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FORMATION OF SPRING BARLEY CROPS BY PARAMETERS OF NUMBER OF PLANTS DEPENDING ON INFLUENCE OF TECHNOLOGICAL FACTORS

The article shows the formation of agrophytocenoses of barley depending on the applied fertilizers and foliar feeding conducted with micronutrient «Nutrivant plus». It is demonstrated the effectiveness of the formation of crops by the joint impact of the aforementioned factors to improve the survival of plants based on the analysis of covariance.

Keywords: *spring barley, the survival of plants, number of plants, foliar feeding , micronutrient «Nutrivant plus», fertilizers*

Introduction. Number of plants per unit area is an effective basis, depending on the rules of seeding, field germination and survival of plants. In addition, the number of plants per unit area is the basic foundation of the formation of crops. Plants – the biological means of production, it depends of their number largely cenotic interaction between them that affects the implementation of all elements of the structure of yields. We should also pay attention to the perfection of technology, one of the most important requirements of this approach is the ability of plants per unit area sown to the number of sown seeds. This allows you to enhance management efficiency of seed standards of set agrophytocenoses parameters. The more number of plants is close to the standards of seed sowing, the better the implementation of technology of growing barley [1, 2 , 3].

The purpose of research – to study the dependence of the parameters of spring barley crops by the number of plants on the effects of water-soluble foliar fertilizer «Nutrivant plus brewing barley».

Materials and methods. Research is carried out in PE «Chemerovets'kyi Food Company» Chemerovets'kyi district Khmelnitsky region. Soils are ashed. Scheme of the experiment: normal fertilizer application –factor A – $N_0P_0K_0$ (control – no fertilization), $N_{30}P_{45}K_{45}$, $N_{60}P_{90}K_{90}$; norms of applying fertilizers «Nutrivant plus brewing barley» – factor B – 0 (control without the use of fertilizers), 3,0; 4,5; 6,0; 7,5; 9,0 kg/ha. Plants of spring barley of variety Sebastian of Czech breeding were the object of the research.

Results and discussion. It is proved by the obtained results of applying of fertilizers «Nutrivant plus» on the parameters of barley crops by the number of plants per 1 m^2 that by improving the survival of both the controls and the variations of mineral nutrition positive results are achieved (*table 1*).

Table 1

Dependence of barley plants survival on the application of micronutrient «Nutrivant plus», % (average for 2007–2010)

Norms of fertilizers, kg/ha (factor A)	Norm of use of micronutrient «Nutrivant plus» kg/ha (factor B)						Average of factor A
	0	3,0	4,5	6,0	7,5	9,0	
$N_0P_0K_0$	86,8	87,5	89,2	90,1	91,0	93,8	89,7
$N_{30}P_{45}K_{45}$	93,4	94,6	96,0	96,6	97,1	97,0	95,8
$N_{60}P_{90}K_{90}$	93,2	94,9	95,8	96,4	97,4	97,8	95,9
Average of factor B	91,1	92,3	93,7	94,4	95,2	96,2	93,8

In the variant without fertilization of the soil, it is found a gradual increase in the survival of barley plants in direct proportion to the impact of the rules of applying fertilizers «Nutrivant plus». In particular, the rate was 86,8% on the control, in variant 4,5 kg/ha – 89,2%, which is 2,4% more.

