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FARMERS USE OF INFORMATION AND COMMUNICATION TECHNOLOGY IN AGRICULTURAL MARKETING IN THE SHAHRAZUR PLAIN IN SULAIMANI GOVERNORATE

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Abstract:

The research aimed to identify the level of farmer's use of information and communication technology in agricultural marketing in plain of Shahrazur- Sulaimani Governorate, additionally arrangement of the main fields of marketing for use information and communication technology, as well as determining the correlation of the use information and communication technology in the agricultural marketing with the independent variables. The data were collected using a questionnaire and using a personal interview method from a simple random sample of 305 farmers, who represent 23% of the size of the research population. The results of the research fiend that the level of use information and communication technology in agricultural marketing for farmers was low, also to arranging the fields (Buying, Transportation, Storage, and Selling) of marketing the result fiend that transportation ranked first in all fields , while storage got the last of ranking ,and that there is a significant correlation between the level of information and communication technology use and each of the following variables: (Age, Education level, Duration of agricultural service, Farmers' attitudes to agricultural technology, Information sources, Openness to change, Hours of using technology), while there is no significant correlation between the level of information and communication technology use and each of the variables (Farm size, Type of farm ownership, Training courses). Therefore, the researchers recommended intensifying specialized training courses and awareness campaigns on the use of information and communications technology when preparing a future extension plan in this field.

Keywords: *Openness to change, Farmer's attitudes, Farm size.*

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أستخدام المزارعين لتكنولوجيا المعلومات والاتصالات في التسويق الزراعي في سهل شہرزور بمحافظة السليمانية

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الخلاصة

يهدف البحث إلى التعرف على مستوى استخدام المزارعين لتكنولوجيا المعلومات والاتصالات في التسويق الزراعي في سهل شہرزور بمحافظة السليمانية، وترتيب المجالات التسويقية الرئيسية لاستخدام تكنولوجيا المعلومات والاتصالات، بالإضافة إلى تحديد علاقة استخدام تكنولوجيا المعلومات والاتصالات في التسويق الزراعي بالمتغيرات المستقلة. وقد تم

جمع البيانات باستخدام الاستبيان وأسلوب المقابلة الشخصية من عينة عشوائية بسيطة بلغت 305 مزارعاً، وهو ما يمثل 23% من حجم مجتمع البحث. أظهرت نتائج البحث أن مستوى استخدام تكنولوجيا المعلومات والاتصالات في التسويق الزراعي لدى المزارعين كان منخفضاً، وكذلك ترتيب مجالات التسويق (الشراء، النقل، التخزين، والبيع)، حيث جاءت النقل في المرتبة الأولى في جميع المجالات، بينما جاء التخزين في المرتبة الأخيرة، وأن هناك علاقة ارتباطية معنوية بين مستوى استخدام تكنولوجيا المعلومات والاتصالات وكل من المتغيرات التالية: (العمر، المستوى التعليمي، مدة الخدمة الزراعية، الاستفادة من التطبيقات، اتجاهات المزارعين نحو التكنولوجيا الزراعية، مصادر المعلومات، الانفتاح على التغيير، ساعات استخدام التكنولوجيا)، بينما لا توجد علاقة ارتباطية معنوية بين مستوى استخدام تكنولوجيا المعلومات والاتصالات وكل من متغيرات (حجم المزرعة، نوع ملكية المزرعة، الدورات التدريبية). لذلك أوصى الباحثان بتكثيف الدورات التدريبية المتخصصة وحملات التوعية في استخدام تكنولوجيا المعلومات والاتصالات عند إعداد خطة إرشادية مستقبلية في هذا المجال.

الكلمات المفتاحية: تكنولوجيا المعلومات والاتصالات، الزراعة، التسويق الزراعي.

