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WEEDINESS OF LINK OF THE FIELD CROP ROTATION DEPENDING ON THE DIFFERENT FARMING SYSTEMS

The results of studies on the effect of different farming systems and soil tillage on weediness level in link of crop rotation.
Keywords: *weeds, sugar beet, winter wheat, alfalfa, farming systems, tillage systems*

Introduction. Weediness of crops is an urgent problem, despite advances in the development of technologies to protect. Simplifying technologies of crops cultivation only increases the problem of weeds. Reducing the quality of tillage, removal of, for lack of funds, of chemical protection has led to adaptation and mass distribution of over 300 weed species [5].

Selective weed resistance to measures of protection against them, in different farming systems led to the emergence of species that are associated specifically with these farming systems. For example, winter and overwintering types of weeds are a problem for both tillage and No-till. However for No-till, in more problems become annual early spring and perennial [3].

Formation of specific weediness type is observed depending on the type of crop. In the fields of winter wheat overwintering weeds caused the most damage (Descurainia Sophia, Thlaspi arvense, Senecio vernalis, etc.), perennial (Cirsium arvense, Sonchus arvensis, Convolvulus arvensis) and annual (Chenopodium album, Ambrosia artemisiifólia, etc.) [4].

This specialization of harmfulness vegetation indicates a high level of adaptability. this is appears from continuous and gradual decrease in the efficiency of chemicals for weed control under different farming systems. This phenomenon was called resistance. This is particularly true of environmental and biological farming systems, in which the proportion of chemical plant protection is reduced or completely eliminated.

Under these conditions increases importance of method for biological suppression. Long-term implementation of phytocoenotic measures considering biological characteristics of weeds can reduce the use of herbicides to 50% [6].

Therefore, the aim of our research was to study the specific of formation of weediness group in the link of crop rotation depending on different farming systems to identify measures to fully ensure control for number of weeds and identifying problematic species typical for these farming systems.

Materials and methods. The study was conducted in the link of field crop rotation alfalfa - winter wheat - sugar beet, in a stationary two-factor experiment of the Department of Agriculture and Herbology, during 2012-2013 yy. Experiment study: three farming systems and four variants of soil tillage in 10-fields crop rotation founded in 2002 at the Agronomic Research Station NULES of Ukraine, Kyiv region. Soil cover research areas typical black soil humus. The humus content in the plow layer soil is 4%, pH - 6.8, absorption capacity is 32,5 mh-ekv/100 g soil.

Crop rotation: alfalfa – winter wheat – sugar beet – maize silage – winter wheat – maize – pea – winter wheat – sugar beet – barley sowing with alfalfa.

Scheme of the two-factor field experiment

Factor A. - Farming systems: industrial (control), environmental, biological.

Factor B. - Soil tillage systems: 1) differentiated tillage, 2) subsurface tillage, 3) periodically tillage, 4) surface tillage.

Variants of the stationary experiment are located by split plots method. Repeated of experiment – are four times, accommodation variants in repetition – regular. Plots of first order with variants of soil tillage had 280 m², accounting - 225 m². The plots of the second order applied system of fertilization and plant protection. Plots area was 93.6 m², accounting - 75 m².

Contents gradations of the first factor:

Industries (control) - priority industrial use of agrochemicals for restoring soil fertility with the introduction on per hectare of crop rotation of 12 tons of manure, 300 kg of NPK fertilizers, intensive protection of crops from pests by using pesticides;

Environmental - priority use for restoring soil fertility organic fertilizers with the introduction on per hectare of crop rotation of 24 tons of organic matter (12 t manure, 6 tons of non-commercial harvest, 6 tons of green manure crop weight) and 150 kg of NPK fertilizer, seed processing complex biological drugs with properties of mobilization nutrients and funhistatical. Using chemicals on the criterion of ecological and economical threshold of harm;

Biological - use only natural resources: 24 t/ha of organic matter for soil fertility reproduction without making industrial agrochemicals, using complex of biological product for seed treatment, biological crop protection.

Contents gradations of the second factor:

1. Differentiated tillage: using surface tillage once during rotation under barley, twice ridge tillage under winter wheat after silage corn and peas and six other tillage;
2. Subsurface tillage for all crops except surface tillage under winter wheat;
3. Periodically tillage – two tillage under sugar beets, surface and subsurface tillage under other crops;
4. Surface tillage conducting disk tillage on depth of 8-10 cm under all crops rotation.

Results and discussion. The effectiveness of crop protection depends on the correct choice of weed control methods based on agrobiological groups. For example, perennial species, despite their problematic, could be controlling by the number of measures, and a few years completely lead out from the field. Annual weeds created a large "banks" of seeds in the soil, making it impossible completely withdraw them [5].

