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WEEDINESS OF THE LINK OF FIELD CROP-ROTATION DEPENDING ON THE AGRICULTURE SYSTEMS IN THE RIGHT-BANK FOREST-STEPPE OF UKRAINE.

Researches in the stationary field experiment found a significant increase in the actual weediness and mass of weeds in crops of the link of field crop rotation with a decrease in the level of anthropogenic load on agrophytocenoses. The best weeds control was relatively industrial farming system on the background of periodically mouldboard tillage in crop rotation.
Keywords: *system of agriculture, soil tillage, ecologization, weediness*

Introduction. Weeds as crops need factors of life: light, moisture, heat and nutrients. Limited amount of this factors leads to competition between them. Therefore between cultural and weedy components in their joint growth are composed sophisticated relationships that are important for the development of components agrophytocenoses. In the course of evolution, weeds acquired a number of properties that allow them to remain in crops. A variety of types of weeds, their biological characteristics and other properties determine the intensity of direct and mediated mutual influence between them and cultivated plants [0, 0, 0, 0].

Investigation of the effect of different tillage and fertilization on phytosanitary condition of crops is important for improving the efficiency of agriculture in general. In ecologization of agriculture, when use of pesticides considered as an extreme measure to the need to preserve the harvest of crops, a special role in regulating of agrophytocenoses belongs competitiveness grown crops to weeds, science-based crop rotation, and systems of tillage, rational use of fertilizers and other factors. Optimization phytosanitary condition of crops, primarily, should be aimed at reducing the harm that weeds bring crops.

The purpose of research was to determine the impact of different systems of agriculture on weediness link of crop rotation: maize for silage-winter wheat-maize.

Materials and methods. Experimental researches were conducted in a stationary experiment of NUBiP of Ukraine "Agronomic Research Station" (Pshenychne, Kyiv region) and research laboratories of the Department of Agriculture and herbology during 2011–2013.

Scheme of crop rotation is typical for forest-steppe conditions: lucerne–winter wheat, crop white mustard (as green manure)–sugar beet–corn for silage–winter wheat, crop white mustard (as green manure)–maize–pea–winter wheat crop white mustard (as green manure) –sugar-beet–barley with sowing of lucerne.

Graduation of the first factor (A) is system of agriculture. They are composed based on their resource supply for the reproduction of soil fertility:

Industrial (control) is the priority use of industrial agrochemicals for the reproduction of fertility of soil, bringing on a 1 hectare of area of crop rotation of 24 t organic fertilizers, 300 kg of NPK of mineral fertilizers and intensive application of pesticides for protecting of sowing from harmful organisms;

Ecological is the priority use for the reproduction of soil fertility of organic fertilizers. Bringing on a 1 hectare of area of crop rotation of 24 t organic fertilizer (12 t leave to rot, 6 t of not commodity part of harvest, 6 t mass of green manure), and 150 kg of NPK of mineral fertilizers. In addition, complex biological seed treatment, by application of chemical preparations after the criterion of ecological and economical threshold of presence of harmful organisms;

Biological – application only of natural resources is 24 t/ha organic fertilizers for the reproduction of soil fertility without bringing of industrial agrochemicals, use of complex bio preparation for treatment of seed and biological facilities of defence of sowing.

The system of soil tillage in crop rotation in each model of agriculture presented in four variants:

1) differentiated (control) with the execution six different deep ploughings during rotation, two disking on 8–10 cm under winter wheat after peas and silage corn and one land clearer cultivation during barley;
2) subsurface ploughing – different deep subsurface plough soil loosening under all crops except the surface tillage under winter wheat in the fields listed in the control;
3) periodical mouldboard tillage: includes ploughing under sugar beet, surface cultivation under winter wheat in the fields listed in the control and subsurface ploughing under other crops;
4) superficial: disking to a depth of 8–10 cm for all crops.

Results and discussion. At the beginning of the growing season of crops, there is a substantial increase weediness in crops in variants of biological agriculture. The most number of weeds was observed in variants of biological system, 396 pcs/m^2 in average of cultures, and the smallest – in industry, 231 pcs/m^2 (Table). Among the systems of soil tillage best effect of weedy control showed periodical mouldboard tillage. By its application, the level of weediness decreased by 17 % compared to control. Superficial and subsurface ploughing causing a significant increase in actual weediness crops, respectively, 37 and 51 %.

