NB-CONTAINED NANOCOMPOSITES IMPACT ON SEEDS MYCOFLORA AND GROWTH PARAMETERS OF MAIZE SEEDLINGS

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One of the most important reserves for maize yield increasing and improving the seeds quality is the phytosanitary optimization of its storage technologies, one of the most essential element of which is to disinfect it from pathogens that, under favorable conditions, can spread during storage and in further affect plants in field conditions. Thus, about 75% of pathogens of fungal nature and more than 88% of bacterial are transmitted by seeds. Regarding this, there is a need for a complete and detailed study of protecting seeds methods from pests and diseases when stored to improve its quality. It's actual the study of seeds affecting during storage by fungi, and increasing the effectiveness of chemical and biological agents which used for seed treatment.

Great opportunities open the application of nanotechnologies in crop production. Increasing seeds quality during storage, the anti-pathogenic effect of nanoparticles without pesticides using – all these tasks can be solved using nanomaterials, without a threat to the environment and its population. Using of nanocomposite materials in seed storage technologies can improve grain standard qualities and increase crop seed properties.

The purpose of the research was to determine how the newly synthesized Nb-containing nanoparticles based on saponites influence the maize seeds growth parameters and increase its resistance to phytopathogens from the genera Penicillium and Fusarium damage.

As shown by samples nanostructure analysis with the help of SEM, nanocomposite Saponite-H^+ particles had a slightly triangular shape that reflects the tetragonal structure of their structure. When they were dissolved in water, they were agglomerated in larger fractions, but remained porous, with a pore size of 100 nm, indicating a significant area of their active surface. Nanocomposite particles of Nb-

Sap-EtO were triangular, 20-30 nm in thickness. Nanocomposites of Nb-Sap-Cl, approximately 30 nm in size, as well as the previous, were agglomerated to form separate scales.

As a result, it was found that maize seeds processing by nanocomposites caused a significant increasing of its energy and laboratory germination. When using nanocomposite Nb-Sap-EtO with a rate 3 kg / t, the energy and germination were 89,0% and 99,0%, respectively, 13,0% and 10,0% higher than in control. Respectively, energy and seed germination increased under the influence of other nanocomposites – Saponite-H^+ and Nb-Sap-Cl, at a rate 3 kg / t, it was 98,0%, which is 12,0% higher than in control. This stimulatory effect can be explained, in particular, by the content in nanoparticles of metal oxide and Fe^{3+}, Mg^{2+}, Al^{3+} ions with a large active surface area of the preparation, which, unlike microfertilizers, promotes their faster penetration into plant cells, thereby more effectively stimulates plant growth and development.

It was noted that under the nanoparticles influence on maize seedlings growth parameters increased its length and underground parts. Like the seed properties in this case the Nb-Sap-EtO nanocomposite has the highest stimulatory activity. Maize root system length with this nanocomposite increased by an average of 27 mm in comparison with the control, and seedling length – by 10 mm.

The next step in our research was to determine the nanocomposites effect on pathogenic mycoflora of maize seeds. In all variants, there were indices of fungi activity (development of mycelium and sporulation) from genera Penicillium and Fusarium in varying degrees.

However, due to nanocomposites, the fungi severity significantly slowed down. Nb-Sap-EtO (5 kg / t) nanocomposite had the highest efficacy: 7,14% of seeds affected with Fusarium fungi were detected, while 35,71% of seeds affected by Penicillium spp. were observed in control variant and 21,43% by Fusarium spp.

Our data suggest that nanocomposite materials based on saponites, in addition to growth-stimulating effects on plants, have other beneficial properties, in particular, inhibition of phytopathogenic fungi growth and development.

According to researching results it was established that maize seeds pre-sowing processing by newly synthesized nanocomposites can help to improve the quality of its phytosanitary condition, crop properties and stimulate seedlings growth and development, and also decrease fungi activity from the genera Penicillium and Fusarium, which will reduce their further spread and development during the growing season.

Keywords: *nanocomposites, corn, seeds mycoflora, growth parameters, storage.*