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OBSTACLES ENCOUNTERED BY WHEAT AND BARLEY FARMERS IN THE ADOPTION OF CROP MANAGEMENT TECHNOLOGIES: A CASE STUDY OF AL-HAWIJA DISTRICT, KIRKUK GOVERNORATE, IRAQ

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Abstract. The objectives of this study are to find constraints for wheat and barley producers in Al-Hawija District, Kirkuk Governorate (northern Iraq) regarding their adoption of wheat and barley crop management technologies in the domain level and to identify the most important constraint for each production domain. They cover the type of varieties, fertilisers used, irrigation, pest control and harvest, socio-economic characteristics of respondents and their association with the challenges faced by producers. A relationship between constraints faced by farmers and various farmer related variables including age, educational status, land ownership status, primary source of farm income, and the rise in wheat and barley farming is also discussed.

The study population was all the officially registered farmers in the Al-Hawija District agricultural division which amounted to 280 farmers growing wheat and barley. A simple random sampling method was used to select respondents, which amounted to 20% of the population, for the study. Structured questionnaire was used to gather data. The first section was personal, communicative and economic features, and the second section consisted of eight questions concerning wheat or barley growing technology. The final version of the instrument contained 26 items. Many kinds of statistical methods used to analyse treatments, such as Pearson's and Correlation Coefficient, t tests and percentile weighting.

The findings show that the percentage of difficulties experienced by wheat and barley farmers was relatively low overall: about 50% of the respondents had low level, and 32.14% had moderate level of knowledge. In terms of the crop serviceability demands, irrigation was considered the most important cultivation domain and fertilisation selection the least important, within the cultivation domains. In addition, the majority of the independent variables were found to be positively correlated with the level of knowledge of the farmers at a statistical significant level.

Given these observations, an emphasis should be placed on increasing the knowledge of farmers in the following areas: land preparation, fertilisation and irrigation. It is recommended to provide more extension services and training programs for farmers in Al-Hawija District of Kirkuk Governorate to provide them with modern techniques of wheat and barley production, such as advanced sprayers and harvesters. Lastly, a very significant positive correlation was obtained between wheat and barley areas and the obstacles encountered, and with the majority of the independent variables are studied. The authors suggested that improvement of farmers' knowledge in the study area especially in land preparation. In addition, it was suggested that extension work and training on crop management be expanded in the following areas and topics, in which farmers had low knowledge levels: The researcher also called on the necessary authorities and the Directorate of Agriculture in Kirkuk to solve wheat and barley farmers' issues.

Keywords: Crop management; Agricultural extension; Irrigation; Farmers' knowledge; Wheat and barley cultivation.

1. INTRODUCTION AND PROBLEM STATEMENT

The world is currently grappling with a number of urgent problems, such as feeding an ever-expanding population, coping with water shortages and poverty. Food security is a critical issue because of the projected population growth to 10 billion by 2050 (**FAO, 2024**). This objective requires rational and judicious use of modern agricultural technologies, as well as the use of improved varieties of seeds, water resource conservation, and adaptation to climate variability (**Jassim & Jaber, 2025**). Wheat and barley are important crops with high economic value which should be given special consideration to ensure food security, farmers' income and profitability, and the wellbeing of farm households (**Al-Hamarneh, 2023**).

During the period of favourable economic conditions (1998-2003) in Iraq, the cultivation area of wheat and barley grew by 120,000 dunams, (**Kayal & Khalife, 2025; Khalaf & Midhas, 2026**). Agricultural extension is one of the major components of agricultural development and it must be systematic in development of human and material resources to fulfill the desired development target and to optimize the use of available resources, it needs coordinative efforts. Training is therefore crucial to ensure that individuals are able to perform their assigned duties and tasks effectively (**Al Naggar et al., 2026**). Cultivation of wheat and barley has increased significantly in Kirkuk Governorate, especially in Al-Hawija District, where wheat production has increased significantly under the effect of various factors. The most critical of these is the farmers' awareness of cultivation methods that do not negatively affect production, since the farmers need to produce more in the current period. Therefore, the skills, information, and experience farmers have in wheat and barley production are considered as the main factors to attain this goal (**Nabiafjadi et al., 2014**). Based on the above, the following research questions were formulated for this study:

1. What are some of the obstacles faced by wheat and barley farmers of Al-Hawija district in Kirkuk governorate to use agricultural technologies in crop management in agricultural production?
2. How well do personal farmer variables (age, educational level, land tenure type, income source and wheat and barley cultivation preference) relate to inhibitors of wheat and barley production?
3. What is the relative importance of the different crop service domains?