In versions 6,0; 7,5; 9,0 kg it is set data 90,1%, 91,0%, 93,8%. In fact it is proved the effective impact of technology of foliar feeding of barley plants through the use of balanced fertilizers according to the quality of brewing barley. However, cultivation of barley provides the technology of mineral fertilizers in the soil, which effectively also affects the survival of barley plants. It is clearly visible from the results of the experiment and data publications [4, 5]. These are listed in table 1 show that the applied micronutrient actually provided additional effect. In particular, in the variant $N_{30}P_{45}K_{45}$ survival was 93,4% without «Nutrivant plus», an increase of 6,6% from these options of $N_0P_0K_0$. Conducting of foliar feeding with plant micronutrient contributed to the improved survival of barley plants in crops. It is set the number of experimental data 94,6%; 96,0; 96,6; 97,1; 97,0% in accordance with the application of fertilizers 3,0 kg/ha; 4,5; 6,0; 7,5; 9,0 kg/ha. Almost similar results were obtained on the background of nutrition of $N_{60}P_{90}K_{90}$, where a gradual increase in standards fertilizers with 3,0 kg/ha to 9,0 kg/ha contributed to improved survival from 1,7% to 4,6%. Through the influence of two factors in conducting of field experiments it is obtained the results of improved survival ranging from 86,8% to 97,8% – 11 of the difference. On average, improving of survival is – 4,1% on two taken together variants of mineral fertilizers in the soil. In variants without fertilization in soil survival of plants with «Nutrivant plus» increased from 86,8% (control without the use of fertilizers) to 93,8% for version 9,0 kg/ha. The difference is 7,0%. Average survival of plants in the studies by factor A has increased from 89,7% to 95,9%, and due to the influence of the applied fertilizers from 91,1% to 96,2%.

The performed dispersive analysis with the definition of particle of impact of factors A and B shows that 25,0% is the impact on the survival of plants with micronutrient «Nutrivant plus» and 72,2% for conventional fertilizer use. To emphasize the influence of the applied fertilizers for growing barley on the backgrounds of mineral nutrition it is shown in figure 1 that an effective foliar feeding, the proportion of effects on plant survival is 98,0%.

The results in table 2 indicate the impact of fertilizers on improving of crop parameters. In particular, on the control and no fertilized background number of plants that provide the formation of grain yield was 230 units/m^2. Application of 4,5 kg/ha of «Nutrivant plus» an average for four years provided 237 plants per 1 m^2 increase in fertilizer consumption to 7,5 kg/ha helped to increase their number to 242 units/m^2. For norm of 9,0 kg/ha number of barley plants reached 249 units/m^2 through better survival.

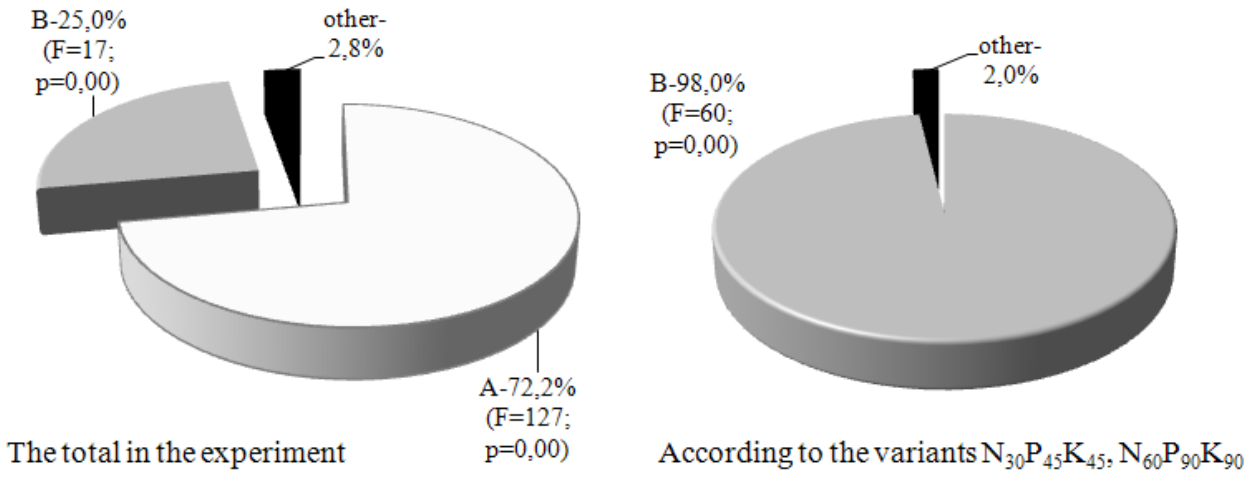

Fig. 1. Influence of micronutrient «Nutrivant plus» on survival of barley plants

As to similar characteristics of barley growing on backgrounds of mineral nutrition $N_{30}P_{45}K_{45}$ and $N_{60}P_{90}K_{90}$. The results show that the applied micronutrient «Nutrivant plus» clearly provided a significant influence on the crops of barley by the parameters of plants per unit area.

