

РОСЛИННИЦТВО, СЕЛЕКЦІЯ ТА КОРМОВИРОБНИЦТВО

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NYTROGEN FEEDING INFLUENCE ON FORMING WINTER RAPE PRODUCTIVITY

The research results are aimed at the study of nitrogen feeding influence on forming winter rape hybrids productivity in the years of 2012, 2013 and 2014 in the conditions of alkaline and chernozem soil of Rivne district. The research results showed that the yield of studied seeds of winter rape hybrids 3,78 m/ha was at the plots with using fertilizer $N_{30}P_{80}K_{105} + N_{60}$ (reestablishment of early spring vegetation) + N_{30} (flower bud formation) growing Nelson hybrid.

Key words: rape, fertilizers, microelements, feeding, yield, productivity

A problem statement

An important sign of winter rape yield is its structure which consists of the following elements: the plants density on the plot, a number of branches and pods on a plant, an average number of seeds in a pod and the mass of 1, 000 seeds. The highest possible harvest of seeds is formed under their optimal correlation [1]. Fertilizers influence greatly on the mass of 1, 000 seeds. Taking into account that each element of the structure are formed at different stages of ontogenesis, special conditions are necessary for their development [2, 3]. Thus, seeds form better depending on the level of providing them with nitrogen at phenological phases of growing and developing (rosette forming, stem forming, branching, flower-bud formation) and its strength in vegetative organs.

The structure of the yield consists of several signs which depend on the soil and climate conditions, varieties peculiarities and a number of parameters which are defined by the technology of this crop growing [4, 5].

Objectives and research tasks

The main aim of the research was to find the optimal conditions for feeding in order to increase the productivity of a crop hybrids and to improve the quality of its seeds in specific soil and climate conditions.

The research was done in the period between the years of 2012–2014 in the conditions of Rivne region on alkaline and chernozem soils. The cropping methods for winter rape growing in the field tests is the same for this zone, but for the zone of feeding which were studied in the experiments. The research experiment was done

using the method of split plot. On the plots of the first sequence hybrids were studied, on the second the plants feeding was studied. The crop plot of an ordinary plot is 56 m², calculating one is 42 m², everything was repeated three times. Winter wheat was grown before it.

The research was done according to the scheme: Factor A was hybrids Nelson, Taurus. Factor B was feeding 1. N₀P₀K₀ (control), 2. N₁₂₀P₈₀K₁₀₅; 3. N₉₀P₈₀K₁₀₅ + N₃₀ (the restoring of spring vegetation); 4. N₆₀P₈₀K₁₀₅ + N₃₀ (the restoring of early spring vegetation) + N₃₀ (flower-bud formation); 5. N₃₀P₈₀K₁₀₅ + N₆₀ (restoring of early spring vegetation) + N₃₀ (flower-bud formation).

Phosphorous and potassium fertilizers were given in autumn when the main cultivation was done: super phosphate granulated (19 % primary nutrient) potassium magnesia (28 % primary nutrient), nitrogen fertilizers were given before sowing and during fertilizing according to the table of the research in the form of ammoniac saltpeter (34 % primary nutrient).

The research outcomes

The yield structure signs are rather changeable and depend upon the specific conditions which form quantity of each of them. We analyzed the structure of winter rape in order to prove the yield data which are received in different conditions of the experiment. The given data show that using different combinations of fertilizers use structural elements of the crop yield also changed (table 1).

Using the received results we can state that one of the factors which influence the formation of the yield structure is the plant quality which defined the plants density according to their feeding territory and the height of lower braches strength. The results show that plants low density caused branching out. It enables them to form a greater number of branches and later a greater number of pods. Thus, the winter rape feeding area changed in our research under the influence of fertilizers variants and the hybrid from 207,0 to 229,3 sm², that was defined by the number of plants on one square meter. In its turn the height of lower branches strength changed from 26,3 to 37,1 sm. Here the number of branches which the plants formed was in average from 5,3 (it was without fertilizing) to 7,4 items (it was using N₃₀P₈₀K₁₀₅ + N₆₀ + N₃₀).

The results of the research showed that yield structure elements, in part the number of a plant pods was calculated by the plants density on a tested plot and peculiarities of a crop fertilizers. During the experiment it was found that the number of pods on plants of hybrid Nelson varied from 113,8 (without fertilizers) to 113,3 items (using N₃₀P₈₀K₁₀₅ + N₆₀ + N₃₀), when hybrid Taurus had accordingly from 111,1 to 130,1 items on a plant.