1.1. Research objectives:

1. The objective is to identify the barriers facing wheat and barley farmers in the Hawija District in Kirkuk Governorate in the utilization of the crop management technologies.
2. The study aims to establish the correlation between farmers' personal characteristics (such as age, educational level, type of land ownership, main source of income, and preference for cultivating wheat or barley) and the obstacles they encounter when cultivating these crops.
3. List the crop service domains in order of relative percentage weight.

1.2. The Study hypothetical:

1. No statistically significant link between knowledge of wheat and barley farmers about crop services and their age.
2. The Knowledge of Wheat and Barley Farmers did not show any statistical difference according to number of years of schooling.
3. The knowledge of crop services does not correlate with the land tenure type of wheat and barley farmers.
4. In the same way, no significant correlation between the most important source of household income and the farmers' knowledge of crop management among wheat and barley farmers.
5. On the same lines, there is no significant relationship between knowledge about the crop services and attitude towards growing wheat and barley.

1.3. Definitions

Agricultural technologies: novel scientific, material or informational technologies developed with the intent of improving and assisting wheat and barley production.

Wheat and barley farmers: All farmers in this study regularly growing wheat and barley and using it as a farm income source.

2. MATERIALS AND METHODS

Considering the above-mentioned research objectives and questions, the researcher used the descriptive approach which is a scientific method that can be described as a method that shows and explains phenomena both quantitatively and qualitatively (**Abdel-Moneam et al., 2015**). This method is more than just a description of the phenomenon being studied, it is a way of developing relationships between variables and predicting their occurrence (**Allam, 2009**). This is done by making sense of the situation being researched and the gathered data includes opinions, reactions or attitudes towards a given phenomenon or subject.

2.1. Study Region

Al-Hawija district was selected in Kirkuk Governorate as a location of this study. The selection of this district was made due to the huge population of wheat and barley farmers in this region.

2.2. Population and Scope of the Study

Our study included all the wheat and barley farmers registered with Urban Agricultural Division, which amounted to 280 farmers. A random sample of 20% of this population was then sampled.

2.3. Research and Study Tool

The instrument used for the survey was a questionnaire, which was originally divided into three parts.

Part One: - included questions related to wheat and barley farmers characteristics including age, level of education, kinds of land ownership, family income and interest in wheat and barley farming (**Al-Zuhairi, 2005**).

Part Two: - The researcher conducted the following activities in the preparation of test instrument and evaluation of the wheat and barley farmers' knowledge level (**Howitt & Cramer, 2007; Khoury, 2004**):

1) reading and reading scientific publications, research which contain information related to wheat and barley cultivation.
2) Using on-line resources.
3) Field visits, interviews in Al-Hawija area of Kirkuk Governorate.

A preliminary questionnaire containing questions about the most important aspects of wheat and barley production was then drawn up. This draft was presented to a panel of experts and academics of the College of Agriculture at Tikrit University, Department of Field Crops. There were 8 domains, with 45 test items in the preliminary questionnaire (see Table 1).

Table 1. Distribution of Study Areas and Questionnaire Items

NO.	Domain	Number of Items
1	Varietal selection	3
2	Land Preparation	5
3	Cultivation/farming method	5
4	Planting date	4
5	Fertilization Practices	8
6	Crops Irrigation Practices	3
7	Pest management	13
8	harvesting	4
	Overall	45

Part Three: It contained 12 problem statements concerning wheat and barley cultivation.

Four alternative responses were given on each problem, which the participants were asked to mark the one that best reflects the problem as they think it is serious (**Abdul Jubouri, 2024**).

