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Perception and Attitudes of Farmers toward the uses of Treated Sewage Water in Palm Trees Irrigation

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ABSTRACT

The primary purpose of the study was to determine the attitudes of farmers toward the uses of sewage water in Palm trees irrigation. The population of the study was 470 farmers. Questionnaire reviewed for content and face validity by a panel of experts from Department of Agricultural Extension at the College of Food and Agricultural Sciences, King Saud University and was used to collect data . A three point Likert -type scale was used. Cronbach's alpha coefficient was found to be 0.85, which indicated the internal consistency of the scale. Finding indicated that the attitudes of farmers were positive towards the benefits of the uses of wastewater in irrigation. Approximately 62% of the respondents agreed that the use of sewage water helps in maintaining the non-renewable water resources, 71% agreed that the treated sewage water, in the future, will become a large part of the water consumption in agriculture, 56% of respondents agreed that there is a global trend to use treated sewage water as an additional source of renewable water for irrigation while agreeing to the benefits of using sewage water, only 46% of respondents agreed to invite their neighbors to use treated sewage water in their farms, 57% did not agree with the idea of expansion of the uses of treated wastewater in agriculture. A simple correlation Coefficient of Spearman indicated that there is a inverse relationship between age and attitudes of farmers towards the uses of treated sewage water in agriculture. Young farmers were more positive towards the uses of treated sewage water than the elderly. Also it turned out that there is a direct correlation between the level of education and attitudes of farmers towards the uses of treated sewage water which means that farmers with higher education were more positive towered the uses of treated sewage water. It was recommended that an extension programs should be implemented to raise awareness of farmers towards the importance of the uses of treated sewage water.

Keywords: Attitudes, Farmers, Sewage water, Irrigation, Palm -trees.

INTRODUCTION

The economic and social development is impossible without water. In the past, the human needs for water was little in comparison to the sources of water available at that time and the technological capabilities had weak impact on the environment. So there was no problems meeting the water needs for various uses. (AL-Mugern, 1997) .Today, the growing population, the increasing water consumption and the growing technological capabilities have a negative effect on the environment. They may have led to the emergence of competition for water use and polluting the environment. From here, it is clear the importance of water for human beings and its important role in protecting the environment.

The increase in population and the rising standard of

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living have led significantly to the rising demand for water. It also led to the idea to diversify water sources and to explore large amount of water in various ways, and to re-use treated sewage water. The re-use of treated sewage water is a way that has remarkable acceptance in recent years .(Qadir, 2010)

A number of countries is facing a crisis of the scarcity of water, whether it for human consumption or for other uses such as industry, and agriculture. Saudi Arabia is one of these countries in the Arabian Peninsula suffering from increasing speed of the water demand, resulting in a sharp deficit in the amount of water for agricultural and industrial purposes .

The studies of Economic and Social Commission for Western Asia (ESCWA) indicated that the per capita consumption of water in the Kingdom of Saudi Arabia at the present time is equivalent to nearly 95 per cent of the amount of available water resources. And it is expected that the consumption of individual in the Kingdom will increase in 2020 to reach 317 per cent of the available water resources. In the sense that the amount of water available to the consumer in the Kingdom will face the challenge of a deficit by 217 per cent by 2020.(Aljadeed, 2012)

The reason behind the emergence of this deficit of water in Saudi Arabia is a great disparity between the rate of annual consumption and annual production rate of water resources. It is estimated that Saudi Arabia consumes about 22 million cubic meters of water annually. And at the same time, Saudi Arabia produces nearly 2.5 million cubic of water. (Aljadeed, 2012) Saudi Arabia covered the difference between the amount of consumption and production by relying on non-conventional water resources, such as water wells, treated sewage, and desalination. According to the rates of consumption of water in the Kingdom, the non-renewable water resources will be sufficient to only 50 years to come according to projections by the Food and Agriculture Organization" FAO". (Aljadeed, 2012)

The sources of water in the Kingdom are surface water, groundwater, seawater, and sewage water . Due to the lack of rivers in the Kingdom, it has adopted to irrigate agricultural crops mainly from groundwater, which is extracted by drilling wells. The number of drilling wells in the Kingdom are 228 927 in total. The number of tube wells are 123 516.The number of handy wells are 5269 and the remaining 142 are sparkling wells. (Ministry of Agriculture, 2007).

