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Evaluation of wastewater effects on quantitative and qualitative characteristics of Festuca

Adel Gheysar Alizadeh, Bahram Amiri and Mansour Esfandiari Bayat

[1]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 festuca 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 (5.7 g), leaf weight (2.3 g), leaf area (7/54), root length (29 cm) and plant height (9.9 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.

Introduction

Festuca is one of important plants in many countries, including America, Canada, Australia, New Zealand etc, it has important role in livestock facilities. 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; Soumlnmez 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 Yarilga, 2003).

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, T1 had highest means of root weight. The treatments T1, T2, T3 and T4 showed, an increase of 31, 29, 20 and 21% in compared to control, respectively.

T_2 had highest means of leaf fresh weight and the treatments T1, T2, T3 and T4 showed, an increase of 5, 21, 15 and 15% in compared to control, respectively.

T_2had highest means of leaf area. The treatments T1, T2, T3 and T4 showed, an increase of 10, 17, 6 and 7% in compared to control, respectively. T_2had highest means of root length. The treatments T1, T2, T3 and T4 showed, an increase of 14, 38, 23 and 9% 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; Angın and Yağanoğlu, 2009). Thus, sewage application helps to reduce soil erosion and improves the soil quality as a plant growth medium. T_1had highest means of plant height and the treatments T2, T3 and T4 showed, a decrease of 12, 8, 13 and 9% 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. T_2had highest means of protein and the treatments T1, T2, T3 and T4 showed, an increase of 18, 27, 10 and 18% in compared to control, respectively.

Sewage can substitute for commercial fertilizers and organic matter if applied in the right amounts to soil.

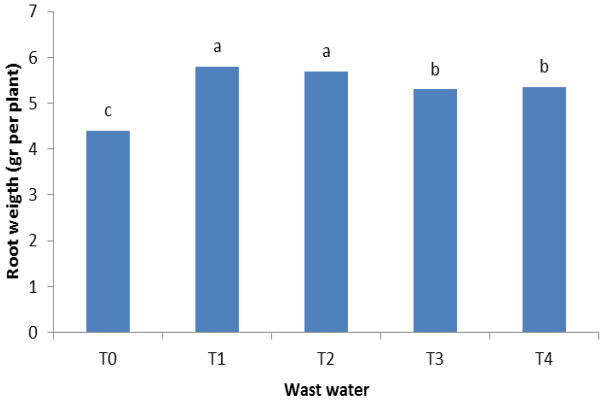
Tele:

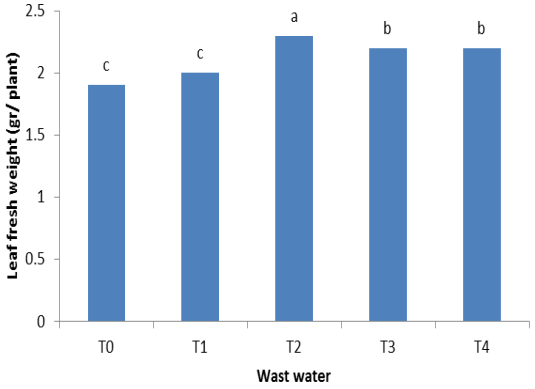
E-mail address: zbreeder@gmail.com

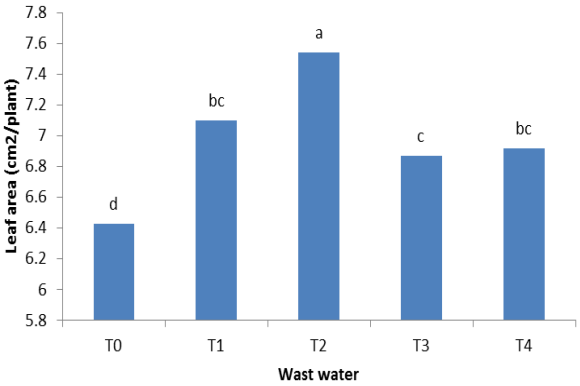
By using Sewage, it is a possibility for farmers to supply their lands with organic fertilizer at low costs. Therefore, recycling of Sewage for agricultural purpose seems to be an appealing solution for sustainable management of Sewage. T_4had highest means of ash and the treatments T1, T2, T3 and T4 showed, an increase of 10, 13, 38 and 40% in compared to control, respectively.

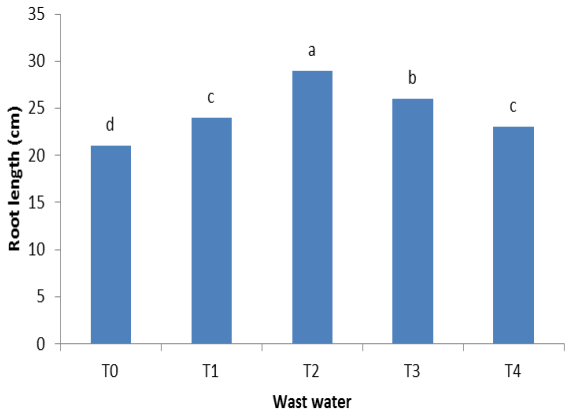
T_3 had highest means of P and the treatments T1, T2, T3 and T4 showed, an increase of 16, 8, 25 and 8% in compared to control, respectively. It has been indicated in various researches that the municipal sewage sludge applied in increasing amounts increase the plant growth and nitrogen content of various 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). T_1 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