Because of the absence of chemical measures to protect crops from weeds, significant growth of weediness in biological agriculture (more than 2-fold) was stored until the end of the growing season crops.

At the time of harvesting crops, trends in the number of weeds in different systems of agriculture remain unchanged.

High crop weediness is a risk factor for the introduction of systems of agriculture with full or partial restriction on the introduction chemical preparations against weeds. Therefore, the extirpation of reproductive weeds is a condition of stabilization and subsequent reduction of weediness fields. A significant number of weeds that survived to the period of harvesting crops has given the seeds. Neither of systems of agriculture could not reach the allowed presence the reproductive instances of weeds in crops plants, which in maize crops is 8 pcs/m^2, and winter wheat – 10 pcs/m^2.

Table

The impact of systems of agriculture on weediness fields of crop rotation, the average for the years 2011–2013

System of agriculture (factor A)	System of soil tillage (factor B)	Weediness, pcs/m^2			Weeds mass, g/m^2
		beginning of growing season	harvesting	reproductive	
1	2	3	4	5	6
corn for silage					
Industrial (control)	differentiated (control)	186	62	54	455,0
	subsurface ploughing	360	118	104	907,3
	periodical mouldboard tillage	158	53	45	339,7
	superficial	320	119	100	755,3
Ecological	differentiated (control)	263	86	78	480,3
	subsurface ploughing	417	128	114	952,0
	periodical mouldboard tillage	188	83	71	374,7
	superficial	342	145	135	1187,3

Continuation of the table

1	2	3	4	5	6
Biological	differentiated (control)	267	122	111	516,3

	subsurface ploughing	624	278	229	896,3
	periodical mouldboard tillage	269	126	120	353,7
	superficial	687	262	222	1030,3
$SED_{05}A$		4,7	4	3,9	8,3
$SED_{05}B$		5,4	4,6	4,4	9,1
$SED_{05}AB$		9,4	7,9	7,0	10,8
winter wheat					
Industrial (control)	differentiated (control)	82	31	7	55,3
	subsurface ploughing	159	49	12	75,7
	periodical mouldboard tillage	96	43	20	57,0
	superficial	159	56	27	393,0
Ecological	differentiated (control)	139	56	28	143,3
	subsurface ploughing	198	131	21	397,3
	periodical mouldboard tillage	148	84	28	148,3
	superficial	197	110	25	348,3
Biological	differentiated (control)	140	115	31	238,0
	subsurface ploughing	216	220	31	307,0
	periodical mouldboard tillage	142,0	113	34	407,3
	superficial	213	247	52	349,7
$SED_{05}A$		4,2	3,7	2,4	5,8
$SED_{05}B$		5,0	4,3	2,7	6,6
$SED_{05}AB$		8,5	7,5	4,7	8,5
maize					
Industrial (control)	differentiated (control)	297	59	55	303,7
	subsurface ploughing	408	132	117	914,7
	periodical mouldboard tillage	236	52	44	256,7
	superficial	314	91	74	598,7
Ecological	differentiated (control)	426	76	70	391,0
	subsurface ploughing	530	168	160	786,7
	periodical mouldboard tillage	276	78	71	335,0
	superficial	355	100	91	768,3
Biological	differentiated (control)	536	113	99	746,7
	subsurface ploughing	619	182	169	1003,0
	periodical mouldboard tillage	413	143	120	469,0
	superficial	630	236	219	1145,7
$SED_{05}A$		4,5	3,9	3,4	8,8
$SED_{05}B$		5,3	4,7	3,5	9,7
$SED_{05}AB$		8,2	7,7	4,9	11,8

So for the industrial system there were 55 pcs/m^2 the reproductive instances of weeds by ecological – 74, and biological – 120. Among the tillage systems, periodical mouldboard tillage not significantly different from control. It caused increase the number of reproductive weeds on 4 % only, compared to control.

Data on the number of weeds confirm inability of superficial tillage, especially against the background of biological agriculture, effectively control the number of weedy component of agrophytocenoses properly.

