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# THE PRODUCTIVITY OF POTATO UNDER INFLUENCE OF LIQUID PHOSPHATE FERTILIZERS

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**Actuality.** According to world experience high development of the potato industry has to basic on the most modern scientific achievement. It includes using of the varieties for intensive growing and using of the seeds with highest quality and modern compounds of the growing technology and effective fertilizers application system and modern plant protection system and high level of the machine supplying. This allows to give 40-55 t per ha tubers yield of the potato in the high developed countries. But, in Ukraine tuber yield of the potato is near 15-18 t/ha [1, 2]. It is caused by low competence of potatoes producers for modernization of the growing technologies and sudden changes of the weather conditions during plants vegetation in the last tenth anniversary. All these factors limit realization of the genetic potential even modern varieties of potato.

The one of the method for increasing of potato productivity is the change of the traditional methods for potato fertilization. And, application of the special fertilizers for better nutrients uptake by plants and for improvement of the plants growth in critical periods of its vegetation in stress conditions is one of these methods. The fertilizers based on polyphosphate acid nave better availability and better mobility of phosphorus in soil. And, they can to assist for increasing of the micronutrients mobility for plants. Especially, it is important in earlier periods of its growth [3].

The doctor Mikel Maclaflin [4] researched marked phosphorus and fixed problems of the dissolving of the phosphorus fertilizers granules in carbonate soils. The using of the granular MAP only small amount of the phosphorus crossed in soil solution. The liquid fertilizers spread to greater space form place of the fertilizer application and in result, these fertilizers have better availability for plants.

The important method of the optimization of the phytohormonal balance of the plants is using of the growth-activate fertilizers in growing technology for potato. They increase plant resistance to stresses and improve plant metabolism and increase efficiency of the mineral fertilizers application for increasing of the potato productivity [6].

Therefore, investigations of the efficiency of the liquid fertilizers in potato productivity in combination with tubers treatment before its planting and foliar application by growth-activate fertilizers is very necessary topic.

**The goal of the investigation is** optimization of the nutrition for potato plants using of the liquid phosphate fertilizers in complex with tubers treatment before its planting and foliar application by growth-activate fertilizers in conditions of the Left-Bank Forest-Steppe of Ukraine.

**The materials and methods for investigation.** The investigation is located in field experiment of Department of the agrochemistry and quality of plant products named by Olexander Dushechkin in National University of life and environmental sciences of Ukraine. It is placed in Borispil district of the Kyiv region. The investigation was made during 2015 and 2016.

The plot size for harvesting is 40 $m^2$. The experiment is designed in 3 applications. The experimental plots are designed methodically. For investigation the Mosart variety was selected. It originator is HZPC Holland.

The tubers treatment before its planting was made Atonic Plus and Bosfoliar Kelp in rate 0.20 %.

Soil of the research plot is dark grey opodzolic soil. it has weakly acid reaction of the soil solution (5.20) and low content of the mineral nitrogen (13.4 mg/kg) and high level of the available phosphorus compounds supplying (168 mg/kg) and high level of the available potassium (174 mg/kg) and middle level of the exchangeable calcium (7.42 eq/100 g of soil) and magnesium (1.64 eq/100 g of soil).

In the experiment we use the next fertilizers: ammonium nitrate (ДСТУ 7370:2013), LCF 11-37 (ТУ – 2186-627-00209438-01), potassium sulfate (ГОСТ

4145-74), magnesium sulfate, Bosfoliar Boron (B–21%), Atonik Plus and Bosfoliar Kelp. The harvesting was made from whole square of the plot of the every variant.

**The results and discussion.** The application of the liquid complex fertilizers in rate $P_{35}$, $P_{70}$, $P_{105}$ on the background application of the nitrogen and potassium fertilizers ($N_{120}K_{180}$) caused essential increasing of the tuber yield of the potato. So, mineral fertilizers application in rate $N_{120}P_{35}K_{180}$ assisted for yield increasing in comparative to control (22.2-23.2 t/ha) to 7-11 t/ha and $P_{70}$ – 10.3–13.3 t/ha, $P_{105}$ – 15.–20.4 t/ha regardless of fertilizers for tuber treatment before it planting. In variant with tuber treatment by Atonic Plus before planting and LCF in rate $P_{35}$ on the background NK the tuber yield was 33.5 t/ha. In variant with $P_{70}$ yield addition was 3.4 t/ha and in variant with $P_{105}$ yield addition was 5.7 t/ha. In variants with tuber treatment before planting using Bosfoliar Kelp and liquid complex fertilizers application in rate $N_{120}P_{35}K_{180}$ tuber yield was 31.1 t/ha. When the rate of phosphorus $P_{70}$ was used the tuber yield addition would be 5.6 t /ha. In variant with $P_{105}$ application the yield addition was 2.5 t/ha.

The foliar application of the plants using Atonic Plus and tuber treatment before planting using Bosfoliar Kelp on the background $P_{35}$ increased tuber yield to 32.6 t/ha, $P_{70}$ – 40.2 t/ha and $P_{105}$ – 43.4 t/ha. In variant with used Bosfoliar in these methods of fertilizers application the tuber yield addition was 2.4 t/ha with using $P_{70}$ and 6.6 t/ha with using $P_{105}$. The calcium and magnesium application with macroelements caused decreasing of the tuber yield because they were applied on similar deep. The using new fertilizers in modern methods of the application caused increasing of the commercial fraction in the tuber yield composition for potato.

**Conclusions.** So, the application of the liquid complex fertilizers in rate $P_{105}$ on the background $N_{120}K_{180}$ in combination with tuber treatment before planting and foliar application of plants using growth-activate fertilizers given tuber yield in level 46.3 t/ha including commercial tuber fraction (tuber size more 50 mm) in level 80.4 %.