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PARAMETERS OF SOWING OF WINTER BARLEY BY THE NUMBER OF PLANTS DEPENDING ON THE INFLUENCE OF TECHNOLOGY FACTORS

The article shows the dependence of the number of plants of winter barley per unit area of the crop on applied fertilizers and seed standards. A study of experimental data is based on covariance analysis, it is set performance factors, strength and shape communication of effective characteristics and factorial.

Keywords: winter barley, number of plants, rates of fertilizer application, norms of seeding

Introduction. The optimum number of plants per unit area is the first and quite essential for obtaining high yields of crops. The density of plants per unit area of crop is complex indicator of yield structures as it is constantly decreasing, starting from germination to the end of the growing season. This indicator combines three components: field similarities, wintering and survival. It is found that the number of plants depends on many technical factors [1, 2]. Is has been proved in studies conducted by Lviv State Agrarian University that number of plants increased with increasing of norms of fertilizers. For example, variety Myronivska 808 at sowing on the 30 of september against the background $N_{80}P_{60}K_{60}$ it was 268 units/m^2, and against background $N_{140}P_{100}K_{120}$ increased to 290 units/m^2. In other studies, where the effect of seed rates on the density of plants was studied, it was also found that against the background of $N_{110}P_{80}K_{90}$ at a lower rate of 4,0 million/ha, their number was 274 units/m^2, at a rate of 4,5 million/ha – 290 units/m^2 [3]. It should be emphasized that the evaluation of parameters of crops in research is a priority. Formation of crops of barley is associated now with optical density, efficiency of fertilizer use, energy, water. Also density of crops is very important today in relation with the formation of structural elements of grain yield and its quality [4].

Purpose of research – to study the dependence of the parameters of winter barley by the number of plants on the effects of the applied fertilizers and seed regulations in the southern part of the western steppes .

Materials and methods. Research is performed in the experimental field of selection, seed production and general subjects department of Podilsky State Agricultural and Technical University of «Obolon Agro» Chemerovets'ky district Khmelnytsky region during 2009-2012 years. Scheme of the experiment: norms of fertilizer application – $N_0P_0K_0$ (control – no fertilization), $N_{30}P_{30}K_{30}$, $N_{60}P_{60}K_{60}$, $N_{90}P_{90}K_{90}$, $N_{120}P_{120}K_{120}$; seeding norms: options – 300, 350, 400, 450 units/m^2. Soil test sites – ashed. Object of research – the sort of two-row winter barley Vintmalt.

Results and discussion. It is found in the result of studies that number of plants of winter barley crops is characterized in the range from 233 to 367 units/m^2. On average, the experiment was 304 units/m^2 (*table 1*).

Table 1

Number of winter barley plants depending on impact of fertilization and seeding norms, units/m^2 (average for 2010–2012)

Norm of fertilizers, kg/ha	Norm of seeding, units/m^2			
	300	350	400	450
$N_0P_0K_0$	233	271	302	338
$N_{30}P_{30}K_{30}$	248	291	325	365
$N_{60}P_{60}K_{60}$	249	289	326	367
$N_{90}P_{90}K_{90}$	250	291	327	365
$N_{120}P_{120}K_{120}$	251	292	325	367

This option of agrophytocenoses of barley was depended on the applied fertilizers, but the rules of significant changes did not provide quantitative measures. These are the data given in accordance with the same rules of seeding. In particular, at seeding 300 seeds/m^2 number of plants per 1 m^2 was lower only on the control and it was the same on the backgrounds of mineral nutrition. A similar pattern was also on the norms of seeding 350, 400, 450 seeds/m^2. Showing results are confirmed by statistical analysis (*table 2*).

