



Evaluation of quantitative and qualitative characteristics of *Lolium perenne* in response to wastewater application

Seyed Mohammad Hasan Mahdavi, Bahram Amiri and Mansour Esfandiari Bayat

Department of Agriculture, Firoozabad Branch, Islamic Azad University, Firoozabad, Iran.

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ABSTRACT

This study was carried out to investigate the effects of using treated wastewater on quantitative and qualitative characteristics of *Lolium perenne* in greenhouse conditions in Sa'dabad of the Dashtestan, Iran. Experiment was performed in a randomized complete block design with 5 treatments and 4 replicates. Treatments included: fresh water, fresh water + 25% treated wastewater, fresh water + 50% treated wastewater, fresh water + 75% treated wastewater, and 100% treated wastewater. Based on the results, it can be concluded that the impact of wastewater had significant effect on growth and physiological characteristics. Root weight (6.7 g), leaf weight (3.6 g), leaf area (8.4 cm²), root length (33 cm) and plant height (11.3 cm) showed a significant increase in compared to the control. In relation to the characteristics of protein, phosphorus and ash, the same trend was observed.

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Introduction

In Europe, 51% of the agricultural land area is devoted to permanent grassland with the dominant species being *Lolium perenne* L. Owing to its high yields, palatability and digestibility in comparison to other forage species; perennial ryegrass is particularly suitable as a forage grass (Wilkins and Humphreys, 2003). Using sewage irrigation for many countries specially those who are located in warm and dry regions has been prevailed. Around 80% of Iran's land is located in dry region and economizing in water resources by reusing of sewage can be useful for overcoming the water limitation problem. Evaluation of increasing urban sewage according to the annually growth population can be considered as an important issue for optimum use of wastewater. Excessive use of waste water will be resulted in heavy metal accumulation in soil (Arora et al, 2008). It was reported that application of wastewater irrigation increased soil nutrient elements and thus improved soil fertility and convenient access to high concentration of nutrients which resulted in increment of growth and biomass of plants (Gardiner et al., 1995; Soumliamez and Bozkurt., 2006; Yang et al., 2010 and Keller et al., 2002). Wastewater application as plant irrigation should be done based on proper management and consistent control (Bozkur and Yarılgı, 2003). The aim of this was evaluation of quantitative and qualitative characteristics of *Lolium perenne* in response to wastewater application.

Material and Methods

Experiment was performed in a randomized complete block design with 5 treatments and 4 replicates. Treatments included: fresh water, fresh water + 25% treated wastewater, fresh water + 50% treated wastewater, fresh water + 75% treated wastewater, and 100% treated wastewater.

Result and dissociation

Based on the analysis of variance, it was founded that the treatments had significant effects at 5 or 1 percent. Mean comparisons between treatments showed that, T₂ had highest means of root weight. The treatments T₁, T₃ and T₄ showed,

an increase of 10, 16 and 33 % in compared to control, respectively. T₂ had highest means of leaf fresh weight and the treatments T₁, T₂, T₃ and T₄ showed, an increase of 13, 24, 20 and 20% in compared to control, respectively. T₄ had highest means of leaf area, the treatments T₁, T₂, T₃ and T₄ showed, an increase of 18, 25, 30 and 30% in compared to control, respectively. T₃ had highest means of root length, the treatments T₁, T₂, T₃ and T₄ showed, an increase of 33, 47, 57 and 42% in compared to control, respectively. Due to its high organic matter content, sewage can improve physical, chemical, and biological properties of soil (Stamatiadis et al. 1999; Aggelides and Londra, 2000; Benitez et al. 2001; Selivanovskaya et al. 2001; McBride, 2003; Sanchéz-Monedero et al. 2004; Gonzáles-Pérez Martha et al. 2006; Zhang et al. 2007; Alcantara et al. 2009; Angin and Yağanoğlu, 2009). Thus, sewage application helps to reduce soil erosion and improves the soil quality as a plant growth medium. T₃ had highest means of plant height and the treatments T₁, T₂ and T₄ showed, a decrease of 20, 33, 28% in compared to control, respectively. It seems that mineral and microelements of sewage has been accumulated largely in roots and because of that a big deal of assimilate has been allocated to vegetative components and finally resulted in improvement of yield and yield components. So sewage irrigation has provided needed minerals for bean and in this way grain weight and pod weight has been increased. T₃ had highest means of protein and the treatments T₁, T₂, T₃ and T₄ showed, an increase of 36, 56, 40 and 32% in compared to control, respectively. Sewage can substitute for commercial fertilizers and organic matter if applied in the right amounts to soil. By using Sewage, it is a possibility for farmers to supply their lands with organic fertilizer at low costs. Therefore, recycling of Sewage for agricultural purpose seems to be an appealing solution for sustainable management of Sewage. T₂ and T₃ had highest means of ash and the treatment T₄ showed, an increase of 10% in compared to control, respectively. T₃ had highest means of P and the treatments T₁, T₂, T₃ and T₄

