

THE WEEDS IN MULTI-ROW BARLEY AGROCENOSIS IN THE MODAL CHERNOZEM

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The weed plants in the spring barley monoculture are usually reduced the grain yield and its quality. During the period of the spring barley tillering, the number of weeds in the typical black soil (e.g. the modal chernozem) is practically reached 28–38 items/m², and their weight – 5,7–10,9 g/m². The seeding rate dosage is usually affected on the contamination of the crops. In embodiments with the Suzdalets two – row barley grade, the seeding rate dosage increase from 2 up to 6 mln. items/ha is practically reduced the number of the weeds per 1 m² for 10–15 pcs. So, in multiple – row barley, the reduction is reached 12 – 16 pcs. at the Vakula grade, and the 13–16 pcs. – at the Helios grade. The Bazagran herbicide application is practically allowed to be reduced the barley crops contamination in 2,7–8,7 times. The areas with the highest standards of the seeds sowing are cleaner of the weeds. The multiple – row barley crops, due to the increased tillering, have 1,4 – 2,0 times lower, than the weeds number, and to 1,2–1,9 times their weight, than the two – row barley crops.

Keywords: weeds, multi-row barley, agrocenosis, chernozem

The foreign plants, in the agricultural purpose monoculture, are practically lost their moisture, the nutrients, are spread their diseases and the pests, and are made the soil treatment more difficult, its care, and the harvesting. So, the weed plants competition with the field crops is practically caused the large damage to the agriculture. The spring barley crop losses, depending on the contamination degree, and the weed vegetation species, can be reached up to 30%. In this regard, the weeds number regulation in the monoculture population is practically the significant and the topical relevant condition of the field culture productivity. So, the grain crops contamination reducing is provided the arrangement activities carrying out, as the preventing measures, having aimed at the crops optimal density formation, the weeds skidding prevention in the field, well as the fighter, having connected with the weed plants destruction in the crops [1].

Having given the barley significance in Russia, as the leading grain culture and the major cereal crop, the cereal, malting, and feed purposes, and, in 2010–2012-es, the field researches in the typical forest – steppe black soil (e.g. the modal chernozem) with the new released grade varieties of the Vakula and the Helios spring barley have been conducted by us.

The test area soil has had the weak – acidic reaction of the environment, the average availability of nitrogen, phosphorus and potassium, with the humus content 4.9%. The barley sowing has been carried out with the space between the already made rows of 15 cm and the rate of 2; 3; 4, and 5 mln pieces of the viable and germinating seeds per hectare. The planting dates have been generally accepted for the Black Earth forest – steppe, and the technology – is quite typical for the region. To be controlled the Suzdalets two – rowed spring barley has been sown simultaneously by the released grade varieties. All these seeds have comple-

ly been met the State Standards (e.g. GOST) on the planting qualities of the seeds sown PC – 1.

So, the barley contamination study has been carried out under the production conditions, where the Bazagran herbicide treatment, at the dose of 3 l/ha, has been held just in the beginning of the tillering phase. The Moscow – 56 winter wheat has been the barley predecessor.

In the result of the carried out researches, in the barley sowing it has been found, that the weed plants species composition, the number and its weight have been dependent on the weather conditions and the rules of the growing season of the sowing seeds. This is practically connected with the different requirements of the weeds separated and the individual species to the basic factors of the life, the competition field changing between the field crops and the weeds. In the weed component structure, the dominant group, the annual weeds group has been, both, as in number, well as in dry weight. The barnyard-grass (e.g. *Echinochloa crus-galli*), the lamb's-quarters (e.g. *Chenopodium album*), the yellow foxtail-grass (e.g. *Setaria glauca*), the odorless chamomile (e.g. *Matricaria perforata*), the common chickweed (e.g. *Stellaria media*), the shepherd's purse (e.g. *Capsella bursa-pastoris*), the shiritsy thrown back (e.g. *Amaranthus retroflexus*) have been observed their massive spread. And from the perennial weeds have sporadically been met the following: the field (or Canadian) thistle (e.g. *Cirsium arvense*), the field sow thistle (e.g. *Sonchus arvensis*), the field or trailing bindweed (e.g. *Convolvulus arvensis*). So, the maximum contamination of the barley crops in the tillering phase had been observed I 2011 and 2012, which were characterized by the intensive rainfall during the growing season. The common chickweed (e.g. *Stellaria media*) has been the most widespread. Its share in the specific weight in the total mass of the weeds, by the results for the first time determining has

been reached 35–40%. This weed plant has been in the lower tier of the seeding, and the negative impact on the barley further growth and its development has not been had. The minimum contamination has been in 2010, the growing period of which has been characterized by the hot and dry weather.

