

## **Environmental pollution factors in the agricultural Field from the perspective of agricultural employees in Tikrit District / Salah al-Din Governorate**

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### **Abstract**

The Research aim the Identification of Environmental Pollution Levels and the aim of the study is to determine the primary causes of environmental pollution in the agricultural sector, determine the effects of this phenomenon on the productivity and sustainability of agriculture, and discuss the approaches and practices used in the agricultural sector by employees in the Tikrit District, Salah al-Din. of Agricultural Employees in Tikrit District / Salah al-Din Governorate, as well as Determining the Variations in the Respondents' Views on the Level of Agricultural Environmental Pollution According to the Personal Factors of Agricultural Employees, Including: (Age, Educational Attainment, Years of Service, Upbringing, and Information Sources), to identify and analyze the causes of environmental pollution in the agricultural field and explore the approaches used by agricultural employees to address them. The research targeted all agricultural employees in Tikrit District / Salah al-Din Governorate, totaling 67 employees. A simple random sample of 60% was taken, resulting in 40 respondents. A questionnaire was prepared to collect the required data to achieve the research objectives. The questionnaire consisted of three sections:

A questionnaire was prepared to collect the data required to achieve the research objectives. It consisted of two sections. The first section included the personal factors of the respondents, and the second section included (23) paragraphs. Several statistical methods were used to achieve the research objectives, including variance, range, mean, and frequency.

Various statistical methods, including mean, standard deviation, and one-way ANOVA, were employed to analyze the data and achieve the research objectives. including variance, range, mean, and frequencies. The results showed that the level of environmental pollution in the agricultural field was moderate, with a tendency towards decline, according to the views of agricultural employees in Tikrit District / Salah al-Din Governorate. The results also revealed variation in the respondents' opinions on the level of environmental pollution in the study area according to their personal factors. The researcher concluded that the employees were unable to diagnose the impact of environmental pollution on the agricultural field in the study area. The researcher also recommends training agricultural employees in Tikrit District / Salah al-Din Governorate on environmental preservation and monitoring its impact on plant and animal production.

**Keywords: Environmental pollution, agricultural sector, agricultural employees.**

**Introduction and Research Problem:**

Human intervention in ecosystems has caused many problems, which have worsened with technological and scientific advancements in industrialized countries. However, these advanced countries, with their significant scientific and financial capabilities, have recognized the seriousness of the problem and have continuously worked to find various solutions to control it. In contrast, developing countries, which bear the largest share of this problem, are still making slow progress in addressing these environmental issues. This is due to several factors that hinder any attempt to confront these problems, including low education levels, poverty, overpopulation, limited resources, and a lack of full awareness of the issue (1). Human

Environmental pollution has become a serious problem in our modern era, making it crucial to take serious and immediate action to preserve the environment and prevent pollution before it's too late. Prevention is better than cure, and global efforts must be intensified to preserve our environment before the problem escalates and becomes more dangerous (5). Therefore, protecting the environment is currently one of the key strategies and objectives, requiring the enactment of laws and regulations that help protect the environment from pollution. It is also essential to continuously provide environmental data, information, and financial resources to facilitate the making of appropriate decisions, which ultimately lead to

Agriculture has, in the present time, become a complex industry in which

problems have increased in this century at varying rates, but there are common issues such as the disruption of natural balances, ignorance of how to manage natural resources, population growth, and environmental pollution in terms of water, air, and food (2). Environmental pollution has become a problem that has raised significant concern as it transcends all borders and barriers, beginning to have negative effects on human health and social life (3). For any living organism to survive, a suitable environment must be provided to support and sustain it. The term "environment," in this context, refers to all living and non-living factors that surround the organism and are affected within a specific spatial area (4).

preserving and protecting the environment from pollution (6). Air, water, and soil pollution threatens the lives of humans, animals, and plants in the global ecosystem, particularly in Iraq. Given the relationship between human well-being and the surrounding environmental factors, and based on the need to optimally utilize natural resources, it is essential to reconsider how we interact with the environment and develop sound plans for utilizing its resources in a studied manner. Waste or depletion of these resources in the future will pose greater risks to growth and sustainable development, leading to disruptions in the ecosystem with negative consequences for the global life system (7).

multiple forces interact. The first of these is the human being who practices

agriculture, and the second is related to nature and the factors affecting it, such as land, water, air, and others." (8). Studies indicate that most agricultural risks occur due to climate changes, in addition to the human impact on land use, such as the

This is the reason why numerous conferences and seminars have been organized which focus on agricultural extension, diversification of the agricultural extension services in such a way that beyond plant and animal production other aspects like management of farms and environmental extension are also incorporated. The importance of agricultural extension in improving environmental awareness and adoption of sustainable agricultural practices is something that has been established by past researchers. As an example, Al-Shammari (2021) discovered that agricultural employee training initiatives have a great impact on enhancing the knowledge of farmers regarding the

increased use of pesticides and chemical fertilizers beyond the recommended levels, deforestation, and other forms of alteration to the natural environment of the land. (9).