2.4. Measurement of Study Variables: Independent variables

1) **Age**: respondents' age based on years of education at the time of the survey.
2) **Education level**: Considering the following: illiterate, literate, primary, intermediate, preparatory, diploma, bachelor's degree, and Higher Educational Qualification, numbers were assigned to the respective education levels (8, 7, 6, 5, 4, 3, 2, 1).
3) **Land Tenure**: Represented by four alternatives, owned, contract-based, leased, and partnership-based land, which were assigned numerical values 1, 2, 3 and 4, respectively.
4) **Principal source of household income**: It was measured using two categories: Agricultural and Non-agricultural, with scores assigned as 1 and 2, respectively.
5) **Farmers' preference for growing wheat and barley**, measured using eight statements, half positive and half negative. Each statement was rated as Positive, Neutral or Negative using numbers of (1,2,3) for Positive statements and (3,2,1) for Negative statements. Therefore, this variable's scores ranged from 6 to 18 points.
6) **Assessment of wheat and barley farmers' knowledge of modern agricultural technologies**: A multiple-choice test was used to assess the farmers' knowledge in wheat and barley farming, consisting of 26 items divided into five categories. Three response options were provided for each statement, of which only one was correct. Each correct answer was given one mark and each incorrect response was given no marks. Therefore, the scores on this variable ranged from 0-37 marks.
7) **Direct interviews** with the respondents were used for field data collection and a questionnaire was used for the purpose of this study. The data was collected from 1 November – 20 November 2025.

3. STATISTICAL ANALYSIS

Once data were collected, the data were coded, categorized and entered into the Statistical Package for the Social Sciences (SPSS) for analysis with the most appropriate statistical procedures. Descriptive and Inferential Statistical methods were used to achieve the objectives and nature of this study (**Frey, 2019**).

4. RESULTS AND DISCUSSION

4.1. The first was to identify the obstacles faced by wheat and barley farmers in Al-Hawija District, Kirkuk Governorate, in implementing the agricultural technologies related to the management of the crops. The data indicated the range of obstacles to be reported by farmers from minimum of 12 points and maximum of 28 points. The respondents were then divided by using the range method, as expressed in table 2.

Table 2. Distribution of Wheat and Barley Farmers According to Obstacles in Crop Management

Items	N.	Percentage	Mean
Low (12-17)	28	50	24.16
Moderate (18- 22)	18	32.14	26.98
High (23 ≤)	10	17.86	32.44
Overall	**56**	**100%**	-

The respondents' mean score was 26.54, with a standard deviation of 2.05.

Half of the wheat farmers surveyed were in the low category with an average score of 24.16, as shown in Table 2, while average score of the barley farmers in the same category was 24.60. This could be attributed to the fact that most farmers do not know the percentages and proportions that are related to crop management practices. Additionally, three-quarters of respondents had neutral attitudes towards wheat and barley cultivation. More than half of the respondents had low level of education and more than three quarters had medium to low farming experience. Moreover, more than half of the respondents (50%) said that they had

limited access to information sources and 60% took no part in agricultural guidance or extension activities.

4.2. The second objective was to examine the relationship between the obstacles faced by wheat and barley farmers and their selected personal characteristics **(Ali & Al-Hamdany, 2026; Altalb & Al-Jubury, 2021):**

1) **Age:** The respondents ages ranged from 17 years and above and were classified into three age groups based on the specified age ranges, as presented in Table 3.

Table 3. Distribution of wheat and barley Farmers According to Age.

GROUPS	N.	%	MEAN	Correlation Coefficient (r)	Calculated t value	Tabulated t-value
YOUTH (17-31) YEAR	20	35.72	29.50	-0.04	0.381	1.0987
AVERAGE AGE (32-46) YEAR	25	44.64	19.51			
ELDERLY (47-61) YEAR	11	19.64	20.83			
TOTAL	56	100%				

As shown in Table 3, A total of 35.72% (n = 20) were in young age group (17-31 years) with a mean score of 29.50. Meanwhile, 44.64% (n = 25) were in the average age category (32–46 years), achieving a mean score of 19.51, and 19.64% (n = 11) were in the elderly age category (47–61 years), achieving a mean score of 20.83. The correlation coefficient r between age and level of obstacles encountered by wheat and barley farmers was found to be r = -0.04 and a t value of 0.381 for a degree of freedom of 1 which is less than the tabulated value of 1.0987. This means that no significant linkage was found between the farmer's age and the difficulties encountered in growing wheat and barley. This is in support of the first null hypothesis.

2) **Educational level**: For the purpose of this study, the respondents were grouped according to their level of education as indicated in Table 4.