The Studies of Food and Agriculture Organization" FAO" indicates that nearly 90 percent of the water in the kingdom comes from groundwater, 5 per cent comes from surface water, 4 per cent of water comes from desalination, and the rest of water comes from treated water sanitation.A relevant statistics indicates that nearly 89 per cent of the average annual water consumption in the Kingdom of approximately 22 cubic kilometers of water is coming from non-renewable sources.

The report of the Saudi Arabian Monetary Agency indicates that the capacity of sewage treatment in the Kingdom is approximately 840 million cubic meters per day. It is operated for nearly 80 percent of its energy to produce about 672 million cubic meters per day. From this treated water nearly 123 million cubic meters per day is re-used (ALjadeed, 2012).

The treated sewage water is one of the future options to bridge the gap between the actual amount of water and the desired amount of water. The extent of the success of uses of sewage water as an alternative source of water depends on a number of factors, first is the degree of the treatment of water, second the types of irrigation systems and third the acceptance of farmers to use this type of water (Aazba**,** 1997).

The treated sewage water in Saudi Arabia, is one of the new sources and complementary to the agricultural

irrigation water. Saudi Arabia has used treated sewage water in agricultural irrigation for the first time in 1982 to irrigate about 147 farms in Dirab and Dir'iya. The treated sewage water were exploited and utilized instead of leaving it to be disposed at the valleys near the cities. And also to prevent environmental pollution and to protect the public health (Ministry of Agriculture, 2010).

Scientific studies have shown that 50% to 70% of the drinking water pumped into public networks in the cities, comes back again out of cities in the form of sewage water. It can be used for agricultural purposes such as irrigating parks, sand dune fixation, or irrigating palm-trees (Al Zahrani, 2002).

The average quantities available for sewage water treatment in the Kingdom about 715 million cubic meters in 2009, and It is expected to increase this amount to more than 1.5 billion cubic meters in 2024(Omran, 2011).

The amount of treated sewage water used for agricultural purposes in the Riyadh region is about 53.27 million cubic meters. The number of farms benefiting from this water was 470 farms, and the area that has been irrigated with treated sewage amounted to 17,800 hectares in 2010. These areas were cultivated by types of crops such as palm trees, fruit trees and ornamental trees(Ministry of Agriculture, 2010).

The scarcity of water resources pushed Gulf States to look for non-conventional water resources to secure their basic needs of water. Three types of resources were: One is desalination, Arab countries stand first in the world in the production of desalinated water. Arab countries produce 70% of world production. The Gulf States produces daily, 8.3 million cubic meters which represent 62.4% of the global production of desalinated water. The six Gulf States varies in the adoption of desalination, UAE produces 64.5% of its water, followed by Kuwait produces 63.24%, Qatar produces 49.% and Bahrain produces19%. Sewage ranks second in terms of use and currently used in most of the Arab countries for the purposes of agriculture. This Sewage contributes to a reasonable source of water in the Gulf Arab states . Saudi Arabia used more of Sewage followed by the UAE, Kuwait, Qatar, Oman and recently Bahrain .Third is agricultural drainage water. This kind of treated water is almost non-existent.

Sewage water is treated in three main ways, they are Primary Treatment, Secondary Treatment and Tertiary treatment. Tertiary treatment includes chlorination, ozone treatment, and then used to irrigate agriculture, gardens and parks. The sewage water treated triple is used to irrigate plants, it is high in the degree of quality and quantity, but it flawed by high salinity. (AMani, 2010)

Farmers use flood, or sprinkler irrigation or drip irrigation in Palm trees farms. The ministry of agriculture encourages farmers to use drip irrigation, because it deliver moisture directly to the roots of trees. There is far less water lost to evaporation and there is no risk of accidentally watering roads, driveways and pathways. Also, when water is delivered slowly and steadily to the trees, there are fewer tendencies to over water, less wastage due to water runoff, and less risk of disease. Clogging is the problem of drip irrigation, if the water is not properly filtered and the equipment not properly maintained.