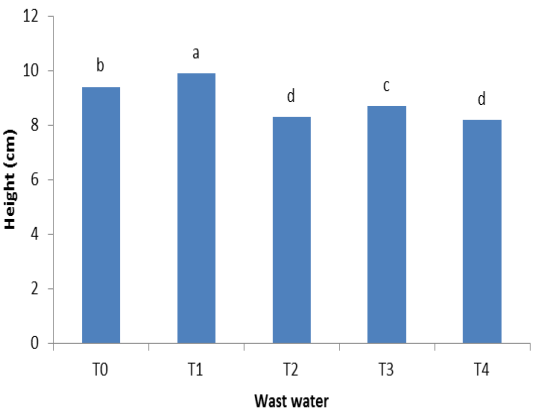
Based on the results, it can be concluded that the impact of wastewater had significant effect on growth and physiological characteristics. Root weight (5.7 g), leaf weight (2.3 g), leaf area (7/54), root length (29 cm) and plant height (9.9 cm) showed a significant increase in compared to the control. In relation to the characteristics of protein, phosphorus and ash, the same trend was observed.

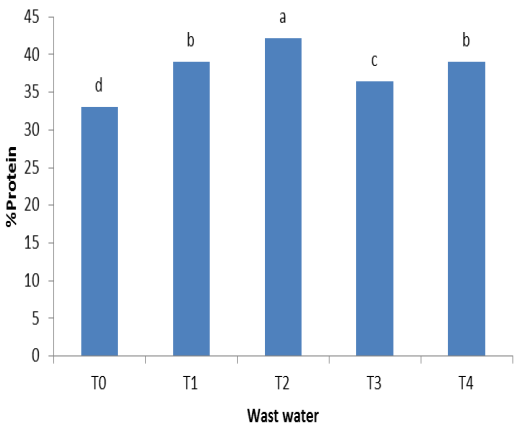












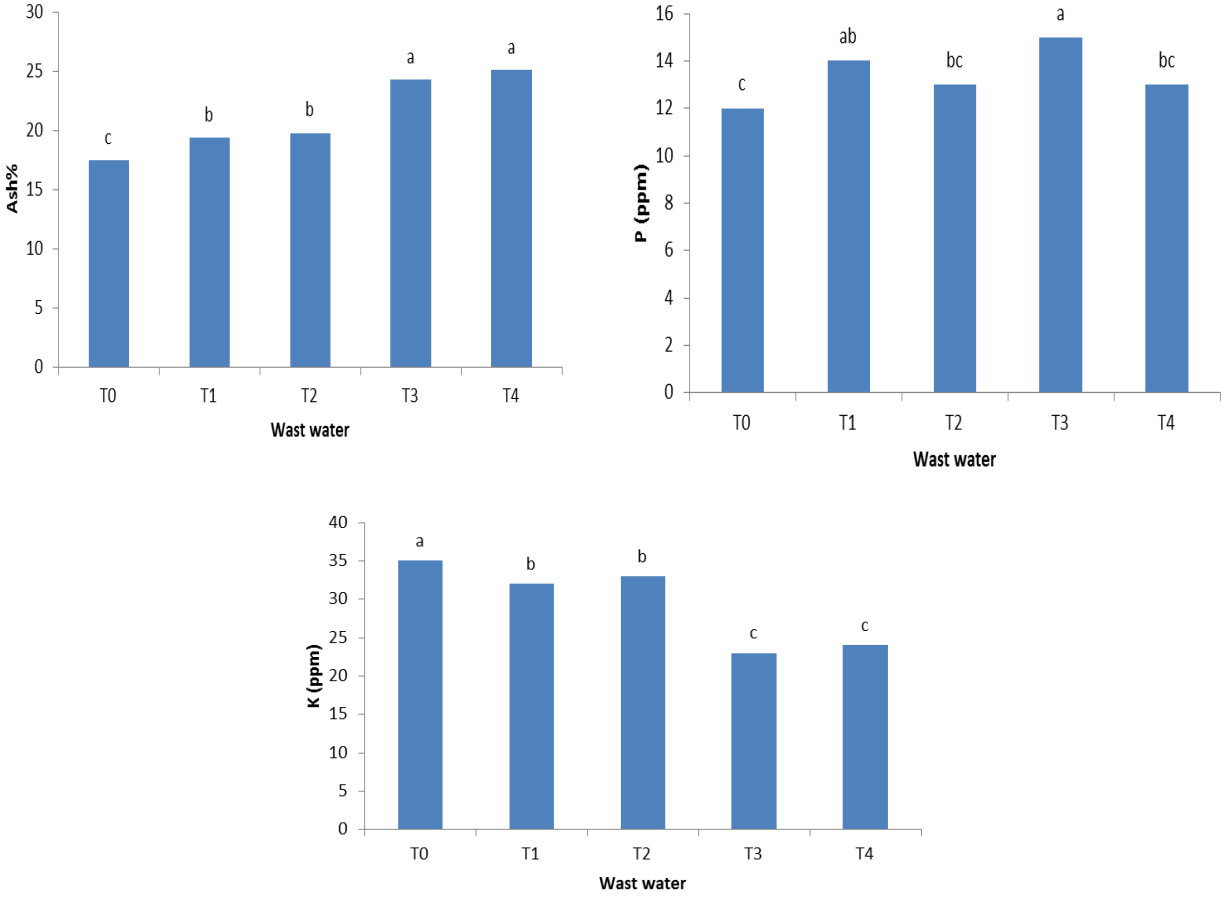


Fig. effect of waste water on studied traits

Resources

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