source of pollution and environmental-friendly farming methods. Equally, Abdulrahman and Kareem (2020) emphasized that environmental extension programs have a direct impact of helping to curb the use of fertilizers and pesticides. Such results show the significance of promoting the activity of environmental extensions to safeguard natural resources and promote sustainable agricultural practices.(10). To assess the extent and causes of environmental pollution and its impact on the agricultural field, as well as methods of addressing it from the perspective of agricultural employees in Tikrit District / Salah al-Din Governorate, the research problem is framed through answering the following research questions:

1. What is the extent of environmental pollution in the agricultural field from the perspective of agricultural employees in Tikrit District / Salah al-Din Governorate?
2. Is there any variation in the extent of environmental pollution in the

agricultural field from the perspective of agricultural employees in Tikrit District / Salah al-Din Governorate based on the following personal factors: (age, educational level, years of service, upbringing, and sources of information)?

**Research Objectives:**

1. To determine the extent of environmental pollution in the agricultural field from the perspective of the respondents (agricultural employees) in Tikrit

District / Salah al-Din Governorate.

2. To identify the variation in the extent of environmental pollution in the agricultural field from the perspective of agricultural

employees in Tikrit District / Salah al-Din Governorate based on the following personal factors: (age, educational level, years of service, upbringing, and sources of information).

3. To determine the impact of environmental pollution on the agricultural field and identify the methods and practices used by agricultural employees in Tikrit District / Salah al-Din Governorate to address

### **Statistical Hypotheses:**

- 1- There are no statistically significant differences in the respondents' perceptions of environmental pollution factors in the agricultural field of Tikrit District / Salah al-Din Governorate according to age.
- 2- There are no statistically significant differences in the respondents' perceptions of environmental pollution factors in the agricultural field of Tikrit District / Salah al-Din Governorate according to level of education.
- 3- There are no statistically significant differences in the respondents' perceptions of environmental pollution factors in

the agricultural field of Tikrit District / Salah al-Din Governorate according to years of service.

- 4- There are no statistically significant differences in the respondents' perceptions of environmental pollution factors in the agricultural field of Tikrit District / Salah al-Din Governorate according to place of upbringing.
- 5- There are no statistically significant differences in the respondents' perceptions of environmental pollution factors in the agricultural field of Tikrit District / Salah al-Din Governorate according to information sources.

### **Operational Definitions:**

- **Environmental Pollution:** It is an unnatural phenomenon and harm that occurs through the introduction of pollutants into the environment, causing disruption in the form and nature of air, water, and soil.
- **Agricultural Field:** Refers to all activities related to the production

of agricultural crops and animal husbandry. It contributes to securing food for the population and helps support both the local and global economy.

- **Agricultural Employees:** Refers to employees working in agricultural departments in Tikrit District who hold agricultural academic qualifications.

### **Materials and Methods**

**Research Methodology:** The descriptive

method was used, as it is suitable for studying this research.

### Research Population:

The research population included all agricultural employees in Tikrit District / Salah al-Din Governorate, totaling 67

employees. A simple random sample of 60% was selected, resulting in 40 respondents.

**Table 1: Research Population and Sample**

Department	Research Population	Sample Size
Salah al-Din Agriculture Directorate	8	5
Tikrit Agriculture Section	39	23
Extension Center	20	12
<b>Total</b>	<b>67</b>	<b>40</b>

### Preparation of the Questionnaire:

A questionnaire was prepared to collect the data required to achieve the research objectives. It consisted of two sections. The first section included the personal factors of the respondents, while the second section included (23) items representing the

After preparing the questionnaire in its initial form, it was presented to experts in the field of agricultural extension, soil, and prevention at the College of Agriculture at Tikrit

causes of environmental pollution in the agricultural field. The alternatives were presented (very large, large, medium, small, very small), and the alternatives (very useful, useful, moderately useful, little useful, not useful).

University, as well as experts in agricultural extension at both the University of Mosul and the University of Kirkuk. The wording of some items was modified in light of the experts' opinions.

### Measurement of Research Variables:

- **Measurement of Independent Variables:**

1. **Age:** It was measured by the number of years of the respondent's age at the time of data collection.
2. **Educational Level:** It was measured using the alternatives (Agricultural Secondary School, Higher Diploma, Bachelor's, Master's, Doctorate), and values of (1, 2, 3, 4, 5) were assigned respectively.
3. **Years of Service:** It was measured by the number of years the respondent has spent in the job.
4. **Upbringing:** It was measured using the alternatives (Rural, Urban), and values of (2, 1) were assigned respectively.
5. **Sources of Information about Pollution:** It was measured using 5 sources from which the respondent can obtain information about agricultural environmental pollution. Alternatives (Frequently, Sometimes, Rarely, Never) were provided, with values of (3, 2, 1, 0) assigned, thus the values representing this variable range from (0 to 15).
6. **Measurement of Pollution Extent:** It was measured using 23 items with alternatives (Very High, High, Medium, Low, Very Low), and values of (5, 4, 3, 2, 1) were assigned respectively. Therefore, the values representing the extent of pollution range from (23 to 115).