The terms of fertilizing using nitrogen fertilizers influenced greatly on a number of seeds in a pod. Thus on tested plots without fertilizers the number of seeds in a pod was 18,5 items (hybrid Nelson), while hybrid Taurus had 18,1 items. The plants

formed the greatest number of seeds in a pod when using $N_{30}P_{80}K_{105} + N_{60} + N_{30}$. Thus, Hybrid Nelson had in average 22,3 items, and hybrid Taurus had 21,1 items on a plant.

The biggest number of 1,000 seeds in our research was received using $N_{30}P_{80}K_{105} + N_{60} + N_{30}$ and it was 4,8 UAH (hybrid Nelson), and it was 4,5 UAH (hybrid Taurus) and the mass of 1,000 seeds without fertilizers was 4,2 and 4,1 UAH accordingly.

The yield structure influenced directly the crop yield. Thus, the factors which were studied influenced greatly on the yield of winter rape plants. The main criterion of using the agricultural crop growing technology is the level of the yield and the cost of one yield.

Table. 1. Yield structure of winter rape plants (average for the period of 2012–2014 years)

Sign	$N_0P_0K_0$ (control)		$N_{120}P_{80}K_{105}$		$N_{90}P_{80}K_{105} + N_{30}$		$N_{60}P_{80}K_{105} + N_{30} + N_{30}$		$N_{30}P_{80}K_{105} + N_{60} + N_{30}$	
	Taurus	Nelson	Taurus	Nelson	Taurus	Nelson	Taurus	Nelson	Taurus	Nelson
The number of plants, items per m^2	43,6	43,8	45,6	44,8	48,3	44,2	45,7	46,1	48,1	48,9
The feeding area, sm^2	229,3	227,2	219,3	223,2	207,0	226,2	218,8	216,9	207,9	204,5
The height of lower branches attachment, sm	35,3	36,5	26,3	32,5	36,3	31,4	37,1	29,9	36,9	30,1
The number of branches on a plant, items	5,3	5,9	6,3	6,1	6,8	7,1	6,9	7,2	7,1	7,4
The number of pods on a plant, items	111,1	113,8	126,1	123,8	128,2	131,4	129,1	132,5	130,1	133,3
The number of seeds in a pod, items	18,1	18,5	18,6	18,9	20,4	21,6	20,9	22,1	21,1	22,3
The mass of seeds from one plant, UAH	8,2	9,3	11,2	10,4	11,8	13,7	12,1	14,1	12,5	14,4
The mass of 1,000 seeds, UAH	4,1	4,2	4,8	4,4	4,5	4,8	4,5	4,8	4,5	4,8

The outcomes of the research showed that the least yield of winter rape was got on the plots without fertilizing with data which were in average 1,56 (hybrid Taurus), and 1,78 tons per ha (hybrid Nelson).

Among the variants of using fertilizers the lowest data was received when putting the whole quota of all fertilizers while cultivating ($N_{120}P_{80}K_{105}$). It was 2,72 (hybrid Taurus) and 2,81 tons per ha (hybrid Nelson) (table 2).

**Table 2. The yield of winter rape hybrids, tons per ha
(average for the period of 2012–2014 years)**

Fertilizer	Tons per ha	
	Taurus	Nelson
$N_0P_0K_0$ (control)	1,26	1,48
$N_{120}P_{80}K_{105}$	2,72	2,81
$N_{90}P_{80}K_{105} + N_{30}$	3,11	3,29
$N_{60}P_{80}K_{105} + N_{30} + N_{30}$	3,29	3,51
$N_{30}P_{80}K_{105} + N_{60} + N_{30}$	3,66	3,87
HIP ₀₅	0,22	0,20

Using $N_{90}P_{80}K_{105} + N_{30}$ та $N_{60}P_{80}K_{105} + N_{30} + N_{30}$ the yield data differed little and were 3,11 and 3,27 tons per ha accordingly (hybrid Taurus) and 3,29 and 3,51 tons per ha accordingly (hybrid Nelson).

The highest possible yield of winter rape seeds was received putting $N_{30}P_{80}K_{105}$ in the main fertilizer, N_{60} during the spring feeding, N_{30} during the phase of flower-bud forming, that was for hybrid Taurus 3,66 tons per ha and for hybrid Nelson 3,87 ton per ha.

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