Introduction

Agriculture is an important source of national income, and in many developing countries, the agricultural sector is viewed as one of the most important components of their economies [1], contributing significantly to the economic and social progress of farmers [2], and bearing significant responsibility for achieving food security and providing essential inputs for other economic sectors [3]. Therefore, modernizing and expanding production methods in the agricultural sector is necessary at the present time in order to improve the prospects for achieving economic development on a large scale, and not just a goal sought by developing countries [4]. in the now the agricultural sector can to a certain extent fill the population demands of food, because of use agricultural technology [5], then agricultural technology is the integration of advanced engineering principles, farming techniques and scientific development to manipulate the growth, maturity and well-being of crops and livestock, by agricultural extension services act as intermediaries between research institutions and farmers, facilitating the transfer, adaptation, dissemination, and adoption of modern agricultural technology.[6]

Information and communication technology play a fundamental role in developing agricultural growth through the use of various devices to achieve economic sustainability and self-reliance [7].indicated that information and communication technology leads to improving market activities, the term information and communication technology encompasses all technical terms used to manage information and promote communication, including computers, network gear, communication lines, and necessary software. Information technology, electronic media, telephones, and processes in all its forms are included in information and communication technology [8]. Information and communication technology tools and platforms provide real-time data on market prices, weather, and best agricultural practices, aiding farmers in making informed decisions [9]. Information and Communication Technology plays a fundamental role in developing agricultural growth by providing better access to consumer trends, production inputs, and market information [10], moreover information and communication technology have the ability to significantly alleviate some of the enduring market failures and information asymmetries that frequently characterize agricultural markets in developing countries. They

can also completely change the structure, organization, and functions of agricultural markets in these nations .[12 ,11]

There are many studies that emphasize the importance of information and communication technologies that facilitate; Research has indicated that farmers who efficiently use information and communication technology tools have a higher chance of improving their livelihoods and obtaining better market prices [13, 14]. However, agricultural marketing involves a number of activities, including organizing the planting, growing, and harvesting of agriculture, food, transportation, grading, packing, and storage handling, distributing, marketing, and selling[15,16] , the integration of technology, market strategies, and strategic management in agriculture creates synergies that enhance productivity and sustainability across the value chain [17] , additionally information and communication technology integration in agricultural marketing offers potential to increase market access, boost productivity, and improve decision-making [18] .Another study indicated that a sizable fraction of farmers experienced minimal advantages from using agricultural marketing information assisted by information and communication technology . [19]

The agricultural sector in the Kurdistan region is one of the main productive sectors, due to its abundance of natural resources [3] , however the agricultural sector in Sulaimani faces great challenges, especially in the current conditions represented by the revolution of information technology, natural disasters [20] especially while using information and communication technology like lack of skills, lack of experience, lack of awareness, The lack of a specialized program for training, Poor language skills of some farmers, literacy and others have in Kurdistan[21,22] ,furthermore, to achieve economic development, the government should create plans to improve communication, infrastructure, management training, marketing channel networks, and access to new markets [23,17] Hence due to the continuous development of technology, which has permeated all sectors and become an integral part of daily life, facilitating various duties with ease, the agricultural sector is not exempt from these technological advancements. In particular, the marketing of agricultural products has seen significant transformation through the adoption of new methods and techniques. These innovations have enhanced information flow and market efficiency, enabling better competition among market participants. Consequently, this study is prompted by the need to explore the impact of these technological advancements on agricultural marketing and their role in improving market competitiveness. This led researcher to conduct this research to determine about farmers use of information and communication technology in agricultural marketing in the shahrazur plain in sulaimani governorate and in general this research came to answer the following questions:

- 1 .What is the level of use information and communication technology by farmers in agricultural marketing in Shahrazur Plain ?
- 2 .What is the correlation between the level of using information and communication technology with independent variables?

Research Objectives

- 1 .Identifying the level of use information and communication technology in agricultural marketing in Shahrazur plain in general.

2 .To arranging the fields (Buying, Transportation, Storage, and Selling) of marketing for use information and communication technology in Shahrazur plain.

3 .Determining the correlation between of the use information and communication technology in the agricultural marketing and each of the variables (Age, Level of education, Duration of agricultural service, Farmer's attitudes to agricultural technology, Size of farm holding, Type of agricultural holding, Training course, Sources of agricultural Information, Openness to change, Number of hours of technology use)

Hypotheses of Research

There is a correlation between the research variables (Age, Level of education, Duration of agricultural service, Farmer's attitudes to agricultural technology, Size of farm holding, Type of agricultural holding, Training course, Sources of agricultural information, Openness to change, Number of hours of technology use) and the using information and communication technology in agricultural marketing.

