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**PRODUCTIVITY OF OATS AND SPRING BARLEY DEPENDING ON PREDECESSORS AND  
USE OF MICRO-FERTILIZERS IN NORTHERN STEPPE**

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*The results of studying the influence of the use of fertilizers on crop yield of oats and spring barley in the Northern Steppe. It is established, that a complex application of micro seed treatment and spraying of crops provides increased productivity of oats by 10%, barley – 15% depending on the predecessor. Found that more adapted to arid conditions are oats that provided by 0.72 t per ha (30.9%) higher yield than barley. The best predecessor for these crops are winter wheat, cultivation after which ensured grain yield formation of oats by 10.1 and 18.1%, and barley – by 20.4 and 23.7% more than after maize for forage and sunflower respectively.*

**Keywords:** *oats, spring barley, predecessors, micro-fertilizer, grain yield.*

**Problem statement.** Oats and spring barley – are the most common cereals in the world. It should be emphasized that many of these crop plants located in the Steppe zone, which is characterized by insufficient and unstable moisture and high temperature conditions, and a negative variation of weather conditions leads to a significant reduction and shortfall the level of grain yield. One of the main reasons for the low realization the genetic potential of modern varieties of oats and barley are insufficient substantiation the technological measures of plant adaptation to adverse growing conditions that deepens the existing socio-economic crisis and is characterized by disparity in prices for materiel and purchase prices for locally grown agricultural products. The solution to this problem is possible by developing new and improving existing technological measures of cultivation the spring grain crops after different predecessors, including by optimizing the mineral nutrition for regulation the growth and productive processes of oats and barley [1, 5].

**Analysis of investigations and publications wherein laid the foundation to solution of the problem.** Under current market conditions with limited economic opportunities have significantly reduced the amount of use the organic and mineral fertilizers, which leads to the need to find the alternative sources of nutrition a plants, including oats and spring barley. For the normal development the plant body needs, aside from macronutrients, else micronutrients. The most efficient and cost effective ways of using the micronutrients are seed treatment and foliar feeding of growing plants. Falling on the leaf surface, elements penetrate into the tissue and included in the biochemical reactions of metabolism in the plant. This technique can significantly improve the utilization of microelements and provide the plants

by necessary composition of microelements during the formation of reproductive organs. This leads to the enrichment of grain crops by microelements and allows get the full crop yield, which includes the optimal number for a given variety of sugars, amino acids and vitamins [2, 4, 6].

**Goals and objectives of investigations.** *The goal* of investigations were revelation of effective ways to improve the grain productivity of oats and spring barley in Northern Steppe. The topical question is to identify the most effective use of micronutrients at seed treatment and foliar feeding of vegetative crops of oats and spring barley after different predecessors.

To achieve this goal prescribed solving the main task – with account of crops adaptability level to optimize the agro technological measures of complex using the mineral nutrition system at growing of oats and spring barley after various precursors in the Northern Steppes of Ukraine.

**Exploration technology.** In order to solve this important scientific task in the laboratory of technology of growing technology of spring cereal and legume crops (based on Erastivs'ka Experimental Station of IASZ of NAAS, Piatykhats'ky district, Dnipropetrovsk region) laid field experiments to study the effect of different predecessors and system of mineral nutrition on productivity of oats and barley plant.

Research carried out in accordance with the general methods [3, 7].

Soil of test plots – ordinary chernozem, low-humic, heavy clay loamed. The humus content in the top soil (0-30 cm) – 4.0-4.5%, total nitrogen – 0,23-0,26%, phosphorus – 0,11-0,16%, potassium – 2.0-2.5%, alkaline soil reaction – 6,5-7,0. Seeded oats variety Skakun, spring barley – Galaktyk, used micronutrient reakom-SP-grain. Technology of addition questions posed for the study is general for zone. Variants in field experiments arranged systematically, three-time repetition, the accounting area of plots is 50 m<sup>2</sup>. Predecessors – winter wheat, green corn, sunflower.

**Results of the investigation.** Meteorological conditions during the years of researches (2011-2012) were characterized by contrast, that allows to fully assess their impact on the realization of the potential grain productivity of oats and spring barley plant. For example, in 2011 during the growing season fell 245 mm of rain, which is 25 mm more than the average long-term rate, the average temperature was +17,7°C. Extreme dry was 2012, which was characterized by higher temperatures (+24,1°C, which is 9,1°C more than normal) and lack of rainfall (during the growing season fell 172 mm, that 50 mm less than normal). Thus, the more favorable growing season for growth and development of oats and barley plants were formed in 2011.