showed, an increase of 20, 10, 40 and 30% in compared to control, respectively. It has been indicated in various researches that the municipal sewage sludge applied in increasing amounts increase the plant growth and nitrogen content of various plants which have been subjected to testing (Menelik et al. 1991; El-Dawwey 1993; Mohammad and Battikhi 1997; Arcak et al. 2000; Şensoy et al. 2000; Bozkurt et al. 2001). T₁ had highest means of K and the treatments T1, T2, T3 and T4 showed, a decrease of 9, 6, 35 and 32% in compared to control, respectively. Based on the results, it can be concluded that the impact of wastewater had significant effect on growth and physiological characteristics. . Root weight (6.7 g), leaf weight (3.6 g), leaf area (8.4 cm²), root length (33 cm) and plant height (11.3 cm) showed a significant increase in compared to the control. In relation to the characteristics of protein, phosphorus and ash, the same trend was observed.

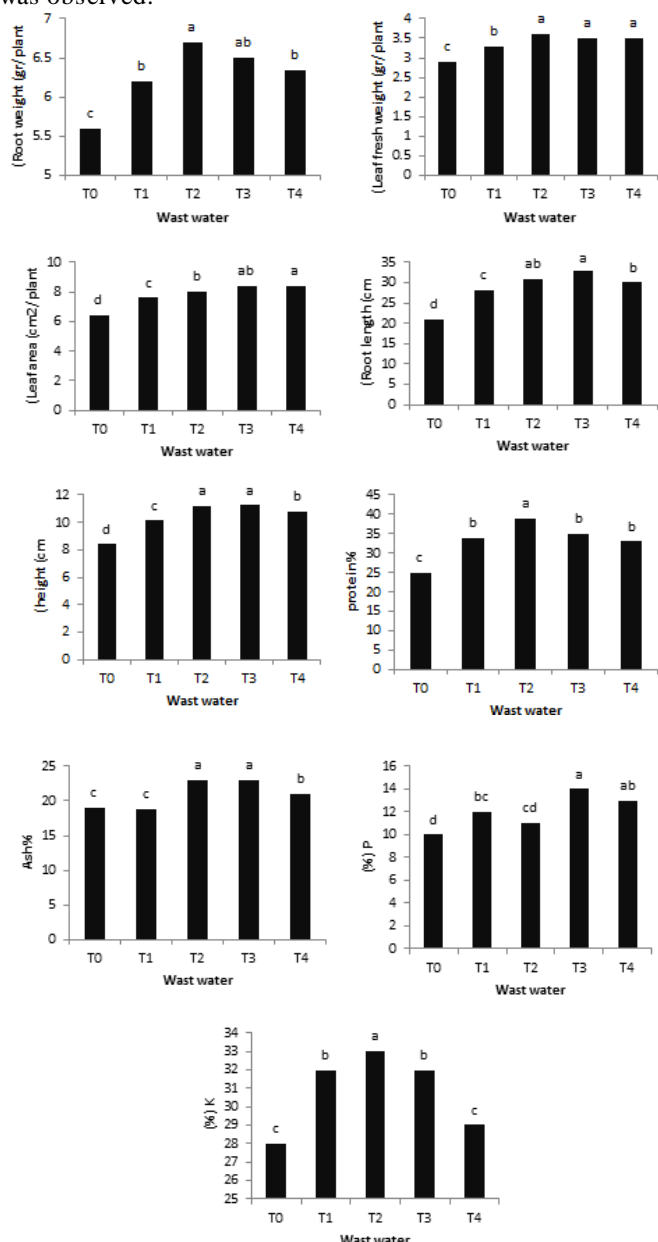


Fig. Effect of waste water on studied traits.

Resources

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