The contamination in the options experiments with the different varieties and the

barley sowing rates in the tillering phase has been the same, as that of the dual, well as the multi – row barleys. So, the observed changes in the weeds number and in their dry weight have been within the experimental error. Thus, during the studies years, it has been established the lasting influence of the seeding rate dose, as the weeds number, well as their weight (see, the Table 1).

Table 1

The Barley Crops Contamination in the Tillering Phase
(Without Herbicide Treatment)

Grade	Sowing Rate, mln. pcs/ha	The Weeds Amount, pcs/m ²				The Weeds Weight, g/m ²			
		2010	2011	2012	average	2010	2011	2012	average
Suzdaletz (control)	2	31	36	47	38	8,4	11,6	12,4	10,8
	3	26	34	43	34	8,1	10,3	11,3	9,9
	4	23	31	40	31	7,5	9,4	10,2	9,0
	5(κ)	22	30	38	30	7,0	9,0	9,2	8,4
	6	20	26	32	26	6,0	8,4	8,5	7,7
	HCP _{0,5} , %	1,4	1,6	1,9		0,2	0,3	0,4	
Vakula	2	32	35	45	37	8,8	11,5	12,5	10,9
	3(κ)	28	33	42	34	8,0	10,0	11,3	9,8
	4	24	26	35	28	6,7	8,6	9,8	8,4
	5	20	25	31	25	5,8	7,5	8,6	7,3
	6	18	23	29	23	5,0	6,7	7,4	6,4
	HCP _{0,5} , %	1,2	1,4	1,5		0,3	0,3	0,4	
Helios	2	30	37	46	38	8,4	11,3	12,3	10,7
	3(κ)	28	32	42	34	7,6	10,1	11,0	9,6
	4	22	24	32	26	6,4	8,0	9,4	7,9
	5	18	22	25	22	5,3	6,9	7,7	6,6
	6	16	20	23	20	4,6	5,7	6,9	5,7
	HCP _{0,5} , %	1,3	1,5	1,5		0,3	0,4	0,4	

M.A. Dauletov and S.E. Kalmykov have pointed to the great significance in the fight with the seeding rate dose contamination [2]. They have also noted, if agricultural crops are taken up the entire area, and they are grown up rather quickly and vigorously, then the weeds are displaced or they are absolutely absent. And, conversely, if the seeding is lightened and thinned, the established seeding crops sowing norm is not practically respected and observed, or the plants growth is slowed down – the weeds will be «flourished».

In our experience with the Suzdaletz grade, the contamination has been decreased at the seeding rate dose increasing from 2 up to 6 mln pcs./ha in 2010 to 11 weeds, in 2011–2012-es, – correspondingly, by 10 and 15 weeds. So, the weeds number reducing with the seeding rate dose increasing has also been observed at the multi – row barley varieties. In 2010, in the

Vakula grade, the contamination in the studied variants has been reduced from 32 down to 18 pcs/m², in 2011 – from 35 down to 23 pcs/m², and in 2012 – from 45 down to 29 pcs/m². The Helios varieties on the plots of the land, the contamination decrease with the seeding rate dose increasing has been gone more intensely. So, for example, in the version with the maximum sowing dose, the weed seeds number has not been exceeded in 2010 – 16 pcs/m², in 2011 – 20 pcs/m², in 2012 – 23 pcs/m². So, this is indicated on the suppression of the weed vegetation by the barley Field culture, and the decline degree of the weed vegetation number is practically depended on the seeding density. In the variants with the maximum sowing dose, the plants density has been reached the varieties at the Suzdaletz 392 – 448 pcs/m²; at the Vakula – 436–485 pcs/m²; at the Helios – 420–481 pcs/m².

The maximum weight of the weeds, to the period of the tillering phase, has been escalated in 2012, and the lowest one, as well as their numbers, – in 2010. The variety influence on the dry substance weight of the weeds has been begun to be appeared on the increased on the rise doses in the rate of sowing. At the dose rate of the sowing seeds 2 and 3 mln pcs/ha, the difference between the varieties has not been significant, but at the dose rate of the sowing seeds 4; 5 and 6 mln pcs/ha, the mass weeds in the sowing of the Suzdaletz grade has been higher, than in the multi – row barley crops. So, in 2010, it, has respectively, been made up 7,5; 7,0 and 6,0 g/m²; in 2011 – 9,4; 9,0; and 8,4 g/m², and in 2012 – 10,2; 9,2 and 8,5 g/m². While, as at the Vakula grade, under the same seeding standards, it has been, respectively, in 2010 – 6,7; 5,8; and 5,0 g/m²; in 2011 году – 8,6; 7,5 and 6,7 g/m²; in 2012 – 9,8; 8,6 and 7,4 g/m². At the Helios grade, the weeds component weight has been for 1,1–2,7 g less, than that at the control varieties, and for 0,3–1,0 g less, than at the Helois grade.