The above negative processes are amplify increasing mass of weeds. Before that leads rejection of the use of pesticides. Minimum weight of weeds was in periodical mouldboard tillage because of smaller number and weaker development them (-17 %). The most mass of weed viewed (more than 2-fold) in subsurface ploughing and superficial tillage per biological agriculture, which

can be explained by the high number of weeds in these field. Ecological system has led to an increase in mass of weeds at 23 %.

The degree of weediness also has a significant impact by the amount obtained crop. There is a strong negative correlation between the weediness of crops at the beginning of the growing season and before harvesting and productivity. The higher number of weeds causes less amount of mass of corn silage (r = -0.79, r =-0.89).

Winter wheat has the yield at 3.9 t/ha for industrial farming systems on average over three years, and for ecological and biological the yield were 4.4 and 2.9 t/ha, or +13.6 %, and -26.3 % in relative terms to average yield for industrial system. The best results are obtained by ecological system of agriculture in combination with differential and periodical mouldboard tillage systems – 4.8 and 4.6 t/ha of winter wheat. What by 16.6 and 10.3 % more than the control. The negative effect of a combination of biological system of agriculture with subsurface ploughing and superficial tillage led to a significant reduction in yield by 33.6 and 39.5 % compared with the control.

Winter wheat more competitive in relation to weeds, so the correlation their numbers with crops yield is less. The dependence of the yield on the amount of weeds in crops at the beginning of the growing season, before harvesting the cultures and the mass of weeds is expressed by correlation coefficient r = -0,45, -0,62, -0,52.

In the experiments, maize on average for 2011–2013 gave the same yield in industrial and ecological farming systems – 6.7 t/ha, whereas for biological only 5.3 t/ha, which is 20.7 % less. The best variant a combination of researched factors were in industrial and ecological systems of agriculture on the background periodical mouldboard tillage. The least amount of corn per unit area obtained by biological system of agriculture with superficial soil cultivation – 4.4 t/ha (-39.3 % of control). Variants of differentiated and periodical mouldboard tillage did not significantly differ (6.4, 6.5 t / ha), but there is a significant difference between them and subsurface ploughing and superficial variants, that provide of 5.5 and 4.4 t/ha of corn in average.

It can be argued about strong influence of weediness on the yield of corn. As in the maize crops for silage, here there is a high negative correlation between the increase in the number of weeds and yield of different variants depending on the combination of farming systems and soil tillage. Effect of weediness of culture at the beginning of the growing season r = -0.77, at the end of the growing season - 0.83, the mass of weeds - 0.85.

Conclusions. Industrial system of agriculture per the influence of all parameters of weediness of crop was the best. Ecologization of agriculture leads to an increase in weediness agrophytocenoses link of crop rotation, especially in the biological agriculture, where there is the most significant increase in actual weediness, indicating that its inability to effectively control it.

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Анотація

Павлов О. С., Бабенко А. І.

Забур'яненість посівів ланки польової сівозміни залежно від систем землеробства в Правобережному Лісостепу України

Дослідженнями у стаціонарному польовому досліді встановлено істотне підвищення рівня фактичної забур'яненості і маси бур'янів у посівах культур ланки зерно-просапної сівозміни із зменшенням рівня антропогенного навантаження на агрофітоценози. Кращою відносно контролю бур'янів виявилась промислова система землеробства на фоні полицево-безполицевого обробітку ґрунту в сівозміні.

Ключові слова: *система землеробства, обробіток ґрунту, екологізація, забур'яненість*

Аннотация

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Засоренность посевов звена полевого севооборота в зависимости от систем земледелия в Правобережной Лесостепи Украины.

Исследованиями в стационарном полевом опыте установлено существенное повышение уровня фактической засоренности и массы сорняков в посевах культур звена зернопропашного севооборота с уменьшением уровня антропогенной нагрузки на агрофитоценозы. Лучшей относительно контроля сорняков оказалась промышленная система земледелия на фоне отвально-безотвальной обработки почвы в севообороте.

Ключевые слова: *Система земледелия, обработка почвы, экологизация, засоренность*