

Knowledge Level of Agricultural Extension Agents in Nineveh Governorate with Water Harvesting Technology

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ABSTRACT

This research aimed to identify knowledge level of Agricultural Extension agents in Nineveh governorate with water harvesting technology. And identify knowledge level of Agricultural Extension agents in domains ,and items of the test. And identify the correlation between knowledge level of Agricultural Extension agents in domain of water harvesting and some independent variables. Research sample included (103) respondents, representing for (25%) of the population (the Nineveh Agriculture directorate and its agricultural divisions).selected as randomly sample and data were collected through questionnaire consisted of two parts, the first part included measuring the in independent variables, while the second part items of knowledge level of Agricultural extension agents in domain of water harvesting and the number of (28) items from which distributed into four domains in technology of water harvesting. Validity was measured by using face validity and content validity, reliability was tested by Cronbach's Alpha method which was (0.88). The data had been analyzed by using: means - Pearson correlation coefficient – spearman Brown coefficient . results showed that (87.37%) of the respondents possess a medium knowledge that tends to low. The Results also showed that highest knowledge level of Agricultural Extension agents was in two domains (Comparative advantage, the Maintenance). The research showed that there were significant relationship between knowledge level of Agriculture extension agents and variables (education level, location of work, duration of employment, agricultural information source). and the study recommends To intensify extension efforts in disseminating knowledge in domain of water harvesting through various media, and work to open an agricultural center specializing in water harvesting in the province.

مستوى معارف العاملين بالارشاد الزراعي في محافظة نينوى بتقنية حصاد المياه

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الملخص

هدف البحث الى التعرف على مستوى معارف العاملين بالارشاد الزراعي في محافظة نينوى بتقنية حصاد المياه، التعرف على مستوى معارف العاملين بالارشاد الزراعي في مجالات وفقرات الاختبار، والتعرف على العلاقة الارتباطية بين مستوى معارف العاملين بالارشاد الزراعي في مجال حصاد المياه وبعض العوامل المستقلة. شمل البحث عينة تكونت من (103) مبحوث يمثلون نسبة (25%) من المجتمع الكلي (مديرية زراعة نينوى والشعب الزراعية التابعة لها). تم جمع بيانات البحث باستخدام استبيان مكونة من جزئين الجزء الاول تضم قياس المتغيرات المستقلة، بينما تضمن الجزء الثاني اختبار لقياس مستوى معارف العاملين بالارشاد الزراعي في مجال

حصاد المياه والذي تضمن (28) فقرة موزعة على اربعة مجالات متعلقة بتقنية حصاد المياه. تم التحقق من الصدق عن طريق صدق المحتوى والصدق الظاهري. الثبات تم ايجاده بطريقة معامل الفا كرونباخ الذي بلغ (0.88)، كما تم تحليل البيانات باستخدام المتوسط الحسابي، معامل ارتباط بيرسون، معامل ارتباط سبيرمان. النتائج اظهرت بان (87.37%) من المبحوثين يمتلكون معارف متوسطة تميل الى الانخفاض. كما اظهرت النتائج بان اعلى مستوى معارف للعاملين بالارشاد الزراعي كان في المجالين (الفائدة النسبية، والصيانة). كما اظهرت النتائج بانه هناك علاقة ارتباط معنوية بين مستوى معارف العاملين بالارشاد الزراعي والمتغيرات الاتية (مستوى التعليم، موقع العمل، مدة الخدمة الوظيفية، مصادر المعلومات الزراعية). واوصت الدراسة بتكثيف الجهود الارشادية بنشر المعارف بمجال تقنية حصاد المياه عن طريق الوسائل الارشادية المتنوعة، والعمل على فتح المراكز المتخصصة بتقنية حصاد المياه في المحافظة.