Table 4. The distribution of the wheat and barley farmers based on level of education.

educational level	n.	%	Mean	Correlation Coefficient (r)	Calculated t value	Tabulated t-value
Preparatory	11	19.64	19.93	0.39	4.04	2.64
institute	14	25	17.91			
Bachelor's	23	41.08	22.68			
Higher certificate	8	14.28	25.38			
Overall	**56**	**100%**				

Table 4. revealed that the highest percentage (41.08%) of the respondents had a Bachelor's degree and the highest mean knowledge score (25.38) was noted for the Higher Certificate group. A Spearman's correlation was carried out to analyse the correlation among level of knowledge and educational level of the farmers, which gave 0.39. The t value calculated was

4.04, and tabulated value is less than that value. This suggests that results indicated a significant correlation between the obstacles faced by farmers and their education level is statistically significant at 1% level. The hypothesis of no difference between wheat and barley farmers is therefore rejected in favor of the alternate hypothesis, since there is a significant correlation between the level of knowledge of wheat and barley farmers, and their education level. The results indicate that greater wheat and barley production practices knowledge was found among the farmers who received more education. It could be that higher education provides a farmer with more information and knowledge related to farm operations, such as extension bulletins. This helps them to broaden their knowledge base.

3) **Land Tenure**: Respondents were categorised according to their land ownership type, as shown in Table 5.

Table 5. Distribution of Wheat and Barley Farmers According to Land Ownership Type

Items	n.	%	Mean	Correlation Coefficient (r)	calculated t value	Tabulated t-value
Ownership	26	46.42	64.45			
contract	18	32.14	62.87	-0.13	1.23	2.64
Lease	8	14.28	22.5			
Partnership	4	7.16	12.54			
total	**56**	**100%**				

The findings presented in Table 5 indicate that the majority of respondents, 46.42% (n = 26), held their land under a system of ownership, followed by 32.14% (n = 18) under contract, 14.28% (n = 8) under lease, and 7.16% (n = 4) under partnership arrangements. The relationship between typeof land tenure and the constraints encountered by wheat and barley farmers were examined, yielding a correlation coefficient of r = -0.13. The calculated t-value was 1.23, which is lower than the tabulated t-value of 2.64No statistically significant correlation was found between land tenure type and the level of constraints faced by wheat and barley farmers. Accordingly, the null hypothesis stating that no significant correlation exists between land tenure type and level of knowledge is retained.

4) **Principal Source of Household Income:** Respondents were classified according to their family's principal of income, as presented in Table 6.

Table 6. Distribution of Wheat and Barley Farmers by Principle Household Income Source

income item	N	%	Mean	Correlation Coefficient (r)	Calculated t value	Tabulated t-value
Non-agricultural	22	39.28	25.89	0.34	3.45	2.633
agricultural	34	60,71	27.36			
total	**56**	**100%**				

As seen in Table 6, 60.71% (n = 34) indicated Agriculture was their primary source of income in the family while 39.28% (n = 22) indicated Non-agricultural sources was the main source of income in their family. The correlation coefficient between the main source of income and knowledge level of wheat and barley farmers was found to be r = 0.34. Calculated t value was 3.45, which was higher than the tabulated t value (2.633) and hence, there was statistically significant positive correlation between the primary source of income in the households and level of knowledge of the wheat and barley farmers. For this reason, the null hypothesis (i.e. no significant relationship exists between the source of household income and the level of

knowledge of the farmers) is rejected and alternative hypothesis is accepted. This implies that agriculture-oriented farmers exhibited better knowledge of wheat and barley cultivation practices, as they are the ones who are more directly and consistently engaged in agricultural activities.

5) **Farmers' Preference for Wheat and BarleyCultivation:** Values indicating farmers' preference for wheat and barley cultivation, ranging between 5 and 22 were classified into three catagories as presented in Table 7.

Table 7. Classification of Wheat and Barley Farmers According to Their Orientation towards Wheat and Barley Cultivation

Trend Items	N	%	Mean	Correlation Coefficient (r)	Calculated t value	Tabulated t-value
negative (6-9)	11	19.64	19.87			2.64
Neutral (10-13)	29	51.78	27.77			
positive (14-18)	16	28.58	21.4	0.26	2.57	
total	**56**	**100%**				

Table 7 shows that the majority of the respondents (51.78%, n = 29) had a neutral attitude towards wheat and barley cultivation, while 28.58% (n = 16) had a positive attitude and 19.64% (n = 11) had a negative attitude. The correlation of one with the other, that is the orientation of farmers towards wheat cultivation on one hand and barley cultivation on the other hand, and their level of knowledge was discussed and a correlation coefficient of r = 0.26 was obtained. The calculated t value is 2.57 which is less than tabulated t value of 2.64 and thus it is concluded that there is no statistically significant correlation between farmers orientation towards wheat cultivation and barley cultivation and farmers knowledge level. Hence, the null hypothesis of no significant relationship between the wheat farmers and the barley farmers level of knowledge and their attitude towards cultivation is accepted.

