

EFFECT OF SEWAGE WATER, PHOSPHORUS AND POTASSIUM FERTILIZATION ON ALFALFA YIELD

Modaihsh, A.S.; N.F. Al-Qahtany; A.A. Taha and M.O. Mahjoub
Soil Sci. Dept., College of Agric., King Saud University, Saudi Arabia

ABSTRACT

A field experiment was established at the College of Agriculture Experimental and Research Farm at Dirab, south Riyadh, during 1995-1996 season to study the effect of sewage water irrigation, P and K fertilization on yield of alfalfa (*Medicago sativa* L; var. CUF101) and availability of P and K in the soil. Two different soils in textures were used in this study namely; loamy and sandy soils.

The results showed that application of sewage water resulted in a significant increase in alfalfa dry weight under the various levels of P and K. Irrigation with sewage water gave significantly higher yield of alfalfa than that of well water, regardless of P and K treatments in both soils.

Application of 50, 150, and 250 kg P ha⁻¹ gave significantly higher yield of alfalfa grown under well water irrigation. The percent increment in alfalfa dry weight were 16.0, 29.5 and 35.0% in loamy soil and 18.1, 24.3 and 37.3% in the sandy soil. In contrast, the rate of increase due to P application was less pronounced under sewage water irrigation. Application of K either at a lower rate (50 kg K ha⁻¹) or at a higher rate (100 kg K ha⁻¹) resulted only in a minor increase in alfalfa yield.

The results indicated that the effect of sewage water irrigation was conspicuous on available P content of the soil and resulted in a higher P plant content even if no P fertilizer was applied. Data for available K in the soil indicated a significant decrease in K level regardless of K addition.

Keywords: Sewage water, well water, P and K fertilization, soil texture, alfalfa

INTRODUCTION

Soils of Saudi Arabia are mostly coarse textured, and characterized by high pH values, high amounts of CaCO₃ and low organic matter concentration (Bashour *et al.*, 1983). This could result in inadequate nutrient supply and could affect the availability of various nutrients especially P and K.

Alfalfa is extensively cultivated in Saudi Arabia and it accounts for about 30% of the total crop production of the Kingdom (El-Hag *et al.*, 1989). Due to the high requirement of alfalfa to P and K, it is expected that continuous production of alfalfa could result in a significant decline in the soil P and K. (Doran *et al.*, 1963 and Nuttall *et al.*, 1980). Recent fertilizers trials have provided general information regarding the response of alfalfa to P fertilization (Tag El-Din and Assaeed, 1995). While the effects of P fertilization have been studied fairly extensively in various parts of the world, K fertilization of alfalfa did not receive similar efforts. This may be due to the wide spread notion that soil is generally have adequate supply of this element. In a study on some soils of Saudi Arabia, Al-Mashhady and Omar (1979) found that there was no response to potassium fertilization although the potassium level in these soils is very low.

Another problem facing agricultural production in the Kingdom is the scarcity of water as a result of aridity, which characterize the whole region. It