INTRODUCTION

The issue of water and its optimization has become one of the most important challenges facing endeavors Agricultural development in the world, where the issue of securing the necessary water for agriculture and meet the needs of the population These include food, its importance after increasing the causes of water scarcity, and the severe shortage of water imports. The limited resources at the global level, for many reasons, perhaps the most important is the continuous increase of numbers Population, and growing economic growth, especially in the agricultural sector, which has witnessed a significant and growing development and fast since the second half of the 20th century (Dahsh, 2013). In IraQ, the real problem of water is the decrease in its quantities and the deterioration of its quality as a result of natural factors such as climate change and human factors such as waste water pollution(Nasir, 2017). Water is used in all aspects of life and the most important in domestic and industrial uses and in agriculture About 92% of water is used in the Iraqi agriculture sector(Nafea, 2014). There are many techniques that rationalize the use of rainwater and increase its retention, and its efficient use is essential for any integrated research and development project, including water harvesting technology, where water harvesting can play an important role in achieving these goals. Water harvesting is defined as the collection, diversion and storage of runoff from rainfall and floods, for use in agriculture, groundwater recharge and the provision of drinking water(Jawdat,et.al 2014). Therefore, water harvesting technology is an advanced agricultural technology in the field of agricultural irrigation, for its prominent role in the exploitation of water resources optimally, to address the problems of water, drought, desertification and water crises, and provide water for agriculture and increase agricultural production to high levels. Since agricultural Extension provides knowledge and skills necessary for farmers to be able to adopt and apply the most successful and useful methods of agricultural and animal production to increase their production and raise their standard of living (Russell, 1986). Agricultural Extension usually functions through a range of activities through which its workers interact with farmers to introduce them to new agricultural practices and techniques and to more sophisticated techniques. Productivity and providing them with continuous Extension messages useful to them under administrative or technical supervision through continuous support through a structured Extension device that reflects its objectives clearly within the framework of its own Extension system. As a result of the low and uneven annual rainfall in the Nineveh governorate, it is necessary to follow some Technologies that conserve and reduce rainwater resources The area of natural pastures in the Nineveh governorate About a million hectares depend on rain to provide cover In addition to overgrazing, successive drought has led to The occurrence of an environmental and agricultural disaster in these areas, therefore Recognition of normal life in these areas has become things It is very important because the damage from these areas has

started Creeps to nearby cities through desertification and pat from Necessary to develop a program to save these areas through Plans to harvest rainwater (Rugbo and Salem, 2012). Based on the above and in the absence of any study in the research area, this study was conducted.

Objectives of the Research

1. Identify Knowledge level of Agricultural Extension agents in Nineveh governorate with water harvesting technology.
2. Identify Knowledge level of Agricultural Extension agents in the domains and items water harvesting technology.
3. Identify the correlation relation between Knowledge level of Agricultural Extension agents in water harvesting technology which each of following variables.

Research Hypothesis:

Ho: agricultural extension agents' social, personal and economic properties have no significant influence on their knowledge of with Water Harvesting Technology.

Operational Definitions:

- 1- **Agricultural employees:** They are all agricultural employees who work in the departments of the Nineveh Agricultural Directorate and its agricultural divisions, in addition to agricultural employees working in agricultural research centers in the province
- 2- **Technology:** A set of methods that a person uses to extend his authority over the surrounding environment to adapt his materials and energy to serve and satisfy his needs and desires.
- 3- **Water Harvesting:** The process of collecting, diverting, storing, managing and using the water caused by rain, and flood water in the seasonal valleys for various productive purposes such as agriculture and others.

MATERIALS AND METHODS

The study included all the Agricultural Extension agents in Nineveh governorate (the Nineveh Agriculture Directorate and its agricultural sector), which number (430) employees and after excluding 20 of them for the purpose of (pre-test) extracting reliability, the number of employees became (410). 25% employees was taken a sample random of them and thus the sample was 103 employees as show in table 1. For the purpose of collecting research data, a questionnaire was prepared consisted of two parts The first part consists of personal, social, and communication variables are (educational level, age, origin, specialization, location of work, duration of employment, sources of agricultural information related to water harvest). The educational level of the respondents was determined according to the following indicators (Graduate Agricultural preparatory, Graduate of Agricultural institute, Graduate of Agriculture college, and has a high certificate) has been given numeric values (1,2,3,4) Respectively. Origin was measured according to indicators (rural, urban) and was given numeric values (2,1), respectively. The specialization was measured according to the following indicators (extension, others) and has been given numeric values (2,1) respectively. While the location of work was measured according to the following indicators (village, district center, province center, governorate center) and given numerical values (1,2,3,4) respectively. The sources of agricultural information were measured by the following

