

Manuscript Number: 2872 NAAS Rating: 4.96

## Changes in Physical Properties and Content of Total Organic Carbon in Postagrogenic Soils

Anatoly Trushkov, Mary Odabashyan, Kamil Kazeev and Sergey Kolesnikov

Southern Federal University, Academy of Biology and Biotechnology named after D.I. Ivanovsky Rostov-on-Don, Stachki Ave. 194/1, Russia, 344090 E-mail: trushkov tolik@mail.ru

**Abstract:** A field trial was carried out concerning the transfer of arable land of the botanic garden of the Southern Federal University (Rostovon-Don, Russia) into the category of fallow lands with comparative study of soil quality using biological diagnostics method. During the first year of fallow period, the fast growing high grasses such as *Ambrosia artemisiifolia, Artemisia vulgaris, Cyclachaena xanthiifolia, Chenopodium album* were dominant. Total phytomass in the fallow land was 0.76 kg m<sup>-2</sup>. It was found that physical properties of postagrogenic soils changed due to the emergence and development of grassland vegetation in the first years of fallow period. During the first year, density, temperature and moisture of arable layer changed. In the second year of fallow period, a reliable change in hardness was recorded. In the third year of fallow period, trophic activity of soil mesofauna increased by 17 per cent and CO<sub>2</sub> emissions increased by 18 per cent as compared with arable area. It is noted that there is a straight-line correlation between trophic activity and CO<sub>2</sub> emissions and the time of the study, i.e. biological parameters slowdown in times of drought. In the very first year of fallow period, a reliable difference was determined between total organic carbon in postagrogenic and arable land. During three years of the study, the content of total organic carbon in fallow land did not change significantly. The behavior of increase in the content of active carbon was studied in the third year of fallow period. In the period of active vegetation, the level of this indicator in the areas under study was 4.5–5 times higher than in times of drought. In the arable layer of young fallow land, the content of active carbon was 2.5 times higher than in arable land; however, it was 1.5 times lower as compared with 72-year-old fallow land. Thus, physical and biological properties of postagrogenic chernozems tend to positive change due to the discontinuation of regular cultivation of soil and plants gr

Keywords: Organic carbon, Active carbon, Soil quality, Successions, Soil density, Fallow soils, Biological activity