Table 2

Characteristics of barley crops by the number of plants per unit area of crop depending on the norms of application of micronutrient «Nutrivant plus», units/m^2 (average for 2007-2010)

Norms of fertilizers, kg/ha (factor A)	Norm of use of micronutrient «Nutrivant plus» kg/ha (factor B)						Average of factor A
	0	3,0	4,5	6,0	7,5	9,0	
$N_0P_0K_0$	230	232	237	239	242	249	238
$N_{30}P_{45}K_{45}$	256	259	263	264	266	266	262
$N_{60}P_{90}K_{90}$	255	260	262	264	267	268	263
Average of factor B	247	250	254	256	258	261	254

On average, in factor B change of parameters of crops by the number of plants ranged from 247 to 261 units/m^2. In particular, it is found an increase in the number of plants from 256 to 266 units/m^2 in $N_{30}P_{45}K_{45}$ variant. Similar change of parameters of crops are on the variant of fertilization $N_{60}P_{90}K_{90}$. Significant results have been at a rate of using «Nutrivant plus» 3,0 kg/ha (*table 3*). It is set the efficiency of micronutrient with the advantage of variants 4,5 and 6,0 kg/ha compared with variant 3,0 kg/ha. Equivalent effects are more effective for variants identified for the 7,5 and 9,0 kg/ha compared with all others. It should be emphasized that the increase in the number of plants per unit area of crop due to improving of their survival aims to provide important requirements of growing technology. It is particularly important to keep this number as most close to the number of seeds sown at a rate of seeding. The scientific literature indicates – a prerequisite for high crops is the optimum number of plants per unit area sown evenly placed and equally developed [6].

Table 3

Effects of factor of micronutrient «Nutrivant plus» for parameters of barley crops by number of plants, units/m^2 (Duncan test)

№	Norms of micronutrient, kg/ha	Number of plants	Homogeneous groups			
			1	2	3	4
1	0	255,5	***			
2	3	259,5		***		
3	4,5	262,5			***	
4	6	264,0			***	
5	7,5	266,5				***
6	9	267,0				***

According uniformity of placement of plants depends on the field of seed germination and survival after germination. As noted above field germination was better when making fertilizers of nitrogen, phosphate and potash, improving of survival is a product of both factor A and factor B – applied micronutrient by the technology of foliar feeding. Parameterization of empirical data of micronutrient on variants $N_{30}P_{45}K_{45}$ and $N_{60}P_{90}K_{90}$ of exposure included in the experiment factor of foliar application based on one-dimensional criterion demonstrates the significance of the results within the high proportion of 98,0% of its impact on the number of plants per unit area of crop. Effect of factor is reliable F-53, probability of error is less than 1% of significance level.

In order to evaluate the survival of barley plants depending on factors of impact correlation analysis has been conducted. It is found a strong correlation reliable direct connection $R_{y.xz}$ – 0,89 of dependence of barley plants survival on two factors of influence. Coefficient of multiple determination is R^2–0,8. 80% of survival as a component of variation depends on the background of

nutrition and foliar feeding with micronutrient «Nutrivant plus brewing barley». Conducted regression analysis according to the established equation shows the extent and characteristics of changes of the dependent value, namely survival of barley plants from independent technological factors: fertilization and foliar feeding. It is used regression equation for prediction by shown relationship (*fig. 2*).