indicators (often, sometimes, not contacted) It has been assigned numeric codes (3,2,1) respectively and has been included (Agricultural television programs, agricultural radio programs, agricultural conferences, institutes and colleges of agriculture, Agricultural training courses, friends and neighbors, personal experience, agricultural seminars, Internet, others). The second part of the questionnaire included a test to measure the level of knowledge of agricultural extension agents in the field water harvest, It included (4) domains main are (Maintenance of water harvesting technology, Comparative advantage for water harvesting, the Techniques of water harvesting, the design of water harvesting), these dominas included (28 items) Distributed on the study fields these items were formulated as questions They are of a multiple choice type. The questionnaire was showed to the experts of the Agricultural Extension Department and the transfer of techniques also showed to the experts of the Department of Soil Science and College of Irrigation and Drainage Engineering and Remote Sensing Center, to ensure content and face validity of the items. On the basis of their observations, some items have been deleted and amended, bringing the final number of items (28). The total mark of the test was determined by (100) degree and the degree of the domains and items of the test were determined by specialists in the Department of Soil Science and College of Irrigation and Drainage Engineering Remote Sensing Center at university of Mosul, By distributing (100) degrees on the test domains and items according to the relative importance of each field as follows: (the Comparative advantage 35), (the Maintenance 30), (the Techniques 20), (the design 15), The test was corrected from (28) degree, where has given degree to the right answer and zero for the wrong answer. (pre test) was conducted on a sample of (20) respondents from outside the research sample. The main reliability, where the reliability of the items of the test was found by Cronbach's Alpha where the coefficient of the total reliability of the items. And the reliability coefficient was (0.88). After completing the questionnaire in its final form, data were collected during the period (from April to June 2019). For the purpose of analyzing the data, some statistical methods were used such as mean, Pearson correlation coefficient, Spearman Brown coefficient and T test (Al-Baldawi,2009).

Table (1): Research sample and population

agricultural divisions	Number of respondents in population	Number of respondents in sample
Nineveh Agriculture Directorate	167	42
Baaj	4	1
Hadar	7	2
Hamdania	13	3
Shamal	5	1
Shora	9	2
Shekhan	10	2
Aeadhea	4	1
Qahtaniyah	4	1
Al Qoush	4	1
Qayara	9	2
Kairouan	16	4
Kuer	6	2
Mahelbea	6	2
Al markaz	12	3
Nimrod	7	2
Bartella	9	2

Basheka	20	5
Tel Abtah	5	1
Tel Afar	10	2
Tel Kaif	11	3
Hammam Al aleel	10	2
Hamidat	11	3
Debka	3	1
Rabiaa	3	1
Zammar	12	3
Sinjar	11	3
Faida	11	3
Makmur	3	1
Wana	10	2
Total	412	103

RESULTS AND DISCUSSION

1. Identify Knowledge level of Agricultural Extension agents in Nineveh governorate with water harvesting technology.

Table (2) shows that (72.81%) of the respondents have a medium level of knowledge, while the percentage of respondents with High level of knowledge was (12.63%), while the proportion of respondents with a Low level of knowledge (14.56%), This shows that knowledge of agricultural extension agents in technology the water harvesting is medium with a tendency to low. this is agree with (Dishant and Lakshminarayan, 2018) and (Khafaf, 2013). This result is probably due to the fact that the topic of water harvest is relatively new to the Agricultural Extension agents in the region. This was confirmed by (Rogers ,2003) that newness in an innovation does not just involve new knowledge. Someone may have known about an innovation for some time, but not yet developed a favorable or unfavorable attitude towards it, neither have adopted or rejected it (Ganiyu and Adeosun 2013).

Table(2): Distribution of respondents according to knowledge level with the water harvesting technology.

Categories	Frequency	Percentage
Low(17-20)	15	14.56
Medium(21-24)	75	72.81
High(25-28)	13	12.62
Total	103	100

s.d= 6.33

\bar{X} = 10.76

2. Identify Knowledge level of Agricultural Extension agents for each domains and items of the water harvesting technology.

Table 3 show that the highest level knowledge of respondents was in domain (the Comparative advantage) This indicates that the respondents have information and knowledge in this domain and this may be due to their participation in many extension activities related to this area such as holding seminars, conferences and training courses in domain Comparative advantage for water harvesting. While the lowest level of knowledge for respondents in the domain (the

design) This indicates that they are not familiar with the relevant information in how design of water harvesting because Being one of the new and modern topics which led to the lack of most of the respondents knowledge and information related to this domain.