The use of treated sewage water in agriculture is an alternative resource of water to improve the conditions of production in various farming systems and to conserve the freshwater for domestic use. The acceptance of the farmers to use the treated sewage water to irrigate their farms is an essential condition in the formulation of programs to support the farmers of using this important water resource in the future. Setting aside the availability of these high quantities of treated sewage water, it is still a number of farmers reject the idea of using this type of water. From here it comes to the mind of researchers to formulate a research question, that is what are the perception and attitudes of palm trees farmer towards the use of treated sewage water to irrigate their palm

trees in some provinces of Riyadh region?

The objectives of the research are to study the attitudes of palm trees farmers towards the use of treated sewage water to irrigate palm trees near Riyadh through the following sub- objectives:

1- To determine the attitudes of palm trees farmers towards the use of treated sewage water to irrigate palm trees.

2- To Study the relationship between age, and educational level of the respondents as independent variables and using treated sewage water as the dependent variable.

3-To determine the most important sources of agricultural information used by respondents to get their information about treated sewage water.

METHODOLOGY

The population of this research included all palm trees farmers using treated wastewater from the farms nearby city of Riyadh. The population was 470 farmers in each of the Dir'iya ,Al- eyienah , Al-hayer and Dirab. A total of 304 questionnaires were restored for valid analysis .A total of 166 questionnaires could not be restored or was ruled out because it was not complete and not suitable for analysis. Cronbach's alpha was used to measure the reliability of the questionnaire. The result of the test showed high reliability of 0.85 and then the data were collected.

The data were reviewed ,coded, and tabulated. The percentages, averages and standard deviations were used to find out the personal characteristics of the respondents. A simple correlation coefficient of Spearman, had been used to find out the relationship between age and educational level of the farmers and their attitudes towards the use of treated sewage water**,** all these analysis were conducted using the SPSS (Al Zubi, 2006).

RESULTS

Personal Characteristics of the Respondents

It can be seen from Table 1 that the vast majority of respondents (95.7%) were elderly**.** Their ages ranged from 60 years and above. The percentage of those who belongs to the age group 45 and less than 60 years, were 3.3%. While the percentage of youth under the age of 45 years were only 1%.It is also apparent from the table that approximately 52% of farmers respondents had no schooling, that means the respondents were without a primary level of education.

Table 1. educational level and age of the respondents (n=304)

Farmers distribution by age		
Age	**No of respondents**	**Percentage**
Less than 45 years old (youth)	03	1
45 - less than 60 years old (middle-aged)	10	3.3
60 years and more (elderly)	291	95.7
Farmers distribution by educational level		
Educational level	No of respondents	Percentage
No schooling	187	51.5
Primary to secondary schooling	81	26.7
Diploma and above	36	11.8

Attitude of respondents towards the use of treated sewage water to irrigate palm trees:

Table 2 showed that the attitudes of many of the respondents towards the use of treated sewage water were inconsistent. The percentage of respondents who will call their neighbors to use treated sewage water in their farms were less than half (46%). It is also found that a percentage of more than half of the respondents (57%) did not agree to the idea of expanding the use of treated sewage water in agriculture. A 50% of respondents did not accept to irrigate their farms by treated sewage water. All these percentage of farmers seem to have negative attitudes toward the use of sewage water.

Table 2. attitudes of the respondents towards the use of treated sewage water (n = 304)

Attitudes	Agree %	Do not agree %	Do not known %	M	SD
The use of treated sewage water will maintain the non-renewable water resources .	8.61	3.2	9.35	60.1	54.0
The treated sewage water in the future, Will become a large part of the water consumed in agriculture	1.71	8.11	1.17	60.1	69.0
Using treated sewage water Increase soil fertility.	6.58	3.2	1.39	56.1	54.0
There is a global trend today, for using treated sewage water as an additional source of water for irrigation .	3.56	9.4	8.38	51.1	59.0
Investment in treated sewage water is a good thing that should be encouraged.	3.51	5.14	2.34	37.1	72.0
The use of treated sewage water reduces pressure on other water sources.	3.49	5.14	2.36	35.1	72.0
Treated sewage water can be used in many areas .	3.49	5.15	2.35	34.1	73.0
The use of treated sewage water increase agricultural production.	1.42	5.9	4.48	32.1	64.0
The use of treated sewage water help increase the speed of the plant growth	7.47	4.18	9.33	29.1	76.0
I invite my neighbors to use treated sewage water in their farms	1.46	1.17	8.36	29.1	74.0
I do not accept the idea of using treated sewage water in may farm	3.50	4.22	3.27	28.1	81.1
Plants produced by treated sewage water is not of good taste.	3,52	4,17	3,30	35,1	76,0
The human and animal health are affected negatively by crops irrigated with treated sewage water	5.64	9.4	6.30	40.0	58.0
I do not agree with the idea of expanding the use of treated sewage water in agriculture.	6.56	5.12	9.30	44.1	71.0
The use of treated sewage water harms soil properties	9.10	49	1.40	62.0	67.0
The use of treated sewage water can cause problems for plants	23	1.42	9.34	81.0	79.0

