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Sowing qualities of seeds of corn received at different levels of pollution of ecotopes by heavy metals

Aim. To define the changes of indexes of sowing quality of seed of corn during growing in the conditions of different level of muddiness of ecotopes by heavy metals. Methods. Field, laboratory, математико-статистичний. In researches variants are foreseen with the artificially created backgrounds of lead, cadmium, zinc. Results. Energy of germination, likeness, force of initial height of seed of corn, is certain, that is got in ecotopes, muddy zinc, lead, cadmium. Quality of soil did not have a reliable influence on likeness and energy of germination, but force of plantlets of seed went down with the increase of concentration of heavy metals in soil. Conclusions. In the conditions of Right-bank Forest-steppe on territories with content in the arable layer of lead - 50-1000 мг/кг, to zinc - 25-500, to the cadmium - 1-20 мг/кг grey forest soil it is not recommended to grow corn for seminal aims. The indexes of force of height of sowing material went down after the amount of plants on 14-28%, and by mass of plantlets - on 29-46% comparatively with unpolluted a background.

Keywords: corn, heavy metals, likeness of seed, force of height, energy of germination.

Sowing high-quality seminal material is by the important condition of realization of the potential productivity of sorts and hybrids of agricultural cultures [2, 8]. It is well-proven that worsening of quality of seed results in the substantial fluidizing of sowing, while improvement - to the increase of the productivity on 20-30% [1, 6].

Changeability of quality of seed, except technological and genetic factors, is determined by ecological terms, in particular by agrochemical and toxicological properties of soil [3, 10]. The modern агротехногенне loading often causes contamination of soil toxic substances, in particular by heavy metals [9]. Without regard to a wide discussion in scientific literature of biological and technological terms of improvement of quality of sowing material, now information not enough on influence of amount of heavy metals (BM) in soil on basic sowing properties of seed of agricultural cultures.

An aim of researches is determination of change of indexes of sowing quality of seed of corn for growing of culture in the conditions of different level of muddiness of ecotopes by zinc, lead, cadmium.

Methodology of researches. Researches conducted in stationary small-dwelling experience "Influence of zinc, lead, cadmium on the productivity of agricultural cultures, agrochemical and ecotoxicological descriptions of grey forest soil", 1999 stopped up in the experienced economy "Shepherds" of the National scientific center "Institute of agriculture of НААН" (Right-bank Forest-steppe, Kyiv region). Soil - grey forest loose-buckthorn. In experience variants are foreseen with the artificially created backgrounds of lead, cadmium, zinc : 1 is a natural background of zinc, lead and cadmium (control); 2 is exceeding of natural background of metals in 10 times; 3 - in 100; 4 - in 5 times. Salts of metals brought in to the 0-20-centimetre epiphase of soil. The repeated of experience is 4-valid for one occasion. It is set during gobbing of experience, that natural background of acid-soluble faction of BM in grey forest soil of the experienced economy "Shepherds" presented: to lead - 10, to zinc - 5, to the cadmium - 0,2 мг/кг to soil.

On muddy backgrounds during 2012-2014 grew the permanent sowing of corn grain of that was investigated as seminal material. Sowing was conducted by a широкорядним method. Mineral fertilizers brought in in spring under preseed till of soil in the dose of N of 120P90K120.

Sowing internalss determined on indexes: energy of germination, likeness and force of height (after the amount of plants and mass of plantlets)[5, 7].

The statistical processing of data was executed with the use of the computer programs: Microsoft Office Excel 2003, Statistica 5.0.

Results of researches. Contamination of ecotopes of BM, foreseen in experience, did not entail the considerable change of indexes of energy of germination and likeness of seed of corn, that it is confirmed by the results of mathematical analysis (table). Changeability of signs was insignificant: the coefficient of variation for likeness presented V=of 1,5% and for energy of germination - V=of 3%). On the whole, after likeness grain of corn in all variants of experience answered ДСТУ of 4525:2006 [4].

1. Sowing properties of the seed of corn, grown on the ground backgrounds muddy heavy metals

At the same time the results of statistical analysis of indexes of force of height testify to middle variability of amount of plants (13,7%) and considerable variability mass of plantlets (26,9%) after the variants of experience. The seed of corn with the greatest force of height are got on a natural background are 4,65 gs of green mass and 80 шт. of plants. While on the artificially created ground backgrounds of BM found out послаблення of force of plantlets comparatively with a control variant. The losses of green mass comparatively with control presented 1,33-2,12 gs after HIP05=0,50, and amounts of plants - according to 13-23 шт. after HIP05 = 7,59.

As in experience basic biological, technological, ecological factors were identical in all variants, except the amount of BM, accumulated in a top-soil, then worsening of quality of sowing material is caused exactly by the increase of muddiness of ecotopes by zinc, lead and cadmium. It is confirmed by the results of cross-correlation analysis. The indexes of force of height of seed had a close feed-back with maintenance in soil of movable form of zinc, lead and cadmium. The coefficients of correlation for the amount of plants accordingly presented r=-0, 810; - 0,822; - 0,838 and for mass of plants - r=-0, 650; - 0,665; - 0,686. About toxicness of BM for фітоценозу of corn and worsening of terms of forming of seminal material diminishing to the productivity of the grain, collected on areas, muddy zinc, lead, cadmium, testifies also. The coefficients of cross-correlation connection between the productivity of seed and indexes of his force of height presented r=0,976 after the amount of plants and r=0,909) after mass of plantlets.

Conclusions

Set, that in the conditions of Right-bank Forest-steppe on territories with maintenance in the arable layer of lead 50-1000 мг/кг, to zinc - 25-500, to the cadmium - 1-20 мг/кг grey forest soil it is not recommended to grow corn for seminal aims. The indexes of force of height of sowing material went down after the amount of plants on 14-28%, by mass of plantlets - on 29-46% comparatively with an unpolluted background.

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