Primary, Intermediate, Secondary, Institute, Bachelor's, Higher degree). The highest percentage was in the intermediate category, which was (28.9%). The secondary category came in second place with (22.7%). The primary category came in third place with (21.1%). The "can read and write" category followed with (8.4%). The bachelor's category came in fifth place with (7%). The illiterate category came in sixth place with (4.9%). While the institute and higher degree categories came in seventh and eighth places with (3.5%) for each, respectively. This is shown in Table No. (6 .(

Table No. (6) shows the distribution of respondents according to the educational level variable and its relationship to the impact of personal and economic characteristics of farmers on adopting conservation agriculture technology.

Categories	frequency	%	R .S	P value
Illiterate	7	4.9	0.010	0.893 N .S
Can read and write	12	8.4		
Primary	30	21.1		
Intermediate	41	28.9		
Secondary	32	22.7		
Institute	5	3.5		

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Bachelor's	10	7		
Higher degree	5	3.5		
Total	142	100%		

N.S. = Not Significant

To find the correlational relationship between the reality of application and the educational level variable, Spearman's rank correlation coefficient was used, which had a value of (0.010). This indicates a non-significant relationship between the two variables, with a p-value of (0.893). Therefore, we accept the null hypothesis which states that there is a significant correlational relationship between the reality of the impact of personal and economic characteristics of farmers on adopting conservation agriculture technology and educational level. This may be due to the low or poor educational level of the respondents in the study area, as only approximately (12%) have a good educational level. This is reflected in the lack of impact of education level on farmers' application Of conservation agriculture technologies. That is, the lower the educational attainment of the respondents, the less capable and willing they were to contact information sources and learn about all that is new in their field of work. Consequently, their information in the field of conservation agriculture became poor compared to their peers with higher educational levels. This is confirmed by the results of studies and research that farmers with higher educational levels are more receptive to modern agricultural technologies than illiterate individuals or those with low educational levels. Also, there is a direct relationship between the level of education and the level of application of modern agricultural technologies by farmers [15 .[

.3Number of Years Working in Agriculture: The study results showed that the minimum number of years working in agriculture for the respondents was (6) years and the maximum number of years working in agriculture was (60) years, with an arithmetic mean of (25.49) and a standard deviation of (10.327). Respondents were divided into three categories according to the actual range - class width rule. The highest percentage was within the moderate category (24 – 41) with a percentage of (47.887%). This was followed by the low category (6 – 23) with a percentage of (31.690%). As for the high category (42 – 60), it ranked last with a percentage of (20.423%). This is shown in Table No. (7 .(

Table No. (7) shows the distribution of respondents according to the number of years working in agriculture variable and its relationship to the impact of personal and economic characteristics of farmers on adopting conservation agriculture technology.

Categories	**Frequency**	**%**	**Arithmetic mean**	**S. d**	**R value**	**P value**
(6-23)low	45	31.690	25.49	10.327	*0.0131	0.026
(24-41) medium	68	47.887				
(42-60) high	42	20.423				
Total	142	100%				

Significant at 0.05

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To find the correlational relationship between the reality of application and the number of years working in agriculture variable, Pearson's simple correlation coefficient was used, which had a value of (0.131). This indicates a significant correlational relationship between the two variables, with a p-value of (0.026) at a significance level of (0.05). Therefore, we reject the null hypothesis which states that there is no significant correlational relationship between the reality of the impact of personal and economic characteristics of farmers on adopting conservation agriculture technology and the number of years working in agriculture. We accept the alternative hypothesis which states that there is a significant correlational relationship between the reality of the impact of personal and economic characteristics of farmers on adopting conservation agriculture technology and the number of years working in agriculture. This may be due to the fact that as the number of years working in agriculture increases for respondents, their information and knowledge increase, which reflects an increase in their experience, making their acceptance and application of new technologies easier, such as applying conservation agriculture technology, especially since more than Two-thirds of the respondents had extensive experience in agriculture .

.4Cultivated Land Area: The study results showed that the smallest cultivated land area for the respondents was (33) dunams and the largest cultivated land area was (800) dunams, with an arithmetic mean of (312.68) and a standard deviation of (352.129). Respondents were divided into three categories according to the actual range - class width rule. The highest percentage was within the moderate category (290 – 546) with a percentage of (53.521% .(

This was followed by the high category (547 – 800) with a percentage of (24.648%). As for the low category (33 – 800), it ranked last with a percentage of (21.830%). This is shown in Table No. (8 .(

Table No. (8) shows the distribution of respondents according to the cultivated land area variable and its relationship to the impact of personal and economic characteristics of farmers on adopting conservation agriculture technology.

Categories	frequency	%	Arithmetic mean	S. d	R value	P value
(33-289) Dunams	31	21.830	312.68	352.129	0.093	0.314 N .S
(290-546) Dunams	76	53.521				
(547-800) Dunams	35	24.648				
Total	142	100%				

N.S. = Not Significant

To find the correlational relationship between the reality of application and the cultivated land area variable, Pearson's simple correlation coefficient was used, which had a value of (0.093). This indicates a non-significant relationship between the two variables, with a p-value of (0.314). Therefore, we accept the null hypothesis which states that there is no significant correlational relationship between the reality of the impact

of personal and economic characteristics of farmers on adopting conservation agriculture technology and the cultivated land area. This may be due to the fact that smaller cultivated land areas for farmers yield lower economic returns compared to larger areas. This reduces the impetus and enthusiasm of farmers with small cultivated areas to apply modern technologies such as conservation agriculture technology. There is a direct relationship between the size of the farm cultivated by the farmer and their level of application of modern technologies. This is because many agricultural technological advancements usually require large farm units to be used on sound economic bases. Furthermore, in many cases, large farm capacities are associated with the financial, technical, and administrative capabilities of their cultivators. Thus, the larger the farm size, the higher the level of farmers' adoption of new ideas [12 .[

Conclusions :

.1

We conclude from the research that the overall level of farmers' adoption of conservation agriculture technologies was moderate, tending towards high. The highest percentage of respondents falls within the middle category (199-215) with a percentage of (63,380%)This indicates the great importance of conservation agriculture, especially in humid areas, due to its significant benefits compared to traditional agriculture .

.2 We conclude from the research that age does not affect the application of conservation agriculture technologies. The results showed no significant correlational relationship between age and the reality of farmers' adoption of conservation agriculture technologies.

.3 We conclude that the educational level variable has no significant relationship with the application of conservation agriculture techniques, The majority of respondents had a low level of education, which was reflected in their level of application of conservation agriculture techniques

Recommendations :

.1

Work on developing plans for extension programs and other specialized programs to persuade as many farmers as possible in Nineveh Governorate in general to adopt this modern technology, given its importance, especially in providing food for many people .

.2 Conduct a similar field study using other respondents and new independent variables .

.3 Emphasize the extension aspect to increase farmers' awareness and knowledge of conservation agriculture technology for proper application to ensure achieving the best desired results and benefits of extension activities .

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