

FORMS OF POTASSIUM IN SIX RAINFED SOILS OF POTOHAR

B. Z. Shaikh, Rahmatullah, M. Sharif Zia, M. Salim and B.H. Niazi¹

ABSTRACT

Fifty three composite samples each collected at 0-15, 16-30 and 31-45 cm depth for Balkasar, Guliana, Kahuta, Qutbal, Qazian and Rajar series were analysed for soluble, exchangeable, nonexchangeable and total K. The samples were also characterized for pH, EC, CaCO_3 , organic matter and soil texture. All the sampled soils were non-saline alkaline in reaction and invariably contained < 1 per cent organic matter. Soil texture varied from medium to coarse. On an average total K in the six Potohar soils was 1.43 per cent. Soluble K ranged from 7.67 to 9.22 mg kg^{-1} . Ammonium acetate extractable K in the three surface samples (6 per cent) was either marginal or < 60 mg K kg^{-1} soil. It ranged from 7.73 to 268.92 mg K kg^{-1} soil with an average value of 121.45 mg K kg^{-1} . Nonexchangeable K extracted with boiling HNO_3 ranged from 59.27 to 453.73 mg K kg^{-1} soil. Average content of 159.23 mg K kg^{-1} soil of nonexchangeable K was about 1 per cent of total soil K. Significance of various forms of K in soils has also been discussed for plant nutrition.

INTRODUCTION

Potassium exists in soils in soluble, exchangeable, interlayer and mineral forms. For their growth plants absorb K from soil solution which is then replenished by other forms of K in soils (Sparks, 1987). Previously K released from interlayer and mineral phases over a growing season was considered small

important rainfed soils of Potohar region in Pakistan.

MATERIALS AND METHODS

Fifty three composite samples each collected at 0-15, 16-30 and 31-45 cm depth for Balkasar (Udic Haplustalf), Guliana (Udic Haplustalf), Kahuta (Typic Ustochrept), Qutbal (Typic Ustorthert), Qazian (Lithic Torripsamment) and Rajar (Typic Ustorthert) series from Potohar region (Rafiq and Khan, 1974 and Ahmad, 1986) were air dried, ground and passed through a 2 mm sieve. Range and mean values for some physical and chemical characteristics estimated in the samples according to standard procedures reported in USDA handbook NO.60 (Richards, 1954) are given in Table 1.

The samples were digested with HNO_3 , HF, HClO_4 and H_2SO_4 in Teflon beakers for total K (Follett and Lindsay, 1970). Soluble K was estimated in 1:1 soil:water extract. Exchangeable K was extracted with neutral NH_4OAc . Nonexchangeable K was extracted by boiling 10g portions of each soil sample with 100 ml 1 M HNO_3 (Pratt, 1965). Potassium in all the extracts was estimated by Perkin Elmer atomic absorption spectrophotometer model 4000.

RESULTS AND DISCUSSION