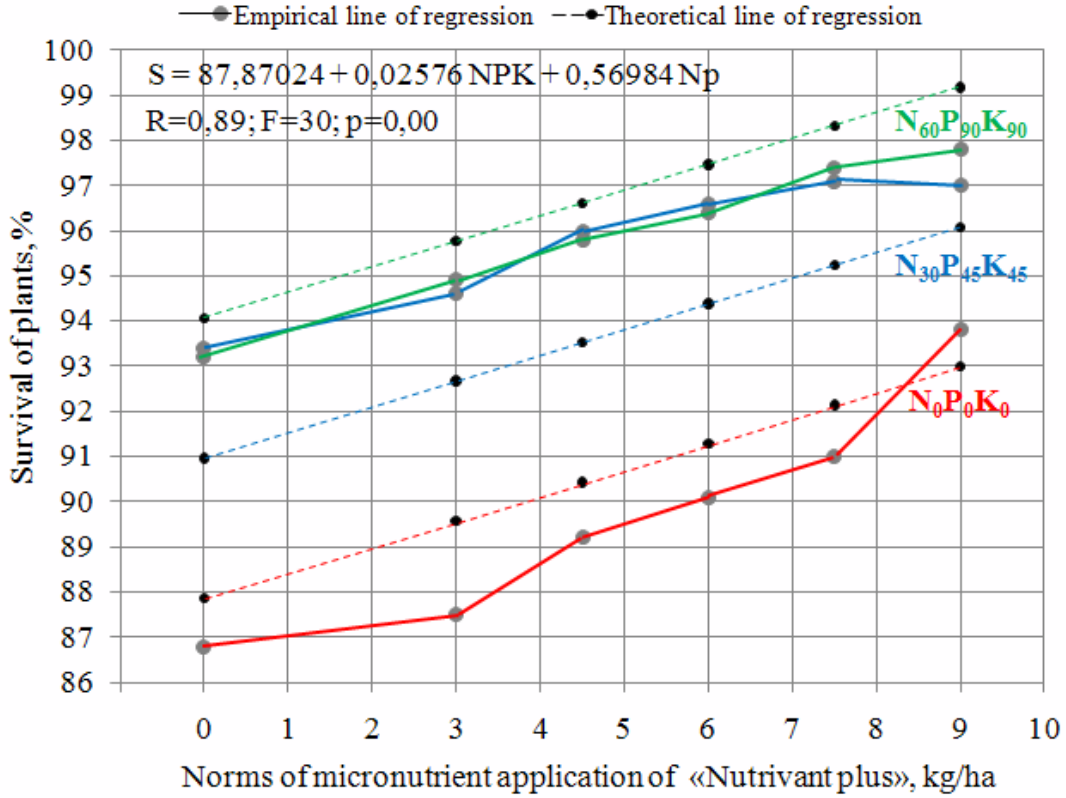

Fig. 2. Dependence of survival of barley plants by the application of fertilizers and foliar feeding with micronutrient

Empirical line of regression is approximated by the theoretical line of regression. The maximum deviation of the theoretical data is 1,4%. By predicting with constant application rate of NPK increase of fertilizers standards for foliar feeding of 3,0 kg / ha will provide improved survival of plants by 1,7%. Functional regression coefficients are accurate, prediction error is within acceptable parameters.

Conclusions. It is established the effectiveness of joint influence of mineral fertilizers and foliar feeding application with micronutrient of barley for survival of plants. The effectiveness is characterized by average data of 97,8% compared to 86,8% of control.

Dependence of survival of barley plants on factors of impact is characterized by multiple correlation coefficients $R_{y.xz}$–0,89.

As a result of improving of barley plants survival it is achieved an increase in their number per unit area sown from 230 to 268 units/m^2.

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Анотація

Бігуляк С.П.

Формування посівів ярого ячменю за параметрами кількості рослин залежно від впливу технологічних факторів

У статті показано формування агрофітоценозу ячменю залежно від застосованих мінеральних добрив та проведеного позакореневого підживлення мікродобривом «Нутрівант плюс». На основі коваріаційного аналізу доведено ефективність формування посівів за сумісним впливом означених факторів на покращення виживання рослин.

Ключові слова: *ярий ячмінь, виживання рослин, кількість рослин, позакореневе підживлення, мікродобриво «Нутрівант плюс», мінеральні добрива*

Аннотация

Бигуляк С.П.

Формирование посевов ярового ячменя по параметрам количества растений в зависимости от влияния технологических факторов

В статье показано формирование агрофитоценозов ячменя в зависимости от примененных минеральных удобрений и проведенной внекорневой подкормки микроудобрением «Нутривант Плюс». На основании ковариационного анализа доказана эффективность формирования посевов по совместному влиянию указанных факторов на улучшение выживаемости растений.

Ключевые слова: *яровой ячмень, выживание растений, количество растений, внекорневая подкормка, микроудобрение «Нутривант плюс», минеральные удобрения*