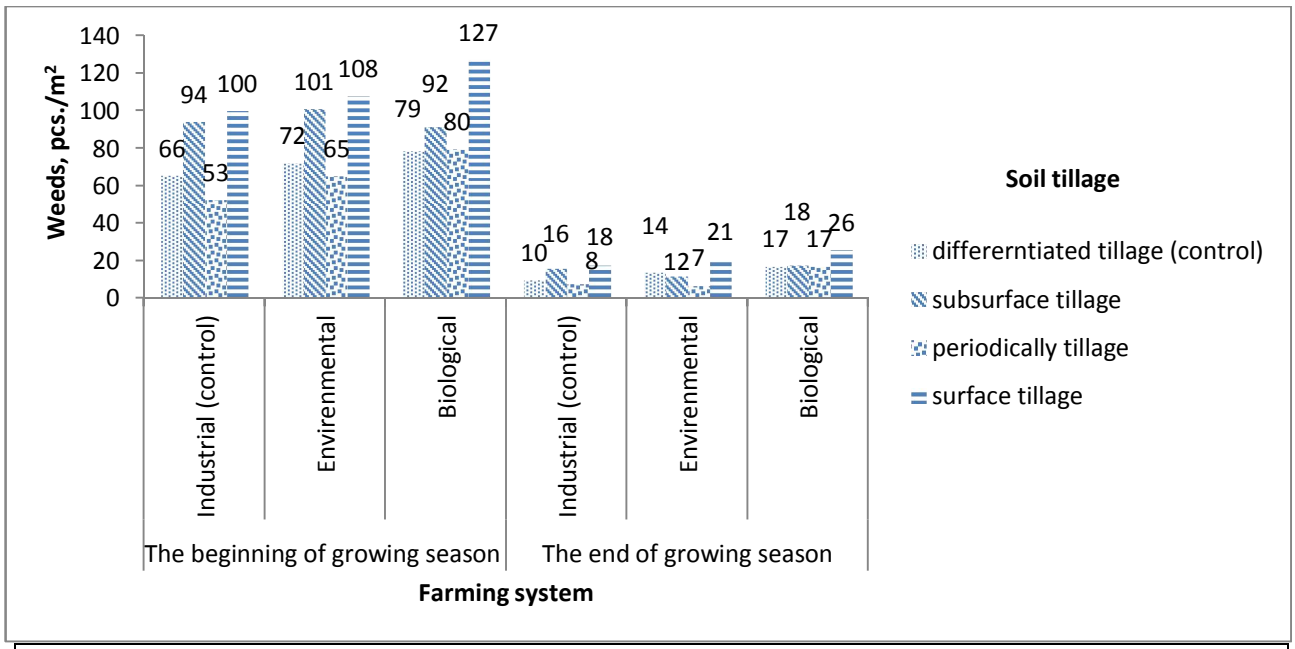
Analysis of the results of studies has shown that on the formation of weed-infested a significant impact has choice of farming systems and soil tillage system.

In crops of alfalfa highest number of weeds, early in the growing season, observed in surface cultivation. Weediness is increased from industrial farming systems to biological. The highest number of weeds was by surface cultivation in the biological system of farming - 127 pcs./m^2. Smallest was in variant of periodically tillage in industrial farming system - 53 pcs./m^2. This dependence kept to the end of the growing season (pic. 1.).

Also found that farming systems significantly affected on distribution of agrobiological groups in crops. For industrial and ecological farming systems dominated annual dicotyledonous weeds - 46% and 56%, respectively, for biological - perennial monocots (87%). At the end of the growing season share of weed respective groups increased to 60%, 78% and 97% respectively.

