Effects of soil Salinization on the Environment from the Perspective of Agricultural Employees in Salah al-Din Governorat

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Abstract

This is study aims primarily to identify the external effects of salinization on the environment from the point of view of employees in a healthy manner according to some personal discrimination methods based on (Academic achievement, job service, training in environmental conservation, contact information sources), and to arrange the research in descending order according to arithmetic moderation and the solutions can be distinguished. Because it began the phenomenon of salinization in the environment from the point of view of agricultural employees in the research area. The research sample included (133) respondents, representing (50%) of the total agricultural employees in Salah al-Din Governorate. A three-part questionnaire was prepared, the first part of which included the employees' personal variables, and the second part (15) paragraphs to measure the magnitude of the negative effects of the salinization phenomenon in The environment, a five-level scale was placed in front of the paragraphs (very large, large, medium, few, very few), and the third part proposed solutions to reduce the phenomenon of salinization in the environment from the point of view of agricultural employees in Salah al-Din Governorate, a three-level scale was placed in front of the paragraphs (useful, moderately useful, little useful).

A preliminary test was conducted on a simple random sample of the research community with a size of (27) respondents to find the reliability and validity coefficient. The reliability coefficient was valued at (0.72) and the validity coefficient was valued at (0.84). The data was collected, transcribed, and the data was classified. The SPSS program was used.) and a number of statistical methods to analyze the data.

The results of the research showed that the majority of the respondents fell into the medium to high category. From this we conclude that the phenomenon of salinization is widespread and the respondents' awareness of the negative effects of this phenomenon.

The results showed that one of the most important negative effects of the phenomenon of salinization in the environment is the clogging of the drippers in the drip irrigation network with salts, which leads to following the old methods of irrigation that farmers use for irrigation. The results of the research showed that the highest average of the proposed solutions to address the phenomenon of salinization in the environment is by making trocar networks to get rid. From excess salinity.

Introduction

Since man was found on the face of the earth, he has been working hard to exploit its natural resources in order to preserve his entity and secure his food. However, his methods of exploiting those resources have increased, and this has resulted in a major disruption of the natural balance of ecosystems and harm to the environment in general, which exposes the fate of current generations. To danger (Fayrouz, 2012:a).

The elements of the environment in this universe move according to specific and balanced proportions to respond according to a balanced form and amount to the needs of living organisms and to ensure the continuity

ISSN 2072-3857

of life on the surface of the Earth and provide a safe environment. This interaction and interconnection between the elements and components of the environment, whether living or non-living, and the precise harmony that governs them, allows them to perform their role. Normally in the continuity of life, which is called (environmental balance), this balance means that the components and elements of the environment maintain their existence and proportions as God Almighty created them, but this environmental balance and its system can be exposed to disruption when any deficiency or defect occurs in any of the following: The components and elements of this system begin to become disturbed and lose balance and the ability to sustain life, resulting in what is called (environmental degradation), (Abdul Kareem, 2012:17).

The problem of salinization is one of the problems that threatens the future of agriculture, as many agricultural lands have turned into unproductive lands due to the accumulation of salts in them, as salinity causes a decrease in the ability of the soil to produce because the high percentage of salinity in the soil limits the ability of the plant to obtain water from the soil. Because of its toxic and bad effect on the plant, it may cause its death (Islaih, 2015: 2). Soil salinization leads to many social, economic and environmental problems, the effects of which are reflected in humans, plants and animals, as the productive capacity of the soil in producing food and clothing decreases, and land and water resources decrease with it, leading to misuse of resources (Salam and Abdel Halim, 2020: 4).

Soil salinity is widespread in more than 100 countries, and no continent, not even Antarctica, was originally thought to be free of salinity. Glaciers, however, are not completely free of salinity, and occupy more than 20% of the global irrigated area. In addition to generating the latest information about the extent Global and regional, the annual cost of land degradation due to salinization was US$264 per hectare, increasing to US$441 per hectare in 2013 with a daily loss rate of 2,000 hectares due to salinization.
(Shahid, Pharis: 2016).

The problem of salinization is accelerating in Iraq, and the percentage of agricultural lands suffering from salinization is estimated at (50%) due to neglect of the agricultural and irrigation sector, as the areas affected by salts in Iraq reached (2008). More than (7 million dunums), which constitute 70% of the lands of the alluvial plain. Despite its relatively good quality, irrigation water in Iraq is one of the main factors for land salinity. It has been estimated that irrigation water can add approximately (3 million tons) of salts annually. In irrigation soils in central and southern Iraq. (Al-Azzawi and Hamada, 2010: 282).