Materials and Methods

Research methodology: To achieve the objectives of the research, the descriptive technique was used. According to [24], this method is helpful for obtaining comprehensive and trustworthy information from social realities, identifying traditions, and understanding the attitudes, ideas, and opinions of both individuals and communities as well as their developmental and evolutionary patterns. [25], Descriptive research is a fact-finding technique that usually entails a cross-sectional analysis of the current situation, which makes it especially useful for compiling in-depth information on how Farmers use of information and communication technology in agricultural marketing in shahrazur plain.

Research area: Shahrazur district of Sulaimani governorate was chosen as a region to conduct the research because the district is one of the important agricultural areas, on which the majority of the region's residents depend on for their livelihood. Shahrazur district is located at a distance of 40 km north-east of Sulaimani city, the total area of the district is 114094.5 dunums, of which 46839 dunums are not suitable for agriculture. As for the area suitable for agriculture, it is 67255.5 dunums of which 52277 dunums is a dime, while the irrigated area is 14978.5 dunums.*

Research population and sample: The research population consisted all farmers in villages of shahrazur district in the Sulaimani governorate, consists 33 villages, A simple random sample was taken from the villages at a rate of (70%) at the rate of 23 villages, and the number of farmers in these villages reached 1016 farmers, then a simple random sample was taken from farmers at a rate of 30% at the rate 305 farmers subject to the research.

Data collection tool

The questionnaire and interview were used to collect data from farmers to obtain objective. The questionnaire is an essential tools and powerful tools to gather information, data, and facts, which aids the researcher in gathering pertinent information on the study's subject [26], questionnaire form was prepared for this purpose, which consists of two parts. It was prepared after the researcher's reference to the relevant scientific and literary sources. In agricultural extension, as well as consulting specialists in these aspects as follows:

The first part includes independent factors (Age, Level of education, Duration of agricultural service, Farmer's attitudes to agricultural technology, Size of farm holding, Type of agricultural holding, Training course, Sources of agricultural information, Openness to change, Number of hours of technology use). As for the second part of the questionnaire, it

*Agricultural areas were obtained by Directorate of Agriculture in the in Shahrazur Plain

consisted of determining the level of using information and communication technology for marketing, which consisted of four fields. The first field is (buying), which consisted of (12) items. The second field is transportation, which consisted of (8) items. The third field is (storage), which consisted of (6) items. The fourth field is (selling), which consisted of (14) items. A three-level scale was placed in front of the items (agree, neutral, disagree), which were assigned numerical values of 3, 2, and 1, respectively.

In order to verify the face validity and content validity, the questionnaires were presented to a group of specialists in the agricultural extension and agricultural communication at the University of Sulaimani and University of (Duhok, Tikrit, Waist, Baghdad and Kirkuk), and made some modifications to some of its items and fields. The reliability of the scale was also measured by conducting a preliminary test was conducted on an exploratory sample 20 farmers of 4 villages in Shahrazur Plain from outside the research sample. To determine the reliability of the scale used, Cronbach's alpha coefficient was applied, which is approved standard for evaluating the reliability of measurement tools and acceptable if its value reached 0.70 or more [27]. A reliability coefficient of 0.86 was determined for the scale of the use information and communication technology in agriculture marketing, and thus the scale obtained high reliability and validity. Data was collected in a questionnaire form and personal interview, after unloading and classifying the data, the SPSS program and a number of statistical tools were used to analyze the data, such as (percentage, arithmetic mean, Pearson's and superman correlation, Range, The standard deviation (SD), frequency distribution).

Results and Discussion

1 Identifying the level of use information and communication technology in agricultural marketing in Shahrazur plain in general

The results of the research illustrate that the highest numerical value obtained by the respondents was 108 score and the lowest numeric value was 40 degrees, on the use of information and communication technology in agricultural marketing in general scale with a theoretical range (40-120) degrees, with an arithmetic mean (61.14) and a standard deviation (19.683). The respondents were distributed into three categories for the level of use information and communication technology in agricultural marketing in general, depending on the extent and length of the category, as illustrate in Table.(1)

Table 1: Distribution of respondents according to the level of use information and communication technology in agricultural marketing in general.

