

INFLUENCE OF FERTILIZATION AND LIMING ON CHANGES OF AGROCHEMICAL CHARACTERISTICS OF SOIL TYPE PSEUDOGLEY

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Abstract

The influence of long-term application (over 15 years) of different system of fertilization and liming (applied every 5 years) on the state of agrochemical characteristics of soil type pseudogley were investigated. The trial included an untreated control and three ameliorative fertilization treatments: NP₁K (120 kg N ha⁻¹, 80 kg P₂O₅ ha⁻¹, 53 kg K₂O ha⁻¹), NP₂K (120 kg N ha⁻¹, 160 kg P₂O₅ ha⁻¹, 53 kg K₂O ha⁻¹), NP₁K + CaCO₃ (120 kg N ha⁻¹, 80 kg P₂O₅ ha⁻¹, 53 kg K₂O ha⁻¹ + 5 t ha⁻¹ CaCO₃), NP₁K + CaCO₃ + manure (120 kg N ha⁻¹, 80 kg P₂O₅ ha⁻¹, 53 kg K₂O ha⁻¹ + 5 t ha⁻¹ CaCO₃ + 20 t manure ha⁻¹). This investigation carried out at the experimental field of Secondary Agricultural-chemical school “Dr Djordje Radic” in Kraljevo. The results of investigation showed a significant effect of long-term application of fertilizers and liming materials to changes in pH, content of N, P₂O₅, K₂O, Fe, Mn, Zn, Al, and partially indicated the composition of adsorption complex of soil and content of humus in soil. The long term application of NP₁K fertilizer every year in combination with periodical application NP₁K + CaCO₃ + manure every five year showed the highest efficient influence on changing the characteristics of pseudogley type of soil. Thus, combined application of NP₁K + CaCO₃ + manure reduced soil acidity (pH_(KCl) for 1.8 units), the content of mobile Al (from 13 mg 100 g⁻¹ to 0.4 mg 100 g⁻¹), and the content of Fe and Mn in several dozen mg kg⁻¹, and increased content of P₂O₅ by about 4.2 mg 100 g⁻¹ and K₂O content by about 2.1 mg 100 g⁻¹.

Key words: agrochemical properties, fertilization, liming, soil, pseudogley.

Introduction

Soil acidity is a major yield-limiting factor for crop production worldwide. The land area affected by acidity is estimated at 4 billion hectare, representing approximately 30 % of the total ice-free land area of the world (Sumner and Noble, 2003). The Republic of Serbia also comprises substantial areas of acid soils, accounting for over 60% of total arable land (Stevanovic et al. 1995). According to Fageria and Baligar (2008), soil acidity produces complex interactions of plant growth-limiting factors involving physical, chemical, and biological properties of soil. The pH can affect the soil environment in many ways through influences on sorption potential, cation availability and microbial degradation rates (Sanderman et al., 2008). Calcium, magnesium, and phosphorus deficiencies or unavailability, and aluminium toxicity are considered major chemical constraints that limit plant growth on acid soils.

Liming is the most common and effective practice for reducing soil acidity related problems (Fageria and Baligar, 2001). Liming of acid mineral soils with agricultural limestone or other liming materials is required to reduce levels of toxicity, increase soil pH and increase

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