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Use of Treatment Water for Irrigation

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Abstract

In this research, the use of waste water produced after treatment for irrigation purposes was investigated. Clean water resources in our world are gradually decreasing and water scarcity is experienced in some countries. For this reason, people turned to domestic water obtained after treatment. In order to meet the water needs of plants, clean water resources are needed. The use of potable water instead of drinking water for this purpose provides a large amount of savings. In this sense, the quality of the water used is very important. Treatment waters must have certain criteria for use in agricultural irrigation. Criteria for wastewater from conventional activated sludge; AKM (suspended solid), BOD (Biological oxygen demand) and total nitrogen value less than 1 mg/L, the COD (chemical oxygen demand) value should be less than 2. Ammonium value should be maximum 0.1 mg/L, total phosphorus value should be 0.5 mg/L (Anonymous, 2019). It is desirable to infect plants with any harmful substances from outside. for this reason, continuous analysis of the water used should be controlled.

Keywords: Environment, wastewater, treatment water, irrigation

Review article

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INTRODUCTION

Water resources are gradually decreasing with increasing population. This has led scientists to use wastewater. Although waste water cannot be used as drinking water, it can be used as irrigation water. Waste water can cause serious problems if not treated. If it is treated, it can be used in many fields. One of them is its use in irrigation. However, in order not to pose any health threat, the content of the wastewater should be at levels that do not affect human health. It should not contain toxic substances. Wastewater reduces the need for fertilizers with the organic substances they contain.

It is stated that the use of wastewater in irrigation has been applied for centuries, efficient use of water resources is required and wastewater is gaining more importance today (Filibeli and Yüksel, 1994).

The recovery and reuse of wastewater after treatment has become an important component of the sustainability of water at both national and international scale and has found wide application area especially in arid countries experiencing water scarcity (Pedrero et al., 2010).

Treated wastewaters are used in irrigation of school gardens, parks, landscaping areas, sports fields, in ornamental gardens, cooling, washing, boiler feeding in industrial sector, watering of golf courses, watering of road sides, fountains, decorative pools and waterfalls. used as; thus, both increasing water needs are met and clean water resources are saved (Özbay and Kavaklı, 2008).

Important Parameters in the Use of Waste Water in Irrigation

Heavy metals

If heavy metals are present in the treated water, it affects human health significantly. In case of irrigation with water containing heavy metal, heavy metals in water pass to plants. If these plants are consumed by human beings, they threaten life. The effect of heavy metal on humans is dangerous by prolonged exposure.

Pathogens

The quality of untreated wastewater causes great harm to human health if pathogens are present. These pathogens; cholera, hepatitis etc. can cause diseases.

Untreated, partial or secondary biologically treated wastewaters contain pathogens that threaten human health, albeit in different species and in different amounts (Luprano et al., 2016).

The presence of pathogens in water varies depending on the degree of treatment. In order to reduce pathogens to levels that do not harm human health, wastewater must be treated and disinfected using appropriate disinfection methods (Luprano et al., 2016). The most common treatment methods are chlorine, ozone, ultraviolet (UV) radiation (Hussain et al., 2002).

Salinity

If the amount of salt in the irrigation water is too high, the plant gets stress due to high salt exposure. It reduces the yield and quality of the plant.

Basic ions that cause salinity in soil are sodium, calcium, magnesium, etc. ions are. Salt accumulation in plant roots and soil is an important problem. The uptake of water by

plant roots takes place by osmotic pressure. Due to the increase of salinity in soil water, the plant gives the cell water to the soil to dilute the soil water due to the osmotic pressure difference between it and the plant cells. This causes the plant to dehydrate and die (Jouyban, 2012).

pH

The H + ions in the irrigation water determine the pH of the water. The pH value is too high or too low affects the plant and soil negatively. Therefore, controls should be made before application.

Bedbabis et al. (2015) in their study; It has been observed that when treated with treated wastewater, it causes short and sudden increases in soil pH, it does not have a negative effect when appropriate doses are used, and if treated wastewater contains a high percentage of bicarbonate, it can be observed that the application of soils through irrigation can increase the soil pH (Bedbabis et al., 2015).

Nutrients

The high amount of nutrients in the water used in irrigation provides savings by minimizing the use of fertilizers in agriculture.

Excess of these nutrients has negative effects such as excessive plant growth, surface and groundwater contamination. Phosphorus is filtered through soil adsorption and precipitation, while nitrogen is oxidized with oxygen and becomes nitrate which can cause serious problems in groundwater (Pedrero et al., 2010).

Suspended solids

Due to the organic substances in the suspended solids, microbial activities are accelerated in the first layers of the soil and accordingly biomass increases. Both the increase in biomass and the accumulation of the non-degradable inorganic part in the Suspended Solids on the surface of the soil decreases the filtration of the soil in time and even causes clogging of the soil and irrigation pipes (Van Oort et al., 2017).

Evaluation of Waste Water for Irrigation

Water resources are gradually decreasing. With the increase in population, more clean water resources are needed. Alternative methods are used to ensure that water resources remain at levels sufficient to meet the needs of future generations. One of them is irrigation with waste water. Although the irrigation process with wastewater is initially considered with prejudice, it is an increasingly common practice.

Organic substances and chemicals may be present in the water. Removal of these substances is very important for plant, soil and human health.

- **Irrigation with urban wastewater**

Urban wastewater collected by sewer systems includes various inorganic materials, both domestic and industrial. They may contain toxic substances such as arsenic, cadmium, chromium, 64 copper, lead, mercury, zinc, especially if industrial wastewater is introduced into the sewage system. Even if the concentration of toxic chemicals does not affect human health, they may have toxic effects on plants. In terms of human health, the most important pollutants to be considered in the use of wastewater in agricultural irrigation are pathogenic microorganisms (Pescod, 1992).

- **Irrigation with industrial wastewater**

It is not used as a first choice because it contains a lot of heavy metals in industrial wastewater. In China, domestic and industrial wastewater from biological domestic wastewater treatment plant is used for agricultural irrigation. In order to determine the effect of these waters and irrigation on the amount of persistent organic pollutants in the soil, PAH (Poly Aromatic Hydrocarbons) analyzes were performed on samples taken from soils irrigated with clean waters and treated wastewaters. Analysis results showed that irrigation with treated wastewater increased PAH accumulation in soil and PAH values in soil exceeded the limit values given for soil quality standards (Chen et al., 2005).

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