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The Importance and Role of Irrigation Water Quality in Agricultural Production

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Abstract

Water resources are one of the most important natural wealth of the country. Increasing parallel to the increase of the population's food needs is revealed as the role of water more efficiently. Water in agricultural production as well as significant human life is one of the indispensable inputs. To be within permissible limits of quality characteristics of agricultural water is extremely important. Non-irrigation water use in agricultural production of good quality care leads to a reduction in yield parameters and prepare the soil of the barren environment. Agricultural water quality in terms of the choice of first and second class should not be used in agricultural waters outside the class waters .Each irrigation water sources should be analyzed before it is used in agricultural production. It does not cause loss of productivity in agricultural production until the water quality parameters in the irrigation water is worth a desired state. In this study; Quality parameters of agricultural irrigation water sources are highlighted. What are the parameters of quality of irrigation water source that can be used in agricultural production may touch upon the subject.

Keywords: *Irrigation water quality; Agricultural production*

Introduction

The effective use and management of water resources is crucial for sustainable development and food security. Soil and water resources are located in the first of the important natural wealth of the society. Society of social and economic aspects of development, said the development of these resources is of paramount importance and wise use [1]. In agricultural production, water is a valuable resource can not be replaced by any other substance. Water is seen not only as a source of agricultural production, but also as an important factor that will affect product quality and yield. The water in agricultural production and sustainable sources so as to cause less harm to the environment should be used as a control in the manufacturing process.

Today, agricultural production as well as the protection of the environment is seen as an ecological rules. Approximately 40% of chemical fertilizer in agricultural production such as America held without harming the environment within the natural decomposition process is observed in the form of ammonia into the atmosphere without threatening the environment.

For example; Mississippian River as a result of reaching leaked agricultural water intensive use of chemical fertilizers in agriculture decreased steadily river's oxygen balance, particularly agricultural pattern made from this river utilized for irrigation is affected agricultural production by seeing serious damage.

Figure 1: *An irrigation water resource from Turkey.*

Studies show that world and in our country agricultural areas heavily used chemical fertilizers and drugs, especially washed from the soil by rainfall and irrigation runoff or leakage as a result of both the river and threaten groundwater. Fertilizers are added to soil chemical compound which is in fact salt character. These compounds affect soil properties as they know the positive or negative direction can also show a significant effect. The negative effect leads to a reduction of the product and the income derived indirectly. This effect also causes the removal in later years, give rise to a more difficult problem.

On the other hand manure wrong choice, wrong and improper dose of fertilizer application form it can be listed as reason enough to achieve more by spending less product. Therefore, when water and soil as a matter of question to ensure continuity for the future generations of our natural resources as particularly necessary in consideration of these issues in the inorganic origin of the manure-soil acidity and its effects on the soil properties and chemical structure of the fertilizer known and fertilization process [2,3].

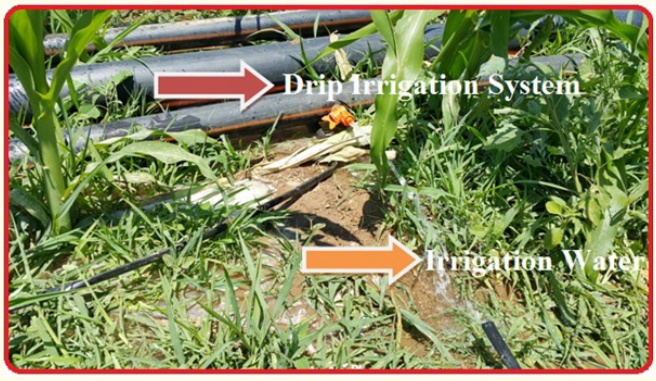

Figure 2: *The irrigation application in maize field from Turkey.*

It is seen as one of the basic principles essential irrigation water for agricultural production. Contamination of water resources, however, to move the hydrological cycle on Earth with water and chemical fertilizers and drugs affect the water quality. Hydrological cycle reaches the Earth's surface covered directly by precipitation or surface water that flows through the ground to reach the river and the sea or groundwater infiltration is the result. This leakage is used in agriculture for the production of this washing water is again taken into account that said chemical inputs used in agricultural production are to threaten result negatively.

