

Effect of nitrogen rate on the productivity of grassland types *Agrostietum vulgaris*

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Abstract

Permanent grasslands in type of *Agrostietum vulgaris* represent an important resource of the forage production in the highland areas of Serbia. The paper analyzes influence of NPK fertilizers use which had different levels of nitrogen (without fertilization – A₀; N60;P40;K40 – A₁; N100;P40,K40 – A₂; N140;P40;K40 – A₃) on the forage yield and botanical composition of natural grassland in type of *Agrostietum vulgaris* on the slopes of mountain Kopaonik. The experiment was set up in the period 2011-2012. Depending on the nitrogen rate, the use of fertilizers influenced on significant increase of forage and hay yield, with regard to the treatment without fertilization. Fertilization also resulted in changes in the ratio of plant species in forage: along with the increase of nitrogen amount, the share of grasses increased, that of legumes decreased, while the share of the other plants decreased significantly already at the lowest nitrogen rate.

Key words: grasslands, fertilization, forage yield, botanical composition

Introduction

Permanent grasslands are the most prevalent meadow-pasture communities in highland area of Serbia (Lazarević et al., 2009). In spite of large areas of meadows (around 600.000 ha) and pastures (over 800.000 ha), the production of forage is relatively low. Lack of use of agronomy practices is the reason for low and unstable yield and poor forage quality (Dubljević, 2007). In the period of 2001-2005, average hay yields on meadows ranged from 1.5 to 2.0 t ha⁻¹ and on pastures from 0.4 to 0.6 t ha⁻¹ (SGS, 2006). According to Đukić et al. (2008), forage yield and quality depend largely on the botanical composition, environmental conditions, soil fertility, amount and distribution of the rainfall, temperature conditions and light. With proper fertilization meadows and pastures with mineral and organic fertilizers and rational utilization, in the same conditions, it is possible to achieve an increase of the hay yield several times (up to 20 t ha⁻¹), while improving the quality of forage (Stevanović et al., 2004; Nešić et al., 2004; Vučković et al., 2004). One of the most important nutrients for achieving high yields of natural grasslands is nitrogen. Vitousek and Howarth (1991), Frink et al. (1999), LeBauer and Treseder (2008) suggest that nitrogen is usually the limiting factor for high production of natural grasslands. The aim of the study was to analyze the effect of NPK fertilizers with different nitrogen rate on its production characteristics (forage and hay yield), share of grasses, legumes and the other species in green forage, on natural meadow in type of *Agrostietum vulgaris*. Considering that natural grasslands largely used for grazing, in the paper presents the results of the effect of different amounts and distribution of rainfall per year on these parameters.

Materials and methods

The experiment was set up in 2011-2012 on the natural meadow in type of *Agrostietum vulgaris* in the village Rakovac on the slopes of mountain Kopaonik (43°23'35,89"N; 20°48'29,24"E, 970m asl). Soil belongs to the type of mold on dolomite (calcomelanosol) (pH_{H2O} 6.5), poor in readily available phosphorus, rich in potassium and medium rich in