Scale agree =3 do not know = 2 do not agree =1

A percentage of 71% of respondents agreed that the treated sewage water will become a large part of the water consumed in agriculture in the future. A 59% of respondents agreed that the use of sewage will increase soil fertility. A 56% of the respondents agreed that there is a global trend for the use of treated sewage water as an additional source of water for irrigation. And slightly more than 50% of the respondents agreed that investment in treated sewage water is a good thing that should be encouraged. All these percentage of farmers seem to have positive attitudes toward the use of sewage water.

The relationship between age , education of the farmers and their attitudes towards the use of treated sewage water

Table 3 shows a significant inverse correlation between age and the attitudes of the farmers towards the use of treated sewage water in agriculture. In other words, the young, 45 years old and younger, are more positive for the use of treated sewage water than the elderly. It also shows a significant positive correlation between level of education as an independent variable and the attitudes of farmers about the use of treated sewage water as the dependent variable. That means , the farmers with higher education are more positive towards the use of treated sewage water.

Table 3. the Spearman correlation coefficient of the relationship between educational level and age of the respondents and their attitudes towards the use of Treated Sewage water.

Personal characteristics	R-value	Level 0f significance
Age	-0.201	0.001*
Education	0.194	0.001*

*Level 0f significance 0.01

Sources of Information:

The sources of information which farmers rely upon to get their information were classified according to the way of displaying information to three sources. They were verbal, written, and demonstration. It can be seen from Table 4 that the verbal sources were, nearly 42% of the farmers relied upon radio programs to get their agricultural information, whereas 30.3% of the farmers sometimes rely on radio programs. Nearly 33% of farmers get their information from their neighbors and friends, 34.5%, from colleagues, 43.1%. from Ministry of Agriculture and 21.1% from agricultural companies.

It was found that 33% of the farmers relay on written information sources such as publication, Bulletins and Pamphlets. Thirty one percent (31%) of farmers, relay on magazines and daily newspapers . Sixteen percent (16%) of farmer relays on books and scientific references. They are regarded as the less commonly used written information sources.

Table 4. Sources of agricultural information (N= 304)

Sources of information	Always use %	Sometimes %	Rarely use %	Do not use %	means M	SD
Verbal Sources						
Agricultural radio programs	**41.8**	**30.3**	**14.1**	**13.8**	**2.71**	**0.64**
Neighbors and friends	**32.6**	**38.8**	**16.4**	**12.2**		
Professional colleagues	**34.5**	**33.9**	**17.1**	**14.5**		
Ministry of Agriculture	**43.1**	**21.7**	**14.8**	**20.4**		
Colleges of Agriculture	**19.4**	**23.7**	**28.6**	**28.3**		
Institutions and agricultural companies	**21.1**	**15.1**	**25.7**	**38.2**		
Written Sources						
Bulletins publications and pamphlets.	**32.9**	**27.0**	**24.0**	**16.1**	**2.47**	**0.71**
Magazines and daily newspapers	**30.9**	**22.0**	**24.7**	**22.4**		
Internet	**28.6**	**19.7**	**12.5**	**39.1**		
Journal of Agricultural	**17.1**	**26.0**	**28.0**	**28.9**		
Books and scientific references	**16.1**	**24.3**	**29.9**	**29.6**		
Demonstrations						
TV programs of agricultural	**39.8**	**28.0**	**18.1**	**14.1**	**2.66**	**0.78**
Agricultural research centers	**29.6**	**28.3**	**20.7**	**21.4**		
Agricultural fairs	**18.4**	**23.0**	**26.6**	**31.9**		

The same table shows that the agricultural television programs and agricultural research centers ranked first and second respectively in demonstration sources of information. Nearly forty percent (39.9%) of farmers always rely on agricultural television programs and 29.6% of the farmers always rely on agricultural research centers to get their Agricultural information. The agricultural fairs are used by 18% of farmers. It is less commonly used as a sources of information.

