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CURRENT CONDITIONS AND FUTURE PERSPECTIVES OF GRASSLANDS IN SERBIA

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Key words: *natural grasslands, pastures, LDN principles, degradation, climate change*

Grasslands are among the most widespread vegetation types on the earth, providing many ecosystem services. Land Degradation Neutrality (LDN) concept under UN Convention to Combat Desertification represents opportunity for their restoring and preservation.

Serbian grasslands are occurring on different habitats from lowlands with deep fertile soils to mountainous terrains with shallow less fertile soils. Grasslands in northern Serbia are occurring on low and flat terrain with temperate climate. They are formed on Solonetz, Solonchaks, Gleysols and Arenosols. Grasslands of Central Serbia and Kosovo and Metohija are formed on hilly–mountainous terrains, under temperate or mountainous climate, more humid and less warm. They are mainly developed on Leptosols. There are 273 meadow and pasture communities in Serbia, especially present in areas not used for intensive agriculture and on natural grasslands in uplands. The most diverse vegetation classes are *Festuco-Brometea* with 1194 plant species – 41.8% of Serbian flora, and *Molinio-Arrhenateretea* with 895 species. Production of meadows in Serbia is 2.3 tha^{-1} of dry matter, and pastures about 2 tha^{-1}. These ecosystems potentials are weakly utilized.

Natural grasslands and pastures occupy 5.96% of the country territory. According to European Space Agency, changes in land cover from 2000–2015 indicate decrease in total grassland area of 1765 km^2 (30.03%), emphasizing dominant conversion of grasslands to forests. Ongoing depopulation trend, rural to urban migrations, and decrease in livestock population are some of main factors impacting grasslands. This trend favors further naturalization of pastures striving to increase the areas under natural grasslands. Such conversion will contribute to overall change in biodiversity richness, especially in areas with saline soils and high mountain regions with increased level of endemic species.

Climate changes will affect grasslands in future by changing species composition, phenology and yields. Increased CO_2 concentration, changes in temperatures, precipitation distribution and extreme events will have region-specific variations and disparate impacts on grasslands. It is expected that mean annual temperatures in Serbia will rise up to 1°C until 2050, while mean annual precipitation will decrease slowly, with increased dry periods during summer. This will affect the phenology and composition of grasslands, as populations of hygrophilic species could decrease in such conditions. Lower amount of soil available moisture could force growth of xerophillic species and increase of their populations. Nevertheless, the e rise of temperatures and decrease in precipitation will slowly cause the

loss of soil organic carbon, which might further deteriorate soil structure and overall soil quality and fertility.

Grasslands play important role in overall sustainability, but their importance it is not properly addressed. Environmental experts should recognize drivers of grasslands degradation and propose appropriate conservation and restoration measures. The priority should be avoidance of grassland degradation that requires good assessment of their current conditions and monitoring of plant, soil, climate conditions and land use activities. Further measures are deduced to sustainable land management practices and smooth human interventions, whereas the aftermost adopted measures should be related to restoration. Grasslands should have more emphasized role in our society and LDN principles should be applied for their preservation.

POTENTIAL OF RANGELAND SPECIES *FESTUCA VALESIACA* FOR PHYTOREMEDIATION OF CONTAMINATED SITES: CASE STUDY OF COPPER MINE BOR, SERBIA

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Key words: *grass, phytoremediation, metal, accumulation, mine waste*

Metalliferous mine wastes are notable sources of contamination remaining after ore exploitation process. Bor mine is one of the largest copper mine basins in Europe where long-term mining caused severe degradation and environmental pollution, making it one of the remediation priorities in the country. Mine wastes, formed by non-selective overburden deposition, generated surface Technosols of variable physico-chemical conditions. Moreover, they are characterized by increased concentration of potentially toxic elements, such as As, Cu, Pb, and Zn.

Festuca valesiaca Schleich. ex Gaudin, species characteristic for rangelands of Eurasia, was found colonizing dry sandy patches of Bor mine waste Technosols. Parent material was fresh andesite and conglomerates rocks of volcanic origin. This research aims at revealing the potential of *F. valesiaca* for phytoremediation of such multi-contaminated sites.

Composite rizosphere soil and plant material were collected and analyzed from several selected sites. Soil pH was measured in 1 to 2.5 ratio of soil and distilled water using pH-meter. Organic carbon content was determined by the method of Tjurin, while total nitrogen content was obtained by Kjeldahl digestion process. Pseudo-total and bioavailable concentration of As, Cu, Pb, and Zn were determined in soil samples by using aqua-regia and EDTA-extraction, respectively. Underground and aboveground parts of *F.valesiaca* were digested with HNO_3 and H_2O_2. Concentration of elements in soil and plant material was analyzed using ICP-OES (Thermo Scientific, 6500 Duo). Bioconcentration (BCF),