4.3. Third goal: Classifying of CSA's based on their Realative Percentage Weight (**Eskander, 2023; Nawara & Al Atrabi, 2023**).

The relative percentage weight of each study domain is presented in Table 8, from which the domains are observed to be ranked in descending order.

Table 8. Ranking of Study Domains According to Their Relative Weights

Rank	percentile weight %	Maximum score of domain	Predicted mean	Domains	Arrangement of Fields in the Questionnaire
1	73.33	3	2.20	Irrigation	5
2	68.50	10	6.85	Pest management	4
3	67.00	7	4.69	Varietal selection	3
4	65.67	3	1.97	harvesting	2
5	61.00	3	1.83	fertilization	1

Table 8 shows the results with irrigation having the highest percentile weight of 73.33%, followed by pest management with a percentile weight of 68.50%, and varietal selection with a percentile weight of 67.00%, harvesting with a percentile weight of 65.67%, and fertilization

the lowest at 61.00%. The findings are similar to the findings of this study which reported that irrigation was the highest ranked domain among the agricultural domains related to the servicing of the crops, whereas the lowest was fertilization.

5. CONCLUSSION

Based on the findings of this study, 50.00% of wheat and barley farmers faced low level of obstacles in the management of their crops with mean score of 24.16, 32.14% faced medium level of obstacles with mean score of 26.98 and 17.86% faced high level of obstacles with mean score of 32.44. This indicates that, although most of the farmers are not facing serious problems with the use of the agricultural technology, there is a significant share of farmers who are still experiencing moderate to substantial problems that they need more support to solve. As far as the age is concerned, 35.72% of the respondents were categorized as young (17-31 years), 44.64% as average age (32-46 years) and 19.64% as elderly (47-61 years), while the correlation analysis gave a correlation coefficient of r = -0.04 with the calculated t-value of 0.381 which is lower than the tabulated t value of 1.0987, meaning that the age was not statistically related to the level of obstacles faced by the farmers. When considering the educational level, 41.08% of the respondents had a Bachelor's degree while the highest mean knowledge score of 25.38 was observed in farmers with a Higher Certificate. The obtained Spearman's correlation coefficient was 0.39, which was greater than the tabulated value and the calculated t value of 4.04 was greater than the tabulated value, indicating a positive significant correlation between the educational level of farmers and level of knowledge about wheat and barley cultivation practices, farmers with higher educational attainment tend to have greater knowledge about wheat and barley cultivation practices.

Regarding to land tenure, the correlation between land tenure type and level of obstacles was r = -0.13, which on calculation gave the t value of 1.23 which was less than the tabulated t value of 2.633, meaning that there was not any statistically significant relationship between land tenure type and level of obstacles encountered by the farmers. As far as the main source of income is concerned, 60.71 per cent of the respondents were mainly engaged in agricultural activities and 39.28 per cent in non-agricultural activities and the correlation between income sources and level of knowledge was statistically significant positive (r = 0.34, t = 3.45> tabulated value 2.633) and this shows that there is a positive relationship between the two income sources, with those who are mainly engaged in agriculture having a high level of knowledge of wheat and barley cultivation. In relation to farmers' positive and negative orientation towards wheat and barley cultivation, 51.78% of the farmers had neutral orientation, 28.58% positive and 19.64% negative orientation, and the correlation between the farmers' orientation and their level of knowledge was r = 0.26, which was slightly lower than the tabulated r-value of 0.29, and t = 2.568 was slightly lower than the tabulated t-value of 2.64, showing no statistically significant relationship between farmers' orientation and their level of knowledge.

The last step was ranking of the different crop service domains from the point of view of relative percentage weight in which irrigation was ranked as the most important domain of crop services (73.33%), followed by pest management (68.50%), varietal selection (67.00%), harvesting (65.67%) and fertilization (61.00%). The ordering shows that irrigation-related problems are the most important problem for farmers in the study area, which is most likely due to limited access to modern irrigation technologies and water scarcity, while difficulties with fertilisers were comparatively low.Combined, these results indicate that the knowledge level and barriers to implementing the Croptec did not vary significantly with age, land tenure type, or orientation toward cultivation but varied significantly with the level of education of the farmers. The results also highlight irrigation as the most critical issue on crop management practices in Al-Hawija District in Kirkuk Governorate, where it is necessary to give it a special attention in the future extension and support programs.