The problem of salinization is one of the dangerous problems that soils are exposed to, especially in irrigated lands in arid and semi-arid areas. These soils are characterized by the proximity of groundwater, as the water containing salts rises by capillary action to the surface. When the water evaporates, the salts remain on the surface layer of the soil and do not The concentration of soil salinity is limited to clay soils only, but extends beyond that to include desert soils, where saline and alkaline soils prevail in dry and semi-arid areas where rainfall is low and evaporation is high, where natural and human factors interact in the spread of salinity in the soil, the degree of which varies from one soil to another. Lands in arid and semi-arid areas may be exposed to an increase in the rate of evaporation, which

ISSN 2072-3857

reaches 50% of irrigation water, and this factor in itself is a major reason for the increase in salts because evaporated water leaves its salts on the surface of the soil. Also, the proximity of groundwater and its rise to the surface of the soil. Through capillary action and then its evaporation, this leads to an increase in salinity in the soil surface. Increasing irrigation water beyond the limit needed by each agricultural crop leads to the transfer of excess water to the second layer of the soil, resulting in the dissolution of salts and thus their transfer to the surface layer of the soil. This concerns the nature of irrigation water and the amount of salts it contains, as the more irrigation water, whether river water or groundwater, contains a high percentage of salts, the greater the soil salinity (Fatein and Thamer, 2023: 332).

The problem of salinization is considered one of the important problems with negative effects on the lands in Iraq, as a large area of the country's total area is salts are deposited in it, which may reflect negatively on the environment. In order to develop appropriate solutions to reduce the damage to the environment due to the phenomenon of salinization in Salah al-Din Governorate, the extent of this damage must be known from the point of view of agricultural employees in the governorate, and from here the idea of the research came to answer the following questions:

1. What is the extent of the negative effects of soil salinization on the environment from the point of view of agricultural employees in Salah al-Din Governorate?
2. What is the descending order of the research paragraphs?
3. Is there a difference in the viewpoint of agricultural employees regarding the negative effects of salinization on the environment in Salah al-Din Governorate according to their personal characteristics represented by (academic achievement, job service, training in the field of environmental conservation, contact with information sources)?
4. What are the proposed solutions to address the effects of salinization on the environment from the point of view of agricultural employees in Salah al-Din Governorate?

The research aimed to:

1. Identify the negative effects of soil salinization on the environment from the point of view of agricultural employees in Salah al-Din Governorate.
2. Arrange the research paragraphs in descending order.
3. Determine the variation in the viewpoint of agricultural employees regarding the negative effects of salinization on the environment in Salah al-Din Governorate, according to their personal characteristics represented by (academic achievement, job service, training in the field of environmental conservation, and contact with information sources).
4. Identify the proposed solutions to address the effects of salinization on the environment from the point of view of agricultural employees in Salah al-Din Governorate.

Materials and methods

The study was carried out in Salah Al-din province. The agricultural employees in these five districts was 250, from them, 133 (50%) were randomly selected to respond to the questionnaire from 1 September- 1 November 2023. Pre-test done on 27 agricultural employees outside the sample for testing the questionnaire's reliability. The instrument used was a 3part questionnaire, namely personal characteristics of agricultural employees, effects of soil salinization and solutions to reduce salinization. The personal characteristics include; academic achievement,

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job service, training in the field of environmental conservation, and contact with sources of information. Effects of soil salinization part consist of (15) items. With five-level scale; very large, large, medium, small, very small. Solutions to reduce salinization part consist of (8) items with three-level scale; useful, moderately useful, and little useful. Content validity of the questionnaire was established by a panel of experts in the field of agricultural extension, desertification and salinization. A pilot study was conducted to establish reliability of the instrument, a Cronbach's alpha (a reliability coefficient) of (0.72) was established, indicating the instrument used was reliable and valid. Thus, the questionnaire is ready to collect the final data. The data was collected, transcribed, and processed statistically using Excel and Spss to extract the following values (range, Cronbach's alpha reliability coefficient, , arithmetic mean, standard deviation (SD), one-way variance

Results and discussion

Effects of salinization on the environment

The results showed that the lowest value expressing the negative effects of salinization on the environment from the point of view of agricultural employees is (39) and the highest value is (75), with an arithmetic mean of (59.11) and a standard deviation of (6.91). The respondents were divided into three Categories according to range and the as shown in Table (1).