Categories of use ICT	Frequency	%	Average level of use ICT
Low (40 - 62)	185	60.65	47.22

Medium (63 - 85)	70	22.95	74.43
High (86 - 108)	50	16.40	94.06
Total	305	100	

Table (1) indicates that the highest percentage of respondents falls within the category of low use information and communication technology with a rate of (60.65%) with an average score of (47.22) degrees, followed by the percentage of respondents (22.95%) that falls within the medium use of information and communication technology with an average score of (74.43) degrees, while the lowest (16.40%) falls within the category of high use of information and communication technology, with an average score of (94.06) degrees, It is clear from this that the level of farmers' use of information and communication technology is low in the fields in agricultural marketing in general in from the point of view of the respondents general in Shahrazur in Sulaimani. This may be because some farmers cannot afford the costs of using technology, such as purchasing equipment, paying for internet subscriptions, or using online marketing platforms, and this result matches what she has reached [28], and this result does not agree with what He reached it. [29]

2 Arrangement of the main fields of marketing (buying, transportation, storage, and selling) for use information and communication technology in Shahrazur plain.

Arrangement the fields of marketing for using information and communication technology, which are (4) fields, obtained weighted averages ranging between (15.06-6.25) degrees and percentage weights located between (62.75-34.72), which were arranged according to their sequence in relation to the number of respondents, as illustrate in Table.(2)

Table 2: Distribution of respondents according to arranging each field of marketing for use information and communication technology in agricultural marketing.

Fields	Weighted Average	Weight %	Std. Deviation	Rank
Transportation	15.06	62.75	7.08	1
Buying	18.47	51.30	9.18	2
Selling	21.35	50.83	8.21	3
Storage	6.25	34.72	1.46	4

Table (2) indicates that the field of transportation ranked first in all fields of all kinds according to importance and percentage weight, as it achieved an average of (15.06) degrees and a weight percentile of (62.75), which is higher than the averages for other fields perhaps this is due to the fact that it's essential for getting products to market on time, information and communication technology helps farmers coordinate transport, reduce delays, cut costs, while the field (storage) ranked last in relation to fields of all kinds, according to Importance and percentile weight, as it achieved an average of (6.25) degrees and a weight percentile of (34.72), which is lower than the averages for other fields this is due to the farmers may rely on traditional storage method or sell their products immediately after harvest .

3 Determining the correlation between the use of information and communication technology in agricultural marketing and set of independent variables:

- Age: The results showed that the highest age of the respondents was 81 years and the lowest age was 15 years, with an average of 47.33 years and a standard deviation of 19.64 y, as shown in Table 3. To find out whether there is a correlation between age and the level of using information and communication technology, use the simple correlation coefficient of Pearson and its value was -0.396 and this indicates that there is moderate negative correlation between the two variables. It is illustrating that the level of use information and communication technology decreases as age to be increases. Therefore, accept the researcher hypothesis that having correlation between two variables .

-Level educational: The results of the research indicate that the highest percentage of respondents (32.8%) is elementary, while the lowest percentage (1.6%) is for the bachelor group, as shown in Table 3. We conclude from Table 3 that the highest rate for level of using information and communication technology is among the graduates of the bachelor, where the amount was 91.80 degree and the lowest rate for the category (read and write) was 50.05 degrees. To find whether there is correlation between the educational level and the level of using information and communication technology, the correlation coefficient used by Spearman Brown was 0.446. This indicates the existence of a correlation between the two variables, which is significant at the level of 0.01. It is illustrating that the educational level increases, while use of information and communication technology also tends to increase. Their respondent shows most of farmer have elementary education, this may be due to the cultural norms, or geographic limitations, many people in rural or underdeveloped areas could not have access to formal education, which raises the illiteracy rate.

- Duration of agricultural service: The results showed that the highest years of service of the respondents was 65 years and the lowest value was 3 years, with an average of 26.09 years and a standard deviation of 19.64, as shown in Table 3. The use of information and communication technology at the category (3-23) years with a highest rate of 68.79 degrees and the lowest rate of 46.38 degrees for the category (45-65). To find out whether there is a correlation between Years of service in agriculture and the level of using information and communication technology, use the simple correlation coefficient of Pearson and its value was -0.414 and this indicates that there is a moderate negative correlation between the two variables. It clears that as years of service increase, the use of information and communication technology tends to decrease.