Analysis of the data shows that the treatment of seeds and foliar feeding of vegetative plants by micronutrients helped to increase the plants height and other biometric parameters of oats and barley. Thus, due to complex application of micronutrients the plant height of oat and barley was 2-6% higher than the variants without micronutrient application. Treatment of seeds and vegetative plant by micronutrient also positively influenced the growth of vegetative mass. Founded that the seed treatment by micronutrient the productive tillering of barley and oats increased 1-4% as a result of spraying crops it

grew 6-10% in oats, and in barley – 1-5%. The combination of seed treatment and spraying of crops contributed to increase in productive tillering of oats by 10-12%, barley – 6-10%. Due to the complex application of micronutrients the oats panicle length increased for 1.5 cm, or 11.3%, and the spike of barley – 0.65 cm or 10.5%, leading to an increase the amount of grain per panicle (spike).

The level of grain productivity of various crops, including oats and barley depend significantly on selecting the best of predecessors. Experimentally found that through the use of micronutrients in crops of oats and barley and selection of the best predecessor possible to significantly increase the grain yield, even in extremely conditions of arid Steppe of Ukraine (table).

***Crop yield of oats and spring barley depending on the use of fertilizers reacom-SP-grain after different predecessors (means for 2011-2012), t/ha***

Application of micronutrient reacom-SP-grain (A)	Predecessors (B)		
	winter wheat	green corn	sunflower
oat			
Control	3,23	2,93	2,67
Reacom-SP-grain (3 l/t) – seed treatment	3,33	2,98	2,71
Reacom-SP-grain (3 l/ha) – spraying of plants at tillering phase	3,38	3,03	2,76
Reacom-SP-grain (3 l/t) – seed treatment + reacom-SP-grain (3 l/ha) – spraying of plants at tillering phase	3,53	3,19	2,90
LSD <sub>0,05</sub> , tons per hectare, for A – 0,07; for B – 0,11			
spring barley			
Control	2,57	2,09	1,96
Reacom-SP-grain (3 l/t) – seed treatment	2,70	2,14	2,05
Reacom-SP-grain (3 l/ha) – spraying of plants at tillering phase	2,76	2,18	2,07
Reacom-SP-grain (3 l/t) – seed treatment + reacom-SP-grain (3 l/ha) – spraying of plants at tillering phase	2,93	2,32	2,27
LSD <sub>0,05</sub> , tons per hectare, for A – 0,06; for B – 0,09			

The influence of predecessors on realization the potential productivity of oats and barley was significant for all variants of the experiment. On average for the 2011-2012 in variants after predecessor of winter wheat formed the largest crop yield of oats – 3,23-3,53 tons per hectare, compared with 2,93-3,19 t per ha – after corn for fodder and 2.67-2.90 tons per hectare – after sunflower. In spring barley the indices were respectively: 2,70-3,32 t per ha 2,09-2,70 and 1,96-2,73 t per ha.

Application of micronutrients provided increased crop yields of oats and barley, but their influence after various predecessors displays differential. Thus, during the experiment (2011-2012) using the micronutrients with seed treatment increased the crop yield of oats after winter wheat by 0.10 t per ha

and barley – by 0.13 t per ha. After green corn and sunflower also obtained additional yield comparatively to control. Results of studies indicates that seed treatment by micronutrient promotes additional yield of oats and barley, by increasing vigor, germination and biomass buildup that was characteristic of the early stages of plants organogenesis.

In applying the reacom-SP-grain in the tillering phase by spraying the vegetating plants received some number additional yield of oats – 0.15 t per ha (after winter wheat), 0.10 t per ha (after green corn) and 0.09 t per ha (after sunflower), and in accordance with barley – 0.19 t per ha, 0.09 and 0.11 t per ha.

Due to the complex application of micro fertilizer reacom-SP-grain (3 l/t) for seed treatment + reacom-SP-grain (3 l/ha) for spraying in the tillering phase received the largest additional yield of oats – 0.30 t per ha (after winter wheat), 0.26 t per ha (after green corn) and 0.13 t per ha (after sunflower.) In barley, these indices were – 0.36 t per ha, 0.23 and 0.21 t per ha respectively to predecessors.

**Conclusions.** Summarizing the results of experimental data, it is important to note the following. The use of modern grain micronutrients in combination with the right choice of predecessor provides a real opportunity to get a significant additional yield. With researches were established that under the influence of studied agro technical elements, specifically the combination of seed treatment with spraying the vegetative plants in tillering phase by micronutrient reacom-SP-grain, oats increases crop yield 10% and spring barley – 15%, depending on the predecessor. Founded that more adapted to arid Steppe conditions are oats that during the years of the experiment ensured 0.72 t per ha (30.9%) higher crop yield than barley. The best predecessor for these crops are winter wheat, growing after which ensures the formation of oat grain yield is 10.1 and 18.1%, and barley – 20.4 and 23.7% higher than after green corn and sunflower, respectively.

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