A new approach for determination of humic substances antioxidant capacity

Stepanova EV[1]*, Suprenok VV[1], Landesman EO[1], Koroleva OV[1], Kulikova NA[2]

[1]A.N. Bakh Institute of Biochemistry of RAS, Russia
[2]Department of Soil Science, Lomonosov Moscow State University, Russia
***evst@inbi.ras.ru**

Keywords: humic substances, antioxidant activity, ABTS radical cation

Mitigating effect of humic substances (HS), which can be defined as a phenomenon of the lowering negative influence on contaminants toxicity and abiotic stress factors such as unfavorable temperature, pH, salinity etc., have been numerously reported. Antioxidant activity of HS is supposed to be one of the main factors determining their mitigating activity. HS can reduce free radicals resulting from stress such as drought, heat, ultraviolet light and herbicide use. Free radicals are damaging because they are strong oxidizing agents, which damage lipids, proteins and DNA within plants cells. In spite of great work has been done recently to evaluate antioxidant activity of HS the data obtained can be considered as contradictory. The main reason is the complicity of HS structure what complicates significantly usage of common methods for determination antioxidant activity. This study was aimed to develop a new approach for determination of HS antioxidant capacity based on colorimetric assay of radical scavenging with potassium pesulfate generated ABTS radical cation. The optimized conditions of determination of antioxidant capacity included buffer pH, HS concentration, and time of registration. A set of HS including three samples of coal-derived humic acids (HA) and a sample of humic-like substances (HLS) produced by Basidiomycetes *Coriolus hirsutus* 075 and *Cerrena maxima* 0275 has been studied. It was shown that antioxidant capacity of the coal HA studied varied in the range 5.0-10.7 μM of Trolox equivalents per mg, while that value observed for HLS was higher and varied from 10.5 to 12.7 μM of Trolox equivalents per mg. This research was supported by the International Science and Technology Center (#KR-993.2).