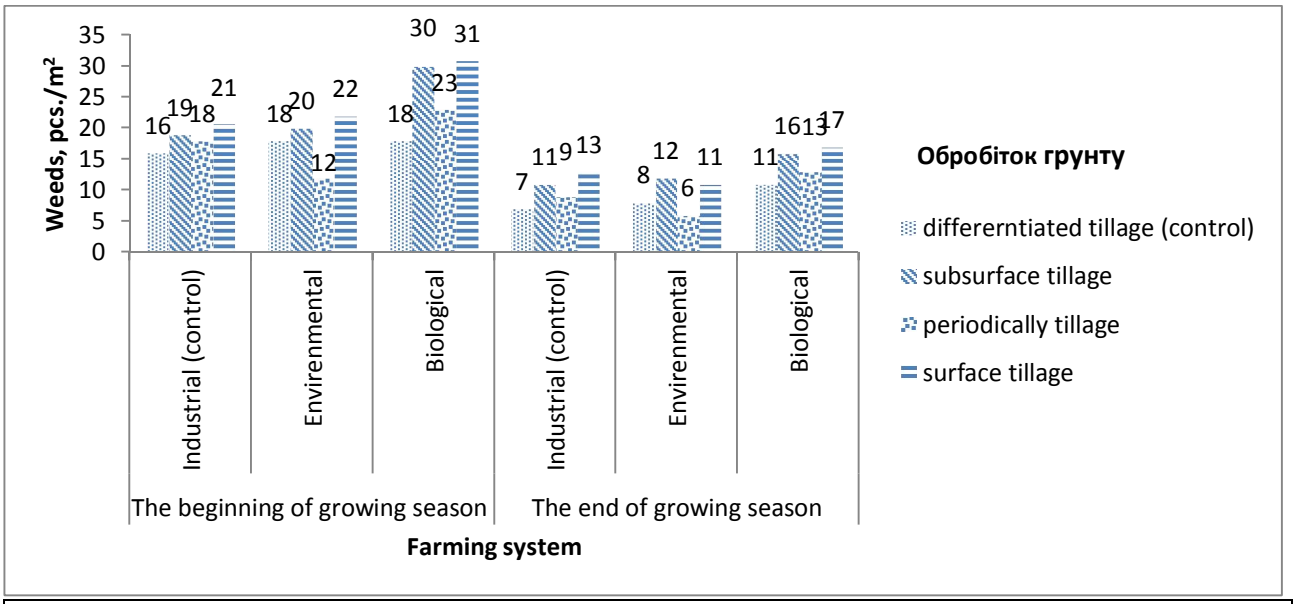
At the beginning of the growing season in crops of winter wheat largest number of weeds was observed in biological farming system for surface tillage - 31 pcs./m^2, the lowest - in the ecological system of periodically tillage - 12 pcs./m^2. At the end of the growing season showed a similar dependence between the numbers of weeds and farming systems (pic. 2.).

In all farming systems dominated were annual dicotyledonous weeds - 86% in industry, 72% in environmental and 73% in biological farming systems. At the end of the growing season predominant weed species for industrial, environmental and biological farming system were monocots annual species - 70%, 82% and 61% respectively.



	The beginning of growing season	The end of growing season
LSD_{05} for farming system –	6,1 pcs./m²	3,6 pcs./m²
LSD_{05} for soil tillage –	7,0 pcs./m²	4,2 pcs./m²
LSD_{05} for interplay of factors –	12,1 pcs./m²	Ff<F_{05}

Pic. 1. The impact of farming systems and tillage on weediness of alfalfa crops (average for 2012-2013)



	The beginning of growing season	The end of growing season
LSD_{05} for farming system –	2,5 pcs./m²	3,6 pcs./m²
LSD_{05} for soil tillage –	2,9 pcs./m²	4,2 pcs./m²
LSD_{05} for interplay of factors –	5,1 pcs./m²	Fф<F_{05}

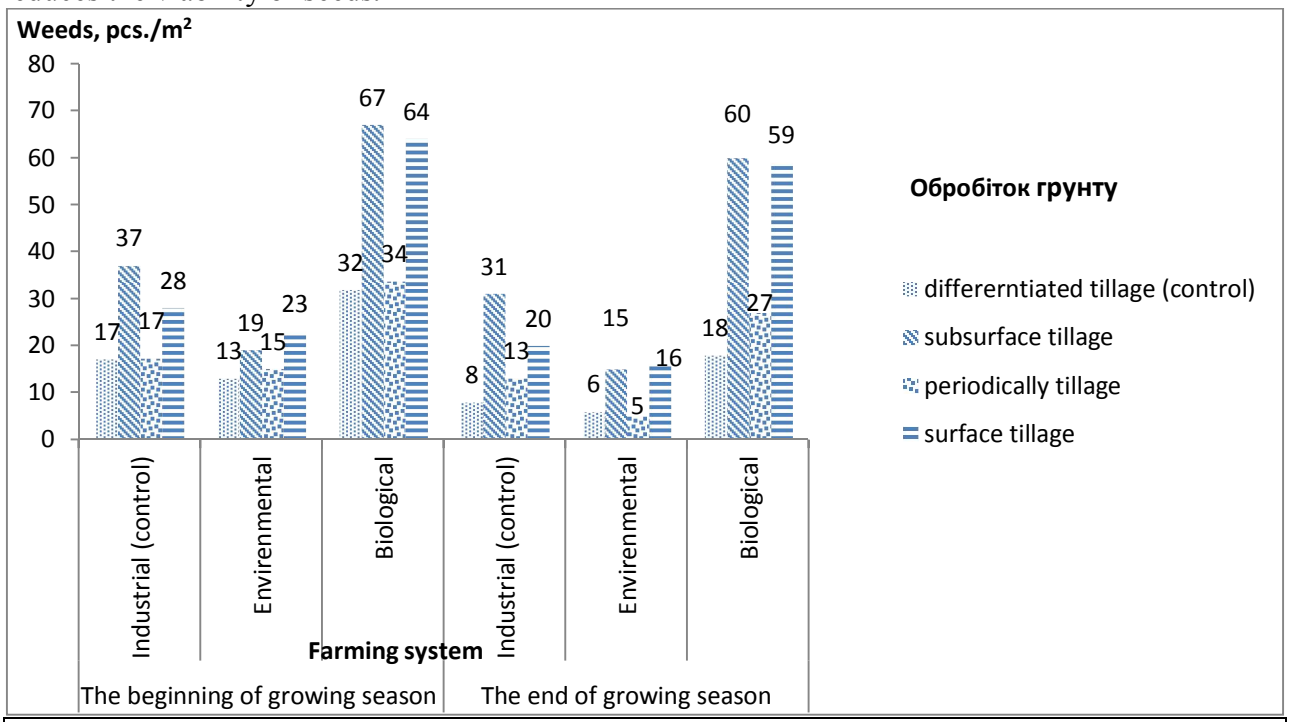
Pic. 2. The impact of farming systems and tillage on weediness of crops of winter wheat (average for 2012-2013)

