

Economic efficiency of complex application of liquid organomineral fertilizers

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The purpose. To determine economic efficiency of new kinds of fertilizers at different times and ways of their entering. **Methods.** Field, statistical. **Results.** Results of field researches by efficiency of application of liquid organomineral fertilizers are brought. High efficiency and profitableness of fertilizers is shown at growing spring barley (net profit — 1594– 3731 hrn/hectare, level of profitableness — 152– 231%). **Conclusions.** Additionally gained profit on application of liquid organomineral fertilizers is economically justified, but differs on the level of profitableness.

Key words: *organomineral fertilizers, carbamide-ammonium nitrate, spring barley, economic efficiency, net profit, profitableness.*

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Introduction. Owing to the high cost of the fertilizers and expenses connected with their application of fertilizer of spring barley demands new economically reasonable approaches of optimization of conditions of food and saving of expenses [1-3]. It is known that new kinds of fertilizers have appeared and continue to appear on the market of Ukraine and other CIS countries and Western Europe, which are characterized by much higher efficiency in comparison with traditional mineral fertilizers. At the same time liquid organomineral fertilizers (OMF) of the prolonged action with the set properties are of particular importance. The basic principles of formation of structure of liquid OMF containing in the balanced ratio organic and mineral compounds are developed for providing plants with biogenous elements a current of all vegetative period [4-6]. To fertilizers of this kind it is possible to carry the liquid OMF received on a basis the carbamide-ammonium nitrate (CAN) and a potassium humate. Technologies which realize the specified approach [7-9], provide at first receiving a humate of potassium, by extraction of humic substances from low-lying peat at the set parameters. The organic component received thus mixes up with mineral components in the set ratio.

The purpose of the research is to determine the economic efficiency of liquid OMF in different terms and ways of their introduction.

Research methodology. In the conditions of temporary experiment field, on the chernozem typical state-owned enterprise «PF «Grakivske» in 2014-2016, the efficiency of liquid OMF is determined by terms and ways of their introduction (the main introduction under preseeding cultivation and according to a leaf).

Scheme of research (Table 1) provides for the creation of three agrochemical backgrounds, which differ in each other by type of fertilizer, their doses and frequency of introduction. In the experiment, for the creation of optimal agrofones used CAN-32 and liquid OMF on its basis. Each part of the agrochemical background was divided into halves. On one part the main fertilizer application was made at the rate of 40 kg / ha a.i. nitrogen under pre-sowing cultivation, on the second to improve the nitrogen nutrition of plants, root-and-neck nutrition of CAN and liquid OMF at doses of 6 kg / ha a.i. in the critical phases of plant development (planting phase, outlet, earing).

The cultivation culture is spring barley of the "Parnassus" variety, which has been entered in the State Register of Plant Varieties, suitable for distribution in Ukraine since 2008 in the zone of Forest-steppe and Steppe [10].

Results and discussion. In most scientific papers on agrochemistry and agronomy studies, the estimation of the economic efficiency of the use of fertilizers or other agriproducts at the prices of products at

the time of evaluation. This allows us to identify the appropriateness of specific investments for yield increments [11-14]. In the calculations of material costs, we used the actual prices for crop and fertilizer products as of 2016.

The results of the calculations performed (Table 1) indicate that the use of liquid OMF in the production of spring barley is of high economic efficiency. Taking into account the prices on the market in September 2016, the cost of 1 ton of barley is 5510 UAH, CAN-32 - 5350 UAH / ton, potassium humate - 50 UAH / liter. Carrying out one root nutrition by liquid OMF - 906-1381 UAH / ha, foliar - 145-234 UAH / ha. Conditionally net profit - 1594-3731 UAH / ha, the cost of the growth of the yield per hectare was 2645-5345 UAH.

1. Economic efficiency of application of liquid OMF on spring barley (an average for 2014-2016)

Variant		Gain of productivity of grain, ton/ha	Harvest gain cost, UAN/ha	Cost of fertilizers, UAN/ha	Net profit, UAN		Profitability, %
Presowing cultivation	Spray nutrition				from 1 ha	for 1 UAH expenses	
Background 1 (CAN ₄₀)		0,21	1157	668,8	488,2	0,73	73
	+ CAN ₆	0,34	1873	769,1	1103,9	1,44	144
	+ OMF-1	0,36	1984	813,6	1170,4	1,44	144
	+ OMF-2	0,39	2149	902,6	1246,4	1,39	139
Background 2 (OMF-1)		0.24	1322	906,3	415,7	0,50	50
	+ CAN ₆	0.34	1873	1006,6	866,4	0,86	86
	+ OMF-1	0.48	2645	1051,1	1593,9	1,52	152
	+ OMF-2	0.63	3471	1140,1	2330,9	2,05	205
Background 3 (OMF-2)		0.34	1873	1380,5	492,5	0,36	36
	+ CAN ₆	0.76	4188	1480,8	2707,2	1,83	183
	+ OMF-1	0.77	4243	1525,3	2717,7	1,78	178
	+ OMF-2	0.97	5345	1614,3	3730,7	2,31	231

Note: Liquid OMF-1 - CAN +5 % humat, Liquid OMF-2 - CAN +15 % humat

The expenditures on the use of liquid OMF were the smallest in the version of the Background 2+ (OMF-1) and amounted to 1051.1 UAH / ha and increased to 1614.3 UAH / ha in the version Background 3+ (OMF-2). The conditionally net profit increased from 1593.9 UAH / ha in the version Background 2+ (OMF-1) to 3730.7 UAH / ha in the version Background 3+ (OMF-2).

Indigenous fertilization on the established agrofons in the three phases of the development of barley branched plants provided a significantly higher conventional net profit of 1 ha compared to one application for pre-sowing cultivation. The conditionally net profit per 1 UAH of expenses was higher than the integrated introduction of liquid OMF and grew from 1.52 UAH in the version Background 2+ (OMF-1) to 2.31 UAH in the version Background 3+ (OMF-2).

It should be noted that for the integrated introduction of liquid OMF the level of profitability was the highest, and was 152% for the version Background 2+ (OMF-1) and 231% for the version Background 3+ (OMF-2).

Conclusion

An analysis of the economic efficiency of barley growth has shown that the complex application of liquid OMF significantly improves the production efficiency: the grain yield increases, which is expedient to the results of statistical processing. Additionally, profits from the use of liquid OMF are economically justifiable,

but vary in terms of profitability. Therefore, during the growing of spring barley grain, a raucous producer should be guided by the economic threshold of rationality of factors.

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