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Soil Mapping with Magnetic Methods at the Agriculture Lands of Pechenigy, Ukraine

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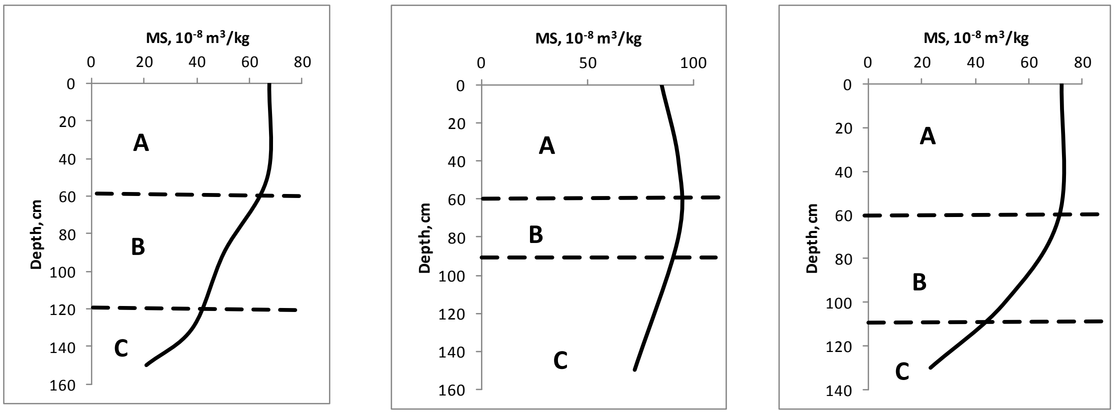
A b s t r a c t

Magnetic method is suitable instrument in assessment environmental problems. Recently we've received promising results in the studying of hydrocarbon areas (Menshov *et al.* 2016) and polluted territories in Ukraine (Menshov 2017). The correct planning of agriculture areas is fundamental for a sustainable future in Ukraine. The agricultural activities need to be monitored in order to observe if they respect the sustainability principles. Magnetic methods demonstrate potential in soil mapping at the productive agriculture lands for the soil fertility controlling. Jaksik *et al.* (2016) estimated topsoil organic carbon in water eroded soil with measuring of magnetic susceptibility in chernozems in South Moravia (Czech Republic). In present study we focused on magnetic properties of the soils from different catena position from the agriculture land in Ukraine. Soil samples were collected from the genetic horizons at the area of farm enterprise (2 hectares) during a soil survey. The study area is located near the Pechenigi, Kharkiv region, Ukraine and now is used for the perennial plantations – garden. The dominant soils are chernozems (Luvic Phaeozems Albic in WRB classification). The geomorphologic position of the area is a weakly prevailing drainage basin. The soil cut section 1 is performed on the right wing, section 2 at the bottom of the valley, and section 3 on the left wing. The first section corresponds to the conditions of the flat watershed and further means as an etalon chernozem. We registered the sharp change in soil type at the lower part where the section 2 was organized. The hydromorphic processes predominant at this point. The temporary overmoistening, deeper humus layer, the presence of gleying were registered. The third section is located at the steeper slope with the thinner humus horizon, high content of carbonates, and finally short soil profile. Previously, the magnetic studies of chernozems were conducted by Górka-Kostrubiec *et al.* (2016). The authors carried out a detailed magnetic study of four types of Chernozem profiles developed on the loess in the Homutovsky Steppe (Ukraine), Middle Poland, and Moravia (Slovakia). Also Jeleńska *et al*. (2018) presented the results of studies of different soil types from Ukraine and Slovakia. In our case a number of magnetic and mineralogical studies were performed with attracting mass-specific magnetic susceptibility measurements



a b c

Fig. 1. Magnetic susceptibility distribution in soil horizons of sections 1, 2, and 3 (a, b, and c; respectively) of the Pechenigy agriculture land, Ukraine.

(MS, χ), its frequency dependence (χ_{fd}), temperature measurements (high and low temperature), anhysteretic remanent magnetization (ARM), and isothermal remanence (IRM). The results of MS distributions in the genetic horizons are shown in Fig. 1. Close correlation between genetic horizons, geomorphologic position, and MS values is visible. A deeper magnetic mineralogical interpretation of the obtained results will be considered during the presentation.

Keywords: soil, magnetic susceptibility, magnetization, genetic horizons.

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