Table 2

Assessing the impact of fertilization norms on the number of barley plants, Duncan test, units/m^2 (average for 2010–2012)

№	Norm of fertilizers, kg/ha	Number of plants	Homogeneous groups	
			1	2
1	$N_0P_0K_0$	286	***	
2	$N_{30}P_{30}K_{30}$	307		***
3	$N_{60}P_{60}K_{60}$	308		***
4	$N_{90}P_{90}K_{90}$	308		***
5	$N_{120}P_{120}K_{120}$	309		***

As a result, rates were similar regardless of backgrounds of mineral nutrition and averaged 307–309 units/m^2. The number of plants was less than 286 units/m^2 on the control. The dependence of plants on mineral fertilizers was in their better survival. At the same crop settings for the number of plants where fertilizers were applied are in one homogeneous group. It emphasizes and draws attention to the fact that the rates of application are characterized by the influence of the same.

It is found that all the rules of sowing significantly influenced the number of plants per unit area of crop. Regularity of result changes is proved (*table 3*).

Table 3

Assessing the impact of seeding norms on the number of barley plants, Duncan test, units/m^2 (average for 2010–2012)

№	Norm of seeding, units/m^2	Number of plants	Homogeneous groups			
			1	2	3	4
1	300	246	***			
2	350	287		***		
3	400	321			***	
4	450	360				***

The lowest value of parameter was at seeding rate 300 seeds/m^2 – 246 units/m^2, at 350 seeds/m^2 number of plants increased by 41 units and was 287 units/m^2, 400 seeds/m^2 – 321 units/m^2 and at a rate of 450 seeds/m^2 – 360 units/m^2 .

Assessing the impact of causal factors on the parameters of the number of plants per unit area shows that the greatest impact on this indicator is determined by norms of seeding 95,6% and only 4,2% – the norms of fertilizers (*fig. 1*).
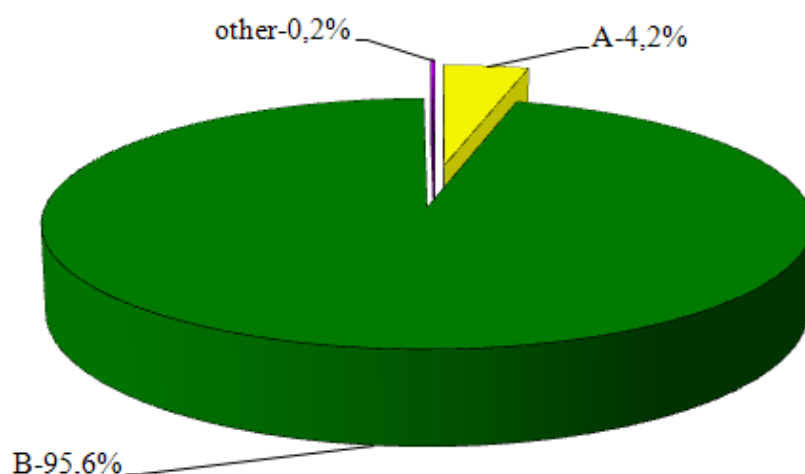
Fig. 1. Share of influence factors on the plant (A – norm of fertilization, B – norm of seeding)

Correlation analysis also confirms a strong correlation dependence of barley plants per unit area of their survival and the factor of seeding rate. Multiple correlation coefficient is $R_{y.xz}=0,99$ (*fig. 2*).