Especially in the reduction of agricultural production is to reach the earth with rain water natural cycle of rainfall is particularly adversely affected. The average annual precipitation in Turkey is 643 mm per year, which corresponds to an average of 501 billion m^3

water. This water is 274 billion m^3 in the return to the atmosphere through evaporation, which the plant with soil and water surfaces, to feed 69 billion m^3 of the underground water, 158 billion m^3 of passing flow is discharged into lakes and seas and closed basin by streams of various sizes. From 69 billion m^3 to 28 billion m^3 of water that feeds the groundwater is to rejoin the surface water through springs. In addition, there are approximately 7 billion m^3 of the water annually from neighboring countries coming to our country. Thus, our country's gross surface water potential is 193 billion m^3. Considering the 41 billion m^3 of the underground water that feeds the total renewable water potential of the country it is estimated to be 234 billion m^3 gross. Within the framework however, current technical and economic conditions, the streams of surface water potential of the country can be consumed for various purposes and 95 billion m^3, coming to our country from neighboring countries, including 3 billion cubic meters of rivers annually on average a total of 98 billion m^3.

14 billion m^3 aboveground, underground water can be consumed as determined by our country with the potential for groundwater potential and an average total of 112 billion m^3/year, 44 billion m^3 are used. Efficient use and management of water resources, it is important for sustainable development and food safety vaccine.

In Turkey, a total of 112 billion m^3 and 1500 m^3 per capita level is a country suffering from water restrictions with total consumable water potential. On the other hand, 73% of the total usage reaching 44 billion m^3 of this potential is realized in the agricultural sector [4].

One third of water use in Europe are of agricultureAgricultural affects the quantity and quality of water available for other purposes. In some parts of Europe, pesticides and pollution from fertilizers used in agriculture continues to be the main reason for the lack of quality water alone [5,6].

Research Findings

Product quality in agricultural production can affect water quality in parallel. In this sense, the controlled and agricultural water is used for agricultural irrigation water quality parameters should be applied considering. Water supply contemplated for production use in the field will need to be subjected to analysis for agriculture use.

The irrigation water samples taken from water sources are classified according to quality parameters and subjected to laboratory analysis. Irrigation water samples with sodium (Na^+), potassium (K^+), magnesium (Mg^{++}), chloride (Cl^-), calcium (Ca^{++}), sulphate (SO_4=), carbonates (CO_3--), bicarbonate (HCO_3-) are sorted reflected by the element . In addition, water samples and alkalinity acidic condition (pH), electrical conductivity (EC) status with boron (B) is viewed in element. General terms of water during irrigation considering these criteria are set out in the analysis concludes that it is appropriate for agricultural production. Related indication that irrigation water sources and exposed to heavy metal pollution in case of doubt it is necessary to determine the content of heavy metals in the water samples.

Irrigation water is able to be classified according to several criteria. For example, sodium (Na^+), magnesium (Mg^{++}), carbonates (CO_3--) or Bicarbonate (HCO_3-) as a result of the determination of residual sodium content (RSC) value is calculated and irrigation water can be classified depending on the content. Irrigation water is one of the parameters affecting the quality of sodium (Na^+) is caused by the high content of plants and soil damage. In this sense the sodium adsorption ratio (SAR) of irrigation water, the sodium amount water quality as a result of calculation can be classified. In this context, the ratio of sodium found to be more than 50 - 60% of irrigation water is extremely important in terms of agricultural product quality and yield (Table 1) [7].

According to the irrigation water classification system developed in 1935 by Schofield; EC and Na% addition of chlorine (Cl-) and sulphate (SO_4=) concentrations were included in the classification value. Accordingly, small irrigation water from Ec x 10^6 = 250 values than the fall in terms of availability of excellent class. Irrigation waters with more than 3000 content is not considered acceptable for use.