In generally verbal sources considered the most used sources by farmers. The mean average of the verbal was 2.71 and the standard deviation was 0.64, followed by demonstrations with mean average of 2.66 and a standard deviation of 0.78. The mean of written information sources was 2.47 and standard deviation was 0.71.

Differences in the average means of respondents :

Table 5 shows the significances differences between the average means of respondents on information sources according to the age, education and occupation. It shows that there is no significant differences between the average means of respondents according to their age and education at the 0.05 level. Table 5 also shows that there is a significant differences between the average means of respondents on information sources according to occupation at the 0.01 level.

Table 5. analysis of variance to test the differences in the sources of agricultural information for the respondents according to age, educational level and occupation

Age	Means	F-VALUE	Level of significance
Verbal Sources	**2.71**	1.035	.3560
Written Sources	**2.47**	2.180	0.115
Demonstrations	**2.66**	1.322	0.268
EDUCATION	**Means**	F-value	**Level of significance**
Verbal Sources	**2.71**	1.373	0.255
Written Sources	**2.47**	0.318	0.727
Demonstrations	**2.66**	0.011	0.989
Occupation	**Means**	**F-value**	**Level of significance**
Verbal Sources	2.56	12.336	*0.001
Written Sources	2.39	10.326	*0.001
Demonstrations	2.54	7.692	*0.001

Table (6) shows the result of Scheffe test for the differences between the average means of respondents in sources of information written, verbal and demonstration according to their occupation .The significant difference lies between the part time farming and each of farmers and farming with ranching. Part time farming uses sources of information written, verbal and demonstration more commonly than farmers and farming with ranching. That may be because Part time farming lives in cities which will be more exposed to information sources.

Table 6. Scheffe test for the differences in the sources of agricultural information for the respondents according to Occupation

NO	Occupations	Mean	SD	F-value	Level of significance	Location of differences
Verbal						
1	Farmer	2.71	0.60	12.336	0.001	Si NO 2 More than Si No 1 and Si No 3
2	Pat time farming (Farming and clerking)	3.02	0.54			
3	Farming and Ranching	1.85	0.99			
Written						
1	Farmer	2.46	0.67	10.326	0.001	Si NO 2 More than Si No 1 and Si No 3
2	Pat time farming (Farming and clerking)	2.94	0.71			
3	Farming and Ranching	1.76	1.05			

Demonstration						
1	Farmer	2.66	0.75	10.326	0.001	Si NO 2 More than Si No 1 and Si No 3
2	Pat time farming (Farming and clerking)	3.05	0.71			
3	Farming and Ranching	1.90	1.19			

DISCUSSION

The result of the research of farmer's attitude shows that the respondents are elderly. This may explain the low educational level. The delayed school enrollment was because their preoccupation with the search for their daily bread. Age is an important factor for the agricultural sector, where the elderly have the priority of a delaying the adoption of modern agricultural innovations. Education also has a large role in influencing the knowledge and practices of the farmers. Education helps to search for and identify new practices in the field of agriculture. Which requires that the agricultural extension workers to take age and educational level into their an account when establishing extension programs. In addition, the agricultural extension workers should use methods and agricultural extension aids that fit in with the age and educational level of the farmers. The farmers consider verbal sources the major source for communication.

There are some benefits of using treated sewage water. They are to maintaining water reserves when it is used in agriculture or any other uses instead of using drinking water, it leads to the provision of drinking water, it helps in expansion of the agricultural areas for the production of a variety of crops at a lower price, it also lead to reduction of costs of production by reducing the cost of imported fertilizers, due to the existence of the essential elements for the plant in sewage waters, sewage water also increases the fertility of the soil , thus it increases agricultural production and reduces the cost of access to water in agriculture, especially if those sources of water are from underground.