References

[1] Abdel-Moneam, M. A., Sultan, M. S., Sadek, S. E., & Shalof, M. S. (2015). Combining abilities for yield and yield components in diallel crosses of six new yellow maize inbred lines. *International Journal of Plant Breeding and Genetics, 9*(2), 86–94.

[2] Abdul Jubouri, K. F. S. (2024, July). "Farmers' Training and Knowledge Needs in the Use of Solar Power System (Photovoltaic PV) in Salah Al-Din Governorate/Al-Sharqat District". In *IOP Conference Series: Earth and Environmental Science* (Vol. 1371, No. 10, p. 102015). IOP Publishing.

[3] Al Naggar, Y., Fahmy, A. A., Ghramh, H. A., & Sharaf El-Din, H. (2026). Beekeeping practices and management capacity shape colony resilience across the Arab world: A COLOSS-aligned survey. *Journal of Apicultural Research*, 1–15.

[4] Al-Hamarneh, S. Y. (2023). The reality of clinical supervision among educational supervisors and its relationship to the performance of teachers in the southern governorates of Palestine. *Journal of Science and Knowledge Horizons, 3*(1s), 263–293.

[5] Ali, A. T., & Al-Hamdany, M. H. S. (2026, March). The Role of Extension Training Programs in Developing Agricultural Employees in the Agricultural Departments/Baghdad Governorate. In *IOP Conference Series: Earth and Environmental Science* (Vol. 1596, No. 1, p. 012041). IOP Publishing.

[6] Allam, Salah al-Din Mahmoud. (2009). *Diagnostic and Educational Scales*. Dar Al-Maysara for Distribution and Publishing, Amman.

[7] Altalb, A. A. T., & Al-Jubury, A. A. G. (2021). The obstacles of the work of the agricultural equipments company in the field of providing agricultural technologies for farmers in Salah Al-Den Governorate, Iraq. *International Journal of Agricultural & Statistical Sciences, 17*(2), 525.

[8] Al-Zuhairi, Nizar Suleiman Ali. (2005). *Genetic analysis of yield and its components in different crosses between yellow corn varieties (Zea mays L).* Master's thesis, College of Agriculture and Forestry, University of Mosul.

[9] Eskander, W. W. (2023, November). Evaluation of the Providing Extension Services to Vegetable Growers in the Field of Rationalizing Irrigation Water in Baghdad Province. In *IOP Conference Series: Earth and Environmental Science* (Vol. 1259, No. 1, p. 012133). IOP Publishing.

[10] FAO State of Food and Agriculture. (2024). Innovations and their role in promoting food and supporting family farms http://www.fao.org/publications/sofa/2014/ar.

[11] Frey, J. R. (2019). Assessment for special education: Diagnosis and placement. *The ANNALS of the American Academy of Political and Social Science, 683*(1), 149–161.

[12] Howitt, D., & Cramer, D. (2007). *Introduction to Research Methods in Psychology*. Pearson Education.

[13] Jassim, M. H., & Jaber, R. R. (2025). The level of knowledge of agricultural employees in the planning process for the transfer of agricultural technologies for yellow maize crop in Kirkuk Governorate. *Cuestiones de Fisioterapia, 54*(4), 6372–6385.

[14] Kayal, G. G., & Khalife, M. R. (2025). Optimizing quality assurance practices: Exploring the Saudi Arabian perspective and their influence on international accreditation and rankings. *Cogent Education, 12*(1), 2482455.

[15] Khalaf, S. A., & Midhas, A. A. H. (2026). Handicaps Farmer Yellow Corn in The Use of Agricultural Techniques Related to Crop Service in the Al-Hadar District. *World Journal of Agriculture and Urbanization, 5*(2).

[16] Khoury, A., & Suleiman, A. (2004). *Economic Development: A Study in Underdevelopment and Development*.

[17] Nabiafjadi, S., Fami, H. S., & Rezvanfar, A. (2014). Strategies for implementation of agricultural water management technologies from Farmers perspective (Case study of Felavarjan City). *Water Management in Agriculture, 1*(1), 61–67.

[18] Nawara, M., & Al Atrabi, N. (2023). Knowledge of Farmers with Good Agricultural Practices in Maize Crop at El Gharbia Governorate. *Alexandria Science Exchange Journal, 44*(2), 431–448.