In crops of sugar beet largest weediness in the early growing season was observed for biological farming system in the subsurface tillage - 67 pcs./m². At the end of the growing season weediness significantly decreased in all farming systems. The smallest number proved to in

ecological farming system at periodically tillage. The largest remained variant of surface tillage in biological farming system (pic. 3.).

At the beginning of the growing season for industrial and biological farming system dominated were dicotyledonous annual weeds - 56% and 64%, respectively, for the ecological system annual monocots - 61%. At the end of the growing season for the biological farming system percent of monocots annual increased to 61%.

The best indicators of control weed-infested that were detected for periodically tillage can be explained by periodic transfer of weed seeds in the lower layers of the soil. Lack of permanent plowing warns penetration on the surface of viable seeds. The rotation of moldboard and nonmoldboard tillage continues stay of weed seeds in the lower layers of soil, which significantly reduces the viability of seeds.



	The beginning of growing season	The end of growing season
LSD_{05} for farming system –	2,5 pcs./m²	3,8 pcs./m²
LSD_{05} for soil tillage –	2,8 pcs./m²	4,4 pcs./m²
LSD_{05} for interplay of factors –	4,9 pcs./m²	7,7 pcs./m²

Pic. 3. The impact of farming systems and tillage on weediness of crops of sugar beet (average for 2012-2013)

In the absence of chemical plant protection, in terms of biological farming, increase the problem of perennial weed species in all research fields. In addition, biological farming system creates the conditions for the dominance of monocotyledonous weed species.

The highest yield of alfalfa achieved by the differentiated tillage systems in ecological farming system, winter wheat - by the periodically tillage in industrial farming system. Yield of sugar beet was higher in industrial farming system in the variant of differentiated tillage (Table).

Table 1

The impact of farming systems and tillage on crop yield level of crop rotation (average for 2012-2013)

	Crop capacity, t/ha		
	Alfalfa	Winter wheat	Sugar beet
Soil tillage			
Differentiated tillage (control)	36,5	2,9	70,4
Subsurface tillage	33,8	2,9	54,6
Periodically tillage	33,9	3,3	69,0
Surface tillage	35,3	2,5	58,9
Farming system			
Industrial (control)	31,5	3,2	71,7
Environmental	36,8	3,2	64,8
Biological	36,4	2,4	53,2
LSD_{05} for soil tillage	2,0	0,25	7,1
LSD_{05} for farming system	1,8	0,21	6,1
LSD_{05} for interplay of factors	3,5	$F_ф<F_{05}$	$F_ф<F_{05}$

Conclusions. Effective weed control peculiar to diferentiated and periodically tillage. By periodically tillage, in which at 10-field crop rotation plowing the fields is performed under sugar beet once in 4-5 years, the viability of weed seeds in the soil on 35-38% lower compared to plowing.

Reducing use to of crop protection chemicals, or their exceptions, causing to increase the problem of perennial weed species. For long-term use of biological farming systems problematic species are monocotyledonous species.

The highest yield of roots achieved by industrial farming systems, perennial grasses and wheat - on environmental.

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Анотація

Танчик С.П., Федишин М.М.

Забур'яненість ланки польової сівозміни за різних систем землеробства

Наведено результати досліджень з впливу різних систем землеробства та основного обробітку ґрунту на забур'яненість ланки польової сівозміни

Ключові слова: *бур'яни, буряки цукрові, пшениця озима, люцерна, системи землеробства, система обробітку ґрунту*

Аннотация

Танчик С.П., Федишин М.М.

Засоренность ланки полевого севооборота за разных систем земледелия

Приведены результаты исследований по влиянию различных систем земледелия и обработки почвы на засоренность ланки полевого севооборота

Ключевые слова: *сорняки, сахарная свекла, пшеница озимая, люцерна, системы земледелия, система обработки почвы*