### Statistical Methods:

Various statistical methods were used, such as (range, mean, standard deviation, and analysis of variance).

### Results and Discussion:

**Objective 1: To determine the extent of environmental pollution in the agricultural field from the respondents' perspective.**

The values representing the extent of

pollution ranged between (64-110), with an average of (85.67) and a standard deviation of (11.78). The respondents were categorized into three groups based on the range law, and the results are shown in **Table 2**.

**Table (2): Extent of Environmental Pollution in the Agricultural Field**

Category	Number	Percentage	Average
Low (64 – 79)	14	35%	73
Medium (80 – 95)	16	40%	87.62
High (96 – 111)	10	25%	100.30
	40	100%	Total

It is clear from **Table (2)** that the highest percentage of respondents fall into the medium category, with an average of (87.62), followed by the low category with an average of (73). Therefore, the level of environmental pollution, according to the respondents' perspective,

is described as medium, leaning towards low. This may be due to the limited participation of agricultural employees in training courses, the lack of resources and support necessary for environmental protection, and also the scarcity of extension seminars in this field

**Objective 2: To determine the variation in the respondents' views on the extent of environmental pollution in the agricultural field according to the following personal factors:**

1. **Age:** The ages of the respondents ranged between (22-50) years. They were categorized into three groups using the range law to express their views on the extent of environmental pollution and its impact on the agricultural field in Salah al-Din Governorate. It was

found that the highest percentage of respondents were within the medium age group. To test the significance of the differences between the means of the age groups, a one-way analysis of variance was used. The results are shown in **Table 3**.

**Statistical Significance Table 3**

Age Group	Number	Percentage	Mean	P-value	F-value	Significance Level
Young Age (22-31 years)	13	32.05	81.69	0.000	10.99	Significant
Middle Age (32-41 years)	20	50.00	82.90			
Old Age (42-51 years)	7	17.50	101.14			
Total	40	100				

Table (3) indicates that ( $p.v < 0.05$ ); therefore, we accept the null hypothesis,

which states that there are no statistically significant differences in the extent of

environmental pollution from the perspective of agricultural employees in

Salah al-Din Governorate based on age.

**Table (4) presents the results of the LSD test based on information source categories.**

Category Comparison	Mean Difference	P-value	Significance
Short vs. Medium	1.208	0.727	Significant
Short vs. Long	*19.451	0.000	Not Significant
Medium vs. Long	*18.243	0.000	Not Significant

Table (4) shows that the source of the difference in the averages of the categories (short: long and medium: long) may be due to the employees replacing years with the change that occurred in the environment in the pollution-free 2-

environment due to the lack of recent events that the country has experienced and the abundance of pollution causes without the desired impact on the environment.

Educational Attainment: The respondents were categorized based on their

educational attainment, as presented in Table (5).

**Table (5) presents the results of the regression analysis based on educational attainment.**

Category	Count	Percentage	Mean	F-Value	P-Value	Significance
High School	4	10%	86.25	0.520	0.721	Not Significant
Diploma	2	5%	95.00			
Bachelor's	14	35%	85.21			
Master's	17	42.5%	83.94			
PhD	3	7.5%	90.67			
<b>Total</b>	40	100%				

Table (5) indicates that ( $p.v > 0.05$ ); therefore, we reject the null hypothesis, which states that there are no statistically significant differences in the extent of environmental pollution from the perspective of agricultural employees in Salah al-Din Governorate based on

educational attainment. This may be attributed to the fact that individuals with higher educational attainment are more capable of recognizing the impact of environmental pollution on agriculture, particularly on plants and animals in the study area.

**3- Job Service**

The length of service for employees ranged between (1 - 14) years. They were categorized into three groups based on

this range. To determine the significance of differences in the mean values among these categories, a one-way ANOVA

analysis was conducted. The results are presented in Table (6) .

**Table (6) presents the results of the ANOVA analysis based on service duration categories.**

Service Category	Count	Percentage	Mean	F-Value	P-Value	Statistical Significance
Short (1-5 years)	24	60%	79.92	12.727	0.000	Significant
Medium (6-10 years)	11	27.5%	91.82			
Long (11-15 years)	5	12.5%	99.80			
<b>Total</b>	40	100%				

It is evident from Table (6) that ( $0.05 < p.v$ ), therefore, we reject the statistical hypothesis which states that there are no statistically significant differences in the level of environmental pollution from

the perspective of agricultural employees in Salah al-Din Governorate based on their job tenure. To identify the source of variation, the LSD test was used, and the results are shown in Table 7.