Table (1): Distribution of respondents according to effects of salinization on the environment

T	Categories	the number	Percentage	Average
1	**Low (39-50)**	**7**	**5,27**	**44**
2	**Medium (51-62)**	**87**	**65,41**	**55,85**
3	**High (63-plus)**	**39**	**29,32**	**69,07**
	the total	**133**	**100٪**	
	Sd=6,918	$\bar{X}$ **=59,11**		

The respondents fell into the medium to high category, and the reason for this may be due to their awareness of the magnitude of the negative effects of salinization on the environment and the clarity of its effects on the environment.

Regarding negative effects of salinization on environment , result in table 2 showed that Salts lead to clogged drippers and old methods of irrigation, which causes significant deposition of salts in the soil was the first effect .

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Table (2): Negative effects of salinization on environment

T	Paragraphs	average	rank
1	Salts lead to clogged lrrigation drippers and therefore follow old methods of irrigation, which causes significant deposition of salts in the soil	4,263	1
2	It reduces plant diversity	4,165	2
3	Salts cause suffocation of plant roots	4,105	3
4	Accumulation of salts on the surface of the soil, making it unsuitable for agriculture	4,09	4
5	High salts in the water make it undrinkable for humans and animals	4,083	5
6	It affects the growth of vegetable plants and crops and reduces their productivity	4,045	6
7	High salt concentrations in rivers cause a decline in freshwater fish populations	4,008	7
8	The need to establish water desalination plants, and this affects the environment due to the toxic waste released by these plants	3,985	8
9	Using salt water for irrigation makes the soil less permeable	3,902	9
10	Poor plant growth due to its inability to absorb nutrients efficiently	3,887	10
11	Affects biodiversity	3,872	11.5
12	Reduces the absorption of chemical fertilizers that are important for plant growth	3,872	11.5
13	Salty soil helps the growth of bush plants such as tamarisk and tarfa	3,759	13
14	Reduces beneficial microorganisms in the soil	3,744	14
15	It affects the movement of machinery in the field when serving agricultural crops	3,383	15

The maximum score for the item = 5

Effects of soil salinization and respondent characteristics

The respondents were distributed according to academic achievement into five categories One-way analysis of variance was used to show the significance of the differences between the means of these categories, and the results were as in Table (3).

Table (3) academic achievement and effect of salinization

T	Attainment categories	the number	percentage	SMA	value F	Probability value p.v	Statistical significance
1	Preparatory school	16	12,03	56.53	3.148	0,017	
2	Institute	23	17,29	56.74			significant
3	College	59	44,36	58.85			
4	Master's	26	19,55	61.81			
5	Ph.D	9	677	62.90			
		133	100				

ISSN 2072-3857

It is clear from Table (3) that there is a significant differences between the respondents according to their academic achievement in their to the effects of salinization.

2. years of service:

The values expressing the number of years of employee service were limited to between (1-30) years. They were distributed according to the range into three categories. To determine the significance of the differences in the means of these categories, one-way analysis of variance was used, and the results were as in Table (4).

Table (4) shows the results of the analysis of variance for service categories

Service categories	the number	Percentage	SMA	F value	Probability value p.v	Statistical significance
Short (1-10) years	**97**	**72.93**	**120,06**	**1,579**	**0,210**	**Not significant**
Medium (11 - 20) years	**30**	**22.56**	**124,40**			
Long (21 - 31) years old	**6**	**4.51**	**124,17**			
the total	**133**	**100**				

It is clear from Table (6) that there are no significant differences in the magnitude of the negative effects of the salinization phenomenon from the point of view of agricultural employees according to categories of years of service.

3. Training in the field of environmental conservation.

The respondents were distributed according to training into two categories The trainee category obtained the highest average. To test the significance of the difference between the averages of the two categories, a T-Test was used, and the results were as in Table (5).

Table (5) T-Test results for training categories in the field of environmental conservation

Category	the number	percentage	SMA	value F	Probability value p.v	Statistical significance
Trainee	**77**	**57.89**	**127.95**	**8.786**	**0.000**	**Not significant**
Untrained	**56**	**42.11**	**112.52**			
the total	**133**	**100**				

It is clear from Table (5) that There are no significant differences in the magnitude of the negative effects of the salinization phenomenon from the point of view of agricultural employees according to the training categories in the field of environmental conservation.

4. Contact sources of information

The values expressing the level of the respondents' contact with information sources were limited to (7 – 28). They were distributed into three categories. It was found that the third category (high) obtained the highest average among the categories and to test the significance of Differences between the means of the categories. One-way analysis of variance was used, and the results were as shown in Table (6).