Sewage water can cause health problems if it is not treated properly, because of the different types of viruses, bacteria and high concentrations of chemicals that are not removed in the various stages of treatment. It may cause damage to plants in case it is used to recharge groundwater without proper treatment, it is possible to pollute groundwater and it may cause a blockage of the irrigation systems .

Due to these traits of sewage water, it is apparent the inconsistencies in the attitudes of farmers toward the use of treated sewage water. Their attitudes about the benefits of using sewage water were positive, while the attitudes of a large proportion of farmers towards the use of sewage were negative. They do not agree with the idea of expanding the use of sewage water. This may be due to the fear of farmers from spreading agricultural diseases that may infect human and animals. The sewage is the source of bacterial contamination, if the water is used in watering crops, especially vegetables such as parsley, carrots, cucumbers, tomatoes, garlic, onions, potatoes and eggplant. These vegetables become contaminated and a source of transmission of communicable diseases such as diarrhea and paralysis, typhoid, hepatitis and cholera, worms and inflammatory bowel disease and other diseases. (Rajab, 2009)

The negative attitudes may be due to contraindications legitimacy. Many of the farmers regard this kind of water unclean. It is not congenial for use in agriculture, or any other purposes. The Council of Senior Scholars in the Kingdom has issued an advisory opinion.

The Council regards this water pure after full purification. So it is returned pure and clean the way it was without any taste, color or smell. It may be good to drink, if there are no adverse health effects arise from its use . The Council of Senior Scholars Research (17 / 40.41).

REFERENCES

Aazba, Ali Abdulrahman.1997. use of treated wastewater and irrigation efficiency, the first scientific symposium of Saudi Agricultural Sciences. Agriculture Arabia between expansion and rationalization . the first volume of Riyadh, Saudi Arabia

Aljadeed, Mohammed bin Nasser.2012. the economics of treated wastewater economic Wednesday 04 June 1433 e. 25 th ,Issue 6771

Almugern, Abdul Latif Ibrahim.1997. strategic development of water sources in Saudi Arabia and conservation), the scientific symposium of the first Saudi Agricultural Sciences (Agriculture Arabia between expansion and rationalization), the first volume ,Riyadh, Saudi Arabia)

Al-Zahrani, Khaddran Hamdan Ahmad Haj .2003. Environmental pollution and its impact on tourism development and vegetation in Al-Baha, Saudi Arabia. King Saud University Journal, Volume II of Agricultural Sciences (2) Department of Scientific Publications, King Saud University,

Al-Zubi, Mohammed Bilal, Abbas Tlavhh.2006. the statistical system understanding and analysis of statistical data SPSS, Dar Wael for printing, publishing and distribution of Jordan 2006.

Amani, Shawki .2010. Farm in Bahrain uses water treatment : number: 2698 Monday, January 25,

Council of Senior Scholars in the Kingdom of Saudi Arabia "An advisory opinion of the toward sewage water uses" ***Journal of Islamic Research***; (17 / 40.41)

Department of Public Affairs for irrigation use of treated wastewater for irrigation. 2000. Regulations , conditions , violations and penalties. The Ministry of Agriculture, Riyadh, Saudi Arabia

Department of Public Relations and agricultural Media.2007. A glimpse of agriculture in Saudi Arabia, the Ministry of Agriculture, , Riyadh, Saudi Arabia

General Directorate of Agricultural Research and animal.2011. uses of triple treated wastewater .agricultural production in the Sultanate of Oman

Karam, Mohammad Khalid .2011. re-use of treated sewage water environment magazine Environment Public Authority No. 119.

Khuraiji, Khaled Abdul Rahman Mansour .1999. some aspects related to the adoption of farmers in Al-Kharj to some modern irrigation methods, Master Thesis, Department of Agricultural Extension and Rural Community College of Agriculture, King Saud University, Riyadh, Saudi Arabia

Ministry of Agriculture.2010. Statistical Yearbook annual, agricultural XXIV Section V Riyadh, Saudi Arabia

Ministry of Agriculture.2006. irrigation in Saudi Arabia . Riyadh

Ministry of Planning .2001. Fifth Development Plan the Kingdom of Saudi Arabia, Riyadh (1410-1415 AH)

Omran, Abdul Rasul, Ali Itr, Mahmoud Nadim .2011. irrigation water quality and methods of analysis King Saud University, scientific publishing and printing presses, (2011G).