Table (3) Arrange domains and items the test by the weight average of the knowledge's level of respondents.

Arrange	weight average	the items	the domains
	1		Comparative advantage
1.5	3.66	Combat Desertification	
1.5	3.66	Livestock development by water provision	
3.5	3.55	Provide rain water in arid and semi-arid areas	
3.5	3.55	Groundwater recharge	
5	3.50	Investment of some distinctive sites for tourism purposes	
6	3.46	Improve biodiversity in dry areas	
7	3.35	Contribute to the rehabilitation of vegetation	
8	3.25	Reduces erosion of soil and protects it from drift	
9	3.12	Water Use in Supplementary Irrigation in Rainfed Areas	
	2		the Maintenance
10	3.00	Install strainers at all openings to prevent dirt from entering	
11	2.90	The location of the reservoir	
12	2.83	Water treatment before consumption by filtration	
13	2.80	Clear groundwater from fluoride	
14	2.61	the get rid of salinity	
15	2.28	Periodic cleaning of the system Conducting regular checks and reforms	
	3		the Techniques
16	2.13	water harvesting technique depended on the depth of the soil	
17	2.10	Use rooftops for water harvesting	
18	2.08	Impact of rainfall	
19.5	2.00	Use earthen dams to prevent flooding	
19.5	2.00	The use of semi-circular dams in watering crops	
21	1.96	technology of Dams are the most modern and useful	
22	1.89	The use of semicircular barriers in low-steep lands	
	4		the design
23	1.77	Tanks should be large capacity	
25	1.76	Determine the distance of the catchment area	
25	1.76	Selection of the watershed topography	

25	1.76	Provide financial credentials and available resources	
27	1.70	Providing manpower	
28	1.55	The nature of the reservoirs in which water will be stored	

3. Identify the correlation relation between Knowledge level of Agricultural Extension agents in water harvesting technology which each of following variables.

- **level of the education:** Table 4 shows the high percentage of respondents according to the level of education for both category (Agricultural preparatory, and Agricultural institute) which were (%37.86), while the percentage of respondents in category (Agriculture college) was (%12.62), and for category (high certificate) the percentage is (%11.66). A significant correlation was found between the level of knowledge of extension agents in aspect water harvesting and their level of education, where the value of the correlation coefficient of Spearman Brown was (2.067), It is a significant value at the probability level (0.05) According to the value of (t) which was (1.854). this disagree with (Al-Abbassi, et.al.2014) and agree with (KHAN, 2017) , (Dishant and Lakshminarayan, 2018). This may be because the higher educational level of agricultural extension agents, increased knowledge of the respondents in the aspect of water harvesting because it makes them more looking for more sources of knowledge.

- **Age:** Table 4 shows that the highest age of the respondents (49) years and the lowest age (20) years, In the distribution of respondents according to age categories, the medium age categories (30-39) years is high, as the percentage of the respondents reached (%48.54), While the percentage of the low age category (20-29) years was (38.84%), the high age category (40-49) years was (12.62%). It was found that there was no significant correlation between the level of knowledge of the respondents and their age. Where the Pearson correlation coefficient was (-0.081) which is not significant according to (t) which was (-0.069), this agree with (Al-Abbassi, et.al.204) and (Khafaf, 2013). This indicates that the age of the respondents not effect with their level of knowledge in general and in the aspect of water harvesting in particular.

- **origination:** As shown in Table (4), the distribution of respondents according to the Foundation showed that (72.81%) of the respondents were urban, while the percentage of respondents were Rural was (27.19%). It was also found that there was no significant correlation between the level of knowledge of the respondents and their Foundation, The correlation coefficient of Spearman Brown (0.059), which is not significant compared to the value of (t), which was (1.545), this agree with (Khafaf, 2013). and this indicates that the respondents, whether their Foundation whether rural or urban have not effective to do with their knowledge in the aspect water harvesting.

- **Specialization:** As shown in Table 4 when the distribution of respondents according to the specialization, 21.35% of the respondents specialize in agricultural extension and 78.65% of the respondents specialize in other fields. The Spearman Brown correlation coefficient was (-0.055), which is not significant compared to (t) which was (-0.450), this agree with (Khafaf, 2013). probably because water harvesting is no longer a major activity that the participants practice or participate in it, whether their specialization is agriculture extension or in other fields.