Irrigation Classes	Suitability for use as irrigation water	Persistent Sodium carbonate (me/L)
First Class Water	Good	1.25
Second Class Water	Fair	1.25 - 2.50
Third Class Water	Not Suitable	> 2.50

Table 1: *The use suitability of irrigation water according permanent sodium carbonate [7].*

Sodium ratio (Na%) rises above this value in terms of the 60 that stated at fair value 20 worth of as little use for the intended use in terms of yield and quality of agricultural production can lead to negative results. Chlorine (Cl-) and sulphate (SO_4=) with regard to the content of 12 meq/L is the use of water on the negative consequences of plant. If replacing the irrigation water source of this damage on the protective measures provided to us than minimize (Table 2) [8].

Irrigation Classes	EC x 10^6 , 25°C	% Na	Cl- (meq/L)	SO_4-- (meq/L)
Excellent	< 250	< 20	< 4	< 4
Good	250-750	20-40	4-7	4-7
Permissible	750-2000	40-60	7-12	7-12
Suspicious	2000-3000	60-80	12-20	12-20
Not Suitable	> 3000	> 80	> 20	> 20

Table 2: *The irrigation classes [8].*

For example, according to the boron content in irrigation water on the road it should be done by going to the way the selection of plant species in agricultural production. Irrigation water at 1 ppm walnut planted more sensitive to agricultural production for which the boron content in the presence of boron, Jerusalem artichokes, beans, figs, apricots are recommended for growing plants such as lemon. Up to 4 ppm boron element is resistant to plant alfalfa, bean, pumpkin, cabbage, carrots and crops such as sugar beets are countable. Plant selection should be made according to the situation of the salt content of irrigation water (Table 3) [9].

Sensitive	Resistant	Semi-durable
1.0 ppm	2.0 ppm	4.0 ppm
Walnut	Sunflower	Asparagus
Sweet potato	Potato	Date
Beans	Cotton	Sugar beet
American Elm	Tomato	Mangel
Plum	Pea	Garden Beet
Pear	Radish	Clover
apple	Pea	Gladiolus
Grape	Clover	Broad bean
Fig	Olive	Onion
American Dates	Barley	Turnip
Cherry	Wheat	Pumpkin
Peach	Egypt	Cabbage
Apricot	Oat	Carrot
Blackberry	Pumpkin	
Orange	Pepper	

Avocado	Lima beans	
Grayfurt		
Lemon		

Table 3: *Classification of plants by resistance elemental Boron [9].*

Depending on the salt content of the salt-resistant plants in irrigation water, sugar beet, wheat, rape, barley plants are considered such as salt tolerant plants in at least the strawberries, lettuce, bean plants can be regarded as (Table 4) [10].

High	Good	Middle	Weak
Mangel	Perennial ryegrass	yellow stone clover	foxtail
Sugar beet	Cocksfoot	vetch	aleksandre clover
Rape	Leek	carrot	beans
Wheat	Red cabbage	pea	Strawberry
Barley	cauliflower	radish	red clover
Italian Ryegrass	tomato	pumpkin	lettuce
	celery	potato	
	spinach	tobacco	
	clover		
	onion		

Table 4: *The salt tolerance of some plants [10].*

A high water quality is considered to be desirable in order to get a high quality yield. In this context, making water quality analysis before starting agricultural production and the results to be obtained in this context is to be selected in the light of the kinds of plants.

In changing the state of water resources prepared environment with some preventive measures to minimize the damage it will recognize the opportunity to make more controlled and conscious of agricultural production.

Suggestions and Recommendations

Most water use in some countries when evaluating the use of water is observed in the agricultural sector. Given that provide irrigation water in agriculture with increased efficiency in the use of water of suitable quality is a condition extremely critical.

Yield with the use of poor quality water for irrigation in agriculture will cause serious decreases. Especially vegetable production of the required measures to ensure the maximum efficiency of irrigation water and must be in the parameters. Before using in the production of agricultural irrigation water sources in particular need to be done in the laboratory analysis. The intensive use of agricultural fertilizers and pesticides pollute to irrigation water sources. Controlled use of fertilizer and pesticide depending on this application will minimizes the negative effects on the environment.

Water is not an endless resource. Although emerging global water resources is only more apparent when considering the importance of water it consists of fresh water 2.5%. Fulfillment of environmentally friendly agricultural apps to be used in agricultural production, reduction of pollution of water resources and irrigation water and proper should be extended.

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