**Table (7) shows the results of the LSD test according to the categories of information sources:**

Category	Mean Difference	P-Value	Statistical Significance
Short: Medium	*11.902	0.001	Significant
Short: Long	*19.883	0.000	Significant
Medium: Long	7.982	0.121	Not Significant

It is evident from Table (7) that the source of variation is the difference in means between the categories (Short: Medium) and (Short: Long). The reason for this may be that employees with longer job tenure have more knowledge about the environment than others due to their experience with environmental changes. This makes them more aware of the level of environmental pollution in the

research area compared to those with shorter job tenure.

**4 -The Origin :** The respondents were categorized based on their origin into two groups as shown in Table (8). It was found that the rural group had a higher mean. To test the significance of the differences between the two groups, the t-test was used, and the results are shown in Table (8).

**Table (8) shows the results of the t-test according to the categories of origin:**

Category	Number	Percentage	Mean	t-Value	P-Value	Statistical Significance
Urban	28	70%	82.96	2.563	0.000	Significant
Rural	12	30%	92.00			
Total	40	100%				

It is evident from Table (8) that the value of ( $p.v < 0.05$ ), therefore, we reject the statistical hypothesis which states that there are no statistically significant differences in the level of environmental pollution from the perspective of agricultural employees in Salah al-Din Governorate based on origin. The reason for this may be that rural residents have direct contact with the environment, allowing them to observe the changes that occur in the environment and notice the

impact of environmental pollution on plants in the research area.

**6- Information Sources:** The values representing the level of respondents connection to information sources ranged between 4 and 15. They were categorized into three groups to express their views on the level of environmental pollution in Salah al-Din Governorate. To test the significance of the differences between the mean values of the groups, one-way analysis of variance (ANOVA) was used, and the results are shown in Table (9).

**Table (9) shows the results of the analysis of variance (ANOVA) based on the categories of information sources:**

Category	Number	Percentage	Mean	F-Value	P-Value	Statistical Significance
Low (4 - 7)	8	25%	76.00	5.664	0.007	Significant
Medium (8 - 11)	19	47.42%	85.42			
High (12 - 15)	13	32.5%	92.00			
Total	40	100%				

It is evident from Table (9) that the value of ( $p.v < 0.05$ ), therefore, we reject the statistical hypothesis which states that (there are no statistically significant differences in the level of environmental pollution from the perspective of agricultural employees in Salah al-Din

Governorate based on job tenure.) The reason for this may be that employees with high access to information sources are more knowledgeable about the causes of environmental pollution and are more aware of its impact on plant production .

Table (10) shows the results of the LSD test based on the categories of information sources:

Category	Mean Difference	P-Value	Statistical Significance
Low: Medium	*9.421	0.042	Significant
Low: High	*16.000	0.002	Significant
Medium: High	6.579	0.093	Not Significant

It is evident from Table (10) that the source of variation is the difference in means between the categories of information sources (Low: Medium and Low: High). The reason for this may be that respondents with high access to

information sources are more aware of environmental pollution factors and its causes, which makes them more aware of the extent of environmental pollution compared to the other categories.

### Conclusions:

1. The results showed that the level of environmental pollution is moderate, tending to decrease, from the perspective of agricultural employees in Tikrit District, Salah al-Din Governorate. From this, we conclude that the employees are not fully capable of diagnosing the impact of environmental pollution in the agricultural field in the research area.
2. The results revealed significant differences in the level of environmental pollution from the perspective of agricultural employees in Tikrit District, Salah al-Din Governorate, based on educational attainment. We conclude that those with higher academic qualifications are more capable of noticing the impact of pollution on the agricultural environment than those with lower educational qualifications.
3. The results indicated statistically significant differences in the perceived level of environmental pollution among agricultural employees in Tikrit District, Salah al-Din Governorate, according to their place of origin. This suggests that respondents from rural areas have a higher awareness and ability to recognize the effects of environmental pollution on plants and animals within the study area.
4. The results revealed individual differences based on access to information sources. We conclude that having multiple sources of information about environmental pollution enables employees to better observe the impact of pollution in the agricultural field.

**Recommendations:**

1. Train agricultural employees in Tikrit District, Salah al-Din Governorate, on environmental conservation and how to observe its impact on plant and animal production.
2. Assign agricultural employees with higher academic qualifications to prepare and implement advisory programs related to environmental conservation .

3. Implement environmental awareness activities by agricultural employees who are from rural areas in the research area.
4. Increase the number of available environmental resources and make them easily accessible to agricultural employees in the research area, enabling them to diagnose environmental pollution factors and develop appropriate solutions.

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