- **location of work:** Table (4) when the distribution of respondents according to the categories location of work that the percentage (38.83%) of them work in the villages, and that (32.06%) of the respondents work in the district centers, while the proportion of respondents who work in the province center (19.41%) While the percentage of respondents working in the governorate center (9.70%), The correlation coefficient of Spearman Brown was (3.732) which is significant

according to t value which was (1.895) at the probability level (0.01). This may be because the respondent's location of work affects his knowledge and information from one place to another as a result of the subject's exposure to communication channels that increase his knowledge in aspect of water harvest.

- **duration of Job service:** Table (4) shows that the lowest duration of work for the respondents (7) years and the highest duration of employment was (24) years, and when distribution of respondents to the categories duration of work we can see that (48.54%) of the respondents fall into the low category (7-12) year, The medium category (13-18) years was (39.80%), while the high category (19-24) years was percentage is (11.65%). It was also found that there was a significant correlation between the level of knowledge of the respondents and the duration of their employment. this agree with (Khafaf, 2013) and (KHAN, 2017).. The reason for this result may be that the longer duration of work for the respondents, caused increase their knowledge in aspect water harvest, due to the accumulation of considerable experience in this field.

- **Exposure to Sources of agricultural information in water harvest:** Table (4) shows that the lowest numeric value of sources of agricultural information (10) and the highest numeric value (27) with an average of (18.11), and when the distribution of respondents according to categories of Sources of agricultural information shows the high percentage of respondents who fall into the medium category (16-22) It reached (53.39%), while the percentage of respondents in the low category (less than 15) (29.12%), while the percentage of respondents in the high category (more than 23) (17.47%). A significant correlation was found between the respondents' knowledge level and the agricultural information sources, Where the correlation coefficient of pearson was (2.087) which is a significant value at the probability level (0.05) according to the value of (t) which was (1.633). this agree with (Al-Abbassi, et.al.204), (Dishant and Lakshminarayan, 2018). This may be due to the fact that increase of the number of sources of information, the more diverse the knowledge of the respondents in the field of water harvest.

Table(4): correlation between the level of knowledge of the respondents and some independent variables.

Variables	frequency	%	(t) Value	pearson	Spearman	significant
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education level:

Agricultural preparatory	39	37.86	1.854		2.067	*
Agricultural institute	39	37.86				
Agriculture college	13	12.62				
high certificate	12	11.66				

age:

(20-29) year	40	38.84	-0.069	-0.081		
(30-39) year	50	48.54				
(40-49) year	13	12.62				

origination:

Rural	28	27.19	1.545		0.059	
Urban	75	72.81				

Specialization:

extension agricultural	22	21.35	-0.450		-0.055	
Others	81	78.65				

location of work:

Village	40	38.83	1.895			
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District center	33	32.06			3.732	
province center	20	19.41				**
Governorate center	10	9.70				

duration of Job service:

(7-12) year	50	48.54				
(13-18) year	41	39.80	0.223	2.59		*
(19-24) year	12	11.65				

Sources of agricultural information in water harvest:

(15 and less) low	30	29.12				
(16-22) medium	55	53.39	1.633	2.087		*
(23 and more) high	18	17.47				

*Significant at p0.05

**Significant at 0.01

CONCLUSION

From the above we conclude:

1. Most of Agriculture extension agents have an medium level of knowledge in aspect water harvest. Therefore, it is necessary to develop their knowledge and perceptions in this area, through briefing them on modern sources in this field by opening to the outside world.
2. Agriculture extension agents lack knowledge in the fields (the Techniques, the design), while they have good knowledge in the fields (Comparative advantage, the Maintenance).
3. The level of knowledge of Agriculture extension agents in the field of water harvest has significant correlation with the following variables (level of education, location of work, duration of employment, sources of agricultural information), while there was no relationship between their level of knowledge and the following variables (age, Foundation, specialization).

RECOMMENDATIONS:

1. The Directorate of Agriculture of Nineveh and the agricultural section and all training centers to conduct training courses related to water harvest or one of its fields for the purpose of increasing the knowledge of workers in agricultural extension.
2. To intensify extension efforts in disseminating information and knowledge in the field of water harvest through various media (audio-visual).
3. The Ministry of Agriculture or the directorates of agriculture to work to open an agricultural center specializing in water harvest in the province.

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