As a result of regression analysis it is showed that seeding rate is an important factor which determines the number of plants. It can be predicted the impact of seeding rate on this indicator in multiple regression equation. For example, at increasing of seeding rate of 100 seeds/m^2 the number of plants will increase by 81 units/m^2 on average. The impact on the overall survival of this figure is also significant. With improved overall survival of plants by 10% the number of barley plants may increase by 38 units/m^2. Reliability of regression equations is high. The discrepancy between theoretical and empirical data is within acceptable error.
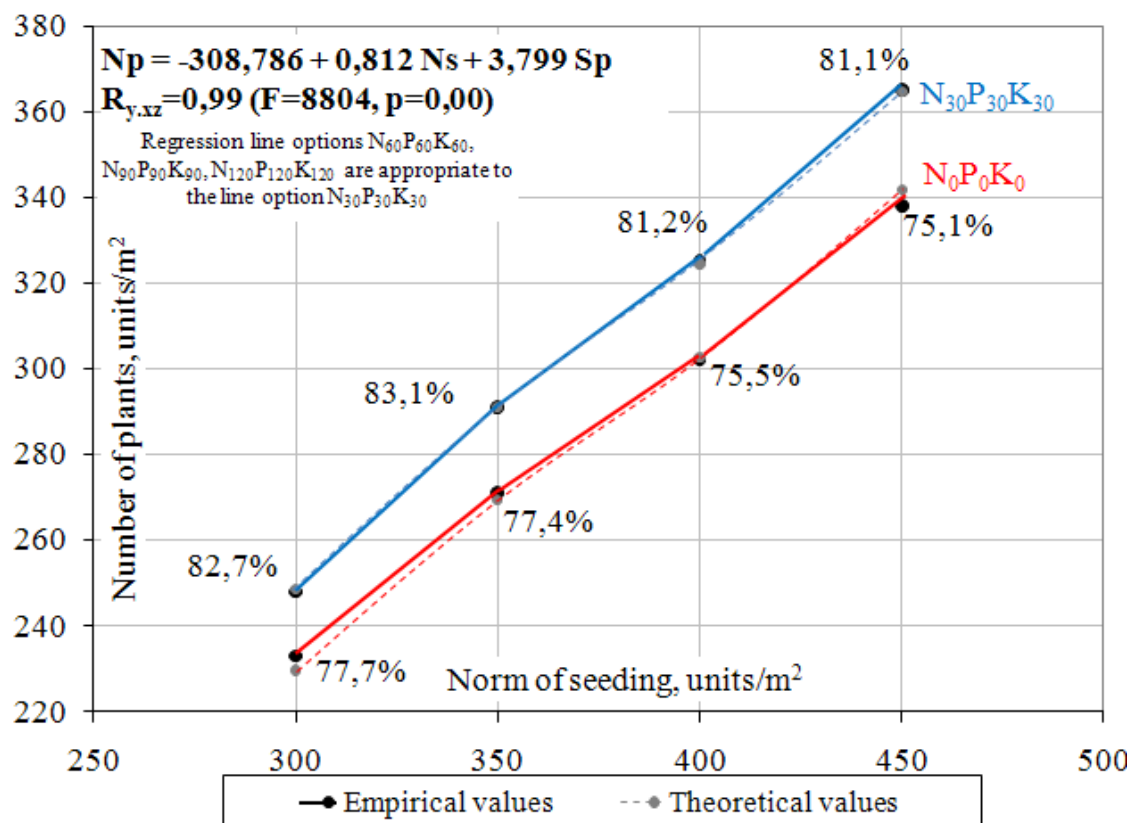

Fig. 2. Dependence of winter barley plants on the norms of seeding and overall survival

Conclusions. It is found that the number of plants at fertilization of $N_{30}P_{30}K_{30}$; $N_{60}P_{60}K_{60}$; $N_{90}P_{90}K_{90}$; $N_{120}P_{120}K_{120}$ was statistically the same and averaged 307–309 units/m^2. With increasing of seeding norms in the order 300, 350, 400, 450 units/m^2 it is found a gradual increase in the number of plants 246, 287, 321, 360 units/m^2. The share of influence of studied factors is 4,2% and 95,6%, respectively.

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Анотація

Климишена Р.І.

Параметри посівів озимого ячменю за кількістю рослин залежно від впливу факторів технології

У статті показано залежність кількості рослин озимого ячменю на одиниці площі посіву від застосованих мінеральних добрив та норм висіву насіння. Проведено обґрунтування експериментальних даних на основі коваріаційного аналізу, встановлено дію факторів, силу і форму зв'язку результативних ознак від факторіальних.

Ключові слова: озимий ячмінь, кількість рослин, норми застосування мінеральних добрив, норми висіву насіння

Аннотация

Климишена Р.И.

Параметры посевов озимого ячменя по количеству растений в зависимости от влияния факторов технологии

В статье показана зависимость количества растений озимого ячменя на единице площади посева от примененных минеральных удобрений и норм высева семян. Проведено обоснование экспериментальных данных на основе ковариационного анализа, установлено действие факторов, силу и форму связи результативных признаков от факториальных.

Ключевые слова: озимый ячмень, количество растений, нормы примененных минеральных удобрений, нормы высева семян