The Bazagran herbicide application (e.g. 3 l/ha) has been helped to be reduced the contamination in 2,7–8,7 times, and some weed plants species have considerably been

depressed and slowed down in their further growth. The two weeks, after the herbicide treatment, the sites survey was shown, that not only the number of the vegetative weeds, but also their weight have been reduced (see, the Table 2). For all this, it can be stated by us, that the complete weeds destruction is not practically even in the crops processing at the optimal time. So, one of these reasons, by the V.V. Isaev's conclusion, is that the weed seeds, having come out their dormancy state, have the two waves of the germination: the early spring biogroup, having overwintered creeping – rooted and rhizomatous weed forming – in the first half of the spring and the fall in part; the late spring ones – in the second half of the spring and summer [3]. The emergence of the weeds' second wave is practically confirmed by the fact, that the weeds number in the barley crops after the herbicide treatment has significantly been varied by the variants of the experiment. If prior the herbicide treatment of the weed plants in excess of the variants' number with the minimum and the maximum dose rate of seeding has been made up at the Suzdaletz grade 1,5 time, at the Vakula and the Helios ones, respectively, 1,6 and 1,9 time, then, after the herbicide treatment – 2,3; 4,0 and 3,7 time.

Table 2

The Barley Crops Contamination, Depending on Sowing Variety and Rate
(the Herbicide Treatment, 2010–2012-es)

Sowing Rate, mln pcs/ha	The Contamination during Growth					
	The Tillering Phase		The Phase of Earing		The Maturity	
	pcs/m ²	g/m ²	pcs/m ²	g/m ²	pcs/m ²	g/m ²
Suzdaletz						
2	14	5,7	18	27,5	19	31,4
3	11	4,0	14	21,8	13	25,0
4	10	3,5	11	18,0	11	20,1
5	8	2,7	9	11,4	10	13,7
6	6	2,0	8	10,2	8	11,9
Vakula						
2	12	4,3	16	21,2	16	30,1
3	10	4,0	13	18,3	12	23,8
4	6	2,7	10	14,7	10	18,2
5	4	1,8	8	10,0	8	13,0
6	3	1,1	5	5,2	4	7,1
Helios						
2	11	4,1	15	17,9	14	26,3
3	9	2,7	12	14,3	11	20,2
4	5	1,9	7	8,0	8	14,0
5	4	1,3	5	5,3	5	8,1
6	3	1,0	3	2,8	4	6,2

This is given the basis to be considered, that if after the barley seeds and the weed plants sowing, they are being grown up, under the same conditions, then after the herbicide treatment and the weeds part destruction, the additional weeds emergence is practically held under the tier of the tillered and cultivated plants, which, in their turn, are inhibited the weeds and are held back their number and the further growth.

So, the subsequent contamination surveys of the barley sowing have been shown, that the weeds number is being grown up slightly. The weeds number by options for the different rates of seeding in the heading phase has been increased up to 8–18 pcs/m² at the Suzdaletz variety. The weeds number has been even smaller, and in the phase of their maturity, it has not been exceeded 4–16 pcs/m² at the Vakula and the Helios grades. At the time, while, how the weeds mass was being grown up to the period of the earing phase at the grades of the Suzdaletz in 4,8–5,1 times; the Vakula – in 4,7–4,9 times; the Helios – in 4,0–4,4 times. Many weeds' species were continued to be vegetated, before the barley harvesting, having increased their mass. In the period of the barley maturity, the weed component dry mass has been the maximal at the dose rate of seeding 2 mln pcs/ha, and it has been made up at the Suzdaletz grade 31,4 g/m², at the Vakula and Helios varieties, – respectively, 30,1 and 26,3 g/m².

As a result, it should be concluded, that the already obtained results are consistent with those of many researches on the herbicides' ef-

ficiency in the fight against the weed vegetation and constantly control it [4; 5]. With its growth and the further development, the barley plants are being successfully competed with the weeds for the factors of the life and the vital factors. This is quite clearly indicated by the data on the weeds' number and also their weight in the crops just before the harvest. There has been the significant effect of the variety regularity lack on the crops contamination at the early stages of the growth, and the barley contamination reduction in the variants with the increased seeding rate has been shown and revealed. The multi – row barley crops, due to the increased tillering and their bushiness of the already studied varieties, have had in 1,4–2,0 times lower the contamination on the weeds' number and in 1,2–1,9 time by their weight, than the two – row barley crops.

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