-Farmer's attitudes to agricultural technology: The results of the research showed that the highest numerical value obtained by the respondents is more than 25 degrees and the lowest numeric value is 10 degrees as shown in Table 3 The majority of the respondents have a neutral attitude that tends to rise towards the use of information and communication technology and that the medium groups formed 58.7 % of the total number of respondents. This may be due to the limited awareness of information and communication technology benefits or lack of experience. To find out whether there is a correlation between the attitudes of farms and the level of use of information and communication technology, use the simple correlation coefficient of Pearson and its value was 0.458. This indicates that

there is correlation relationship between the two variables. This finding is consistent with the findings of.[30]

-Size of farm holding/ Dunums: The results showed that the highest holding size among the respondent is more than 58 dunums, and the lowest holding size is 3 dunums, with knowledge, mean of (64.65) dunums and a standard deviation of (19.64), as shown in Table 3. The use of information and communication technology at the size of farm holding was classified into three categories ,indicates that the highest percentage of respondent was (75.2%) falls within the category of agricultural holding (3 -30) with a mean amount of (16.52), and the lowest of the percentage of respondents was (5.3%) falls within the category (more than 58) with a mean of (84.25).To find out if there is correlation between the Size of farm holding and the level of use information and communication technology of the respondents, the simple correlation coefficient (Pearson) was used, as its value was (0.049), which indicates that there is a no significant correlation between the two variables at the level (0.05), this result is consistent with what was reached by . [31]

- Type of agricultural holding: The results of the research showed that the highest percentage of respondents (75.1%) falls under the category (Agricultural contracts) and the lowest percentage (1.3%) falls under the category (Rent), as shown in Table 3. That the highest rate for the use of information and communication technology for the (Participation) category was 63.67 degrees and the lowest for the (Rent) category was 59.25 degrees. To find out whether there is a correlation between the possession of agricultural lands and the using information and communication technology, the simple correlation coefficient of the Spearman-Rank was used and its value was 0.026. This indicates that there is no correlation between the two variables .

-Training courses: The results of the research indicated that 97.4 % of the respondents do not participate in the training courses, while the participation percentage is 2.6 %, as shown in Table 3 and we conclude from this table that the highest rate of the use of information and communication technology for the (participants) category with a score of 99.75 and the lowest average for the category of non-participants with 91.29 score. To find out whether there is a correlation between the participation in training courses and the use of information and communication technology, the simple correlation coefficient of Spearman-Rank was used and its value was -0.20. This indicates there is no correlation relationship between the two variables.

- Sources of agricultural Information: Table 3 indicates that the highest numeric value for the degree of contact with Sources of Agricultural Information for the respondents is more than 36 degrees and the lowest numeric value are 27 degrees, with an average of 23.92 degrees and a standard deviation of 19.64. The respondents were divided into three categories according to the levels of contact with Sources of Agricultural Information, as shown in Table 3. To find out whether there is a correlation between the Sources of agricultural Information and the use of information and communication technology, the simple correlation coefficient of Pearson was used and its value was 0.284. This indicates that there is correlation relationship between the two variables. This may be due to the quick to reach information or provides information on different aspects of agriculture

-Openness to change: The results of the research showed that the highest numerical value obtained by the respondents is more than 25 degrees and the lowest numeric value is 10

degrees as shown in Table 3 The majority of the respondents have a moderate openness to change that tends to rise towards the use of information and communication technology and that the medium groups formed 54.4 % of the total number of respondents. To find out whether there is a correlation between the openness to change of farms and the level of use of information and communication technology, use the simple correlation coefficient of Pearson and its value was 0.599. This indicates that there is correlation relationship between the two variables. The results explain that farmers who are more neutral are more likely to be ready to adopt information and communication technology, their mentality allows them to overcome barriers like fear or tradition, leading to greater engagement of information and communication technology.

-Number of hours of technology use: The results of the research showed that the highest percentage of respondents (44.3%) use information and communication technology less than 1 hour per day, while the lowest percentage (10.5%) use information and communication technology between (3-4) hours per day as shown in Table 3. To find out whether there is a correlation between the number of hours and the using information and communication technology, the simple correlation coefficient of Pearson was used and its value was 0.532. This indicates the existence of a correlation relationship between the two variables. The result suggests that the increased using information and communication technology engagement improves farmers' confidence, awareness, and ability to apply information and communication technology effectively in their agricultural activities.