Qadir, M. D., Wichelns, L., Raschid-Sally, P.G., McCornick, P., Drechsel, A., Bahri, P.S., Minhas.2010. The challenges of wastewater irrigation in developing countries. International Center for Agricultural Research in the Dry Areas ***Agricultural Water Management***, 97(4): 561-568

Rajep, Maha.2009. It is time to sound the alarm serious diseases caused by use of wastewater to irrigate crops**.**

University Journal of Scientific Research Directorate of October, Syria

Shaban, Muhammad.2001. water scarcity .. Gulf haunt the world of technology and realization

Sun Journal . The uses of wastewater to irrigate orchards. Issue 29

Statistics Centre Abu Dhabi. 2011. statistical report for Environment Statistics in Abu Dhabi .

اتجاهات زراع النخيل نحو استخدام مياه الصرف الصحي المعالج في ري أشجار النخيل

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ملخص

تهدف هذه الدراسة إلى تحديد أدراك واتجاهات المزارعين نحو استخدامات مياه الصرف الصحي المعالج في في ري أشجار النخيل . وقد تكون مجتمع الدراسة من جميع زراع النخيل المستخدمين لمياه الصرف المعالجة وعددهم 470 مزارعا. تم توزيع الاستبانة على لجنة من الخبراء من قسم الإرشاد الزراعي بكلية علوم الأغذية والزارعة جامعة الملك سعود لتحكيم محتوى الاستبيان قبل استخدامه لجمع البيانات. استخدم مقياس ليكرت المكون من ثلاث درجات. واستخدم معامل ارتباط كورن باخ ووجد انه 85% وهذا يدل على أن صدق محتوى الاستبيان عاليا. أشارت النتائج إلى أن اتجاهات المزارعين كانت إيجابية تجاه فوائد استخدامات مياه الصرف الصحي في الري. فواق ما يقرب من 62٪ من المزارعين على أن استخدام مياه الصرف الصحي يساعد في الحفاظ على الموارد المائية غير المتجددة،ووافق 71٪ على أن مياه الصرف الصحي ألمعالجة سوف تصبح جزءا كبيرا من استهلاك المياه في الزراعة في المستقبل ،كذلك وافق 56٪ من الزراع على أن هناك اتجاها عالميا لاستخدام مياه الصرف الصحي المعالجة كمصدر إضافي للمياه المتجددة لأغراض الري. وبينما وافق المزارعون على فوائد استخدام مياه الصرف الصحي ، فقد وافق نسبة قليلة(46٪) من المزارعين على دعوة جيرانهم لاستخدام مياه الصرف الصحي المعالجة في مزارعهم ولم يوافق 57٪ من المزارعين على فكرة التوسع في استخدامات مياه الصرف الصحي المعالجة في الزراعة. وهنا يحصل التناقض بين المعرفة بفوائد استخدام مياه الصرف الصحي والرغبة في استخدام هذا النوع من المياه. أشار معامل الارتباط البسيط لسبيرمان على أن هناك علاقة عكسية بين العمر واتجاهات المزارعين نحو استخدامات مياه الصرف الصحي المعالجة في الزراعة.فقد كان المزارعون صغار السن أكثر إيجابية تجاه استخدامات مياه الصرف الصحي المعالجة من كبار السن. كما اتضح أن هناك علاقة ايجابية بين مستوى التعليم واتجاهات المزارعين نحو استخدامات مياه الصرف الصحي المعالجة وهو ما يعني أن المزارعين ذوي التعليم العالي كانوا أكثر إيجابية لاستخدامات مياه الصرف الصحي المعالجة. وعلى هذا أوصي بأنه يجب إعداد برامج إرشادية لتوعية المزارعين بأهمية استخدامات مياه الصرف الصحي المعالجة لري مزارع أشجار النخيل واتخاذ الاحتياطات الصحية اللازمة عند استخدام هذا النوع من المياه.

الكلمات الدالة: اتجاهات، زراع، نخيل، مياه، صرف، الري.

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