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Table (6) shows the results of the analysis of variance according to the categories of information sources

T	Categories	the number	percentage	SMA	t value	Probability value p.v	Statistical significance
1	Low (7-13)	9	6.77	122,67	5,147	0,007	Moral
2	Average (14 - 20)	55	41.35	117,47			
3	High (21 and over)	69	51.88	124,55			
		133	100				

It is clear from Table (6) that there are no significant differences in the magnitude of the negative effects of the salinization phenomenon from the point of view of agricultural employees according to the categories of information sources). To find out the source of the variance, I use the LSD test.) The results were as shown in Table (7).

Table(7) LSD test results according to categories of level of contact with information sources

Category	Difference in averages	Probability value	Moral
Low: average	5,194	0,241	Not significant
Low: high	1,884	0.665	Not significant
Medium: high	7,078*	0,002	Moral

It was shown from Table (7) that the source of the discrepancy is the difference in the averages of the high and medium communication categories, in favor of the high category. The reason may be that respondents who access more sources about the environment have more knowledge of the impact of salinization on the environment and the possibility of diagnosing its effects on plants in the research area. .

4-5 Fourth objective: Identify the proposed solutions to address the effects of the phenomenon of salinization in the environment from the point of view of agricultural employees in Salah al-Din Governorate.

The paragraphs of the proposed solutions to address the phenomenon of salinization in the environment from the point of view of agricultural employees were arranged in descending order according to the arithmetic mean, and the results were as in Table (8)

Table (8): Arranging the paragraphs of the proposed solutions to the salinization phenomenon in descending order according to the arithmetic mean

T	Paragraphs	Average	Rank
1	making trocar networks to get rid salinity in the soil	2,684	1
2	Draining excess water from the soil to reduce salt accumulation	2,609	2
3	The state's interest in modern trocars and rehabilitating water trocars before returning it to the rivers	2,553	3.5
4	Maintenance of covered, minor, secondary and main trocars	2,553	3.5
5	Add organic fertilizers before planting to improve soil fertility	2,526	5
6	Do not over-water the plants	2,481	6
7	Cultivation of lands with salt-tolerant crops such as (barley and clover)	2,383	7
8	Reducing the level of sodium in salty soil by adding gypsum, or what is known as (calcium sulphate), to the soil	2,346	8

ISSN 2072-3857

It is clear from Table (10) that the highest average of the proposed solutions to address the phenomenon of salinization in the environment is (creating a network of trocar to get rid of excess salinity in the soil), came in last place (Reducing the sodium level in salty soil by adding gypsum or what is known as (calcium sulphate) to the soil).

Conclusions:

1. The results showed that the respondents' opinions about the negative effects of the phenomenon of salinization on the environment in Salah al-Din Governorate are moderate and tend to rise. We conclude from this that the spread of the phenomenon of salinization in Salah al-Din Governorate is large and clear to most agricultural employees in the governorate.
2. The results showed that the problem of clogging of modern irrigation drippers ranked first in the negative effects of the salinization phenomenon. We conclude from this that the percentage of salts in irrigation water exceeds the permissible limit and may cause poisoning of plants.
3. The results showed that there was a significant difference in the differences in the views of the respondents according to most of the factors studied, such as (academic achievement, training in the field of environmental conservation, and the level of contact with information sources). We conclude from this the importance of these factors in the characteristics of agricultural employees who can be assigned to address the phenomenon of salinization. In the search area.
4. The results showed that the paragraph (creating a network of trocars to get rid of excess salinity in the soil) to reduce the impact of the salinization phenomenon ranked first from the respondents' point of view in dealing with this phenomenon. We conclude from this that the lowlands in the south of the governorate need to rehabilitate networks of trocars to rid the soil of excess salts. And maintain its vitality.

- Recommendations:

1. Training agricultural employees and enabling them to diagnose and solve the problem of salinization in the governorate and limit its spread by the Salah al-Din Agriculture Directorate and its affiliated agricultural divisions.
2. Establishing and maintaining modern trocars networks to reduce the percentage of salts in the soil.
3. Taking into account the factors that showed a significant difference in the viewpoints of the respondents when they were assigned to address the phenomenon of salinization in the research area.
4. The necessity of spreading environmental awareness to reduce the negative effects of salinization on the environment by holding seminars and courses for environmental awareness and exploiting the media available in the governorate, such as the Salah al-Din and Samarra channels.
5. Educating farmers about the importance of using modern irrigation methods, such as drip and sprinklers, in order to reduce water waste and limit the process of excessive irrigation to protect the soil from salinization.

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ISSN 2072-3857