Table 3: Distribution of the respondents according to the independent variables and their effect on the use of information and communication technology.

Variables	Frequency	%	Average level of use ICT	correlation coefficient	Sig.
Age/Year					
15 - 31	45	14.8	70.49	-0.396	**
32 - 48	117	38.4	66.03		
49 - 65	111	36.4	55.63		
66 - 81	32	10.5	47.47		
Level of education					
Illiterate	68	22.3	50.25	0.446	**
reading and writing	20	6.6	50.05		
Elementary	100	32.8	59.27		
Intermediate	61	20.0	65.98		
High School	43	14.1	71.65		
Diploma	8	2.6	85.25		
Bachelor	5	1.6	91.80		
Duration of agricultural service					
3-23	140	45.9	68.79	-0.414	**
24-44	128	42.0	56.61		
45-65	37	12.1	46.38		
Farmer's attitudes to agricultural technology					
Negative (10 – 17)	106	29.0	48.60	0.458	**
Neutral (18 – 25)	182	58.7	63.01		
Positive (more than 25)	16	12.2	80.22		
Size of farm holding/ Dunums					
3 - 30	227	75.2	16.52	0.049	N. S
31- 58	59	19.5	40.22		
More than 58	16	5.3	84.25		

Type of agricultural holding					
Ownership	60	19.7	61.13	0.026	N. S
Agricultural contracts	229	75.1	60.80		
Rent	4	1.3	59.25		
Participation	12	3.9	63.67		
Training course					
Participated	8	2.6	99.75	-0.20	N. S
Non-Participated	297	97.4	91.29		
Sources of agricultural Information					
Low (27- 31)	72	23.6	56.99	0.284	**
Medium (32 - 36)	215	70.5	60.28		
High (more than 36)	18	5.9	84.89		
Openness to change					
Low (10 - 17) Agree	27	8.9	47.78	0.599	**
Medium (18 - 25) Neutral	166	54.4	52.93		
High (more than 25) Disagree	112	36.7	76.56		
Number of hours of technology use					
Less than 1 hour	135	44.3	50.41	0.532	**
1-2 hours	57	18.7	64.51		
3-4 hours	32	10.5	66.56		
More than 4 hours	81	26.6	73.83		

*Significant at the level of 0.05

** significant at the level of 0.01

Conclusion

In light of the research results, the following concludes:

- 1 .The low level of information and communication technology use among the majority of participants is due to a lack of training and awareness of the importance of information and communication technology, which contributes to improved marketing.
- 2 .The field of "transportation" is the most important area in marketing agricultural products, according to the respondents. We conclude that transportation is the most important area in the marketing process and should be studied in depth, as farmers' priority is transporting their products to consumers. Storage, on the other hand, ranked last among all other areas. This is perhaps due to the fact that farmers sell their products immediately after harvest.
- 3 .The results of the research showed that there is a correlation between the level of information and communication technology use and each of the following variables (Age, Level of education, Duration of agricultural service, Farmer's attitudes to agricultural technology, Sources of agricultural Information, Openness to change, Number of hours of technology use) are among the factors that have a high contribution to influence the effectiveness and significant correlation between the level of use of information and communication technology in the field.
- 4 .There is a non-significant correlation between the level of using information and communication technology and each of the following variables (Size of farm holding, Type of agricultural holding, Training course). We conclude from this that these variables have nothing to do with the use of information and communication technology.

Recommendations and Suggestions:

- 1 .Providing specific intensify training courses in the field of using information and communication technology on the benefits and practical use it in marketing by Ministry of Agriculture.
- 2 .Afford access to cheap ICT tools in rural areas and enhance internet connectively by improve infrastructure.
- 3 .By way of awareness campaigns promote information and communication technology for marketing use through success stories, demonstrations and extension services to encourage adoption.
- 4 .Solving the problems that farmers suffer from, especially the obstacles related to the lack of training and illiteracy and, developing what is positive in their work.
- 5 .Conducting other similar studies that research aimed at other factors and obstacles that may affect of using information and communication technology for marketing by farmers.
- 6 .The necessity of adopting the results of the research by the Directorate of Agricultural Extension and the Directorate Agriculture in the governorate.

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