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## **BIOLOGICAL ACTIVITY OF SOIL IN SOWING OF WINTER WHEAT DEPENDING ON PREDECESSORS IN FOREST-STEPPE THE LEFT-BANK**

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*Dependence of biological activity of soil under crops of winter wheat from predecessors and a set of cultures in short-term crop rotations is investigated. Positive influence of leguminous predecessors of esparcet, peas and a soya on biological activity of soil microorganisms at crops of winter wheat in crop rotations from a part of grain crops 50; 66,7; 100 % is revealed. During researches it has been established, that accommodation of winter wheat after predecessors of winter wheat and pair black conducted to decrease in intensity of biochemical processes in a superficial layer of soil on 17–35 % compared with leguminous predecessors.*

**Key words:** *biological activity, short-term crop rotations, predecessor, winter wheat, soil.*

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**Statement of a problem.** At the present stage of development of agriculture of a urgency gets a direction of researches of microbiological processes of soil where the important component biological of circulation substances is soil microorganisms. Studying of biological activity of soil enables scientists is more expanded to understand and determines laws during transformation of organic substance, taking into account anthropogenous influence on a soil and its properties [7].

It is proved, that except for cultivation of soil, significant influence on biological activity of it has a crop rotation, predecessors and features of technologies of cultivation of cultural plants. With growth of intensity of biochemical processes productivity of agricultural crops raises, there is an accumulation of organic substance in soil, its physical and chemical properties and fertility [2-4].

**The analysis of last researches and publications in which the decision of a problem is proved.** Well-known, that biological properties of soil directly depend on a variety of soil microorganisms and functioning of different ecology and trophic groups [6, 7].

Biological activity of soil (BAS) determines its fertility, ecological and sanitary condition. Except for that microorganisms can prove as the indicator of soil. It enables to determine presence of contaminant which influence parameters of biological activity, in particular intensity of allocation of carbonic gas from soil [4].

Increase of fertility of soil in manufacture of a grain depends not only on entering organic and mineral components and quality of cultivation, but also from observance of rules of selection of predecessors, and also correct conducting short-term crop rotations [1, 3].

Definition BAS - the important parameter in during conducting monitoring intensity of decomposition of organic substance. It which enables to estimate action of organic mineral fertilizers and efficiency of introduction of new technologies of cultivation. Except for that definition of parameter BAS assists optimization of a nutritious mode of soil and preservation of its fertility [2, 8].

**The purpose and research problems** - an establishment of dependence of biological activity of soil in crops wheat winter from predecessors in short-term crop rotations with a different set and saturation by grain crops.

The problem will consist in definition of intensity of biological activity of soil in layers of 0-30 sm in crops wheat winter depending on predecessors and a part of grain crops.

**Materials and techniques of research.** Research carried out in stationary experience on the basis of the Poltava state agricultural research station of a name of M.I.Vavilov of Institute the pig breeding and

agroindustrial production NAAS on chernozem typical small humus. The arable layer of soil is characterized by such basic agrochemical and agrophysical parameters: contents of humus - 4,9-5,2 %, nitrogen which is easily hydrolized (on Tyurin and Kononova) - 119,1-127,1 mg / kg, P<sub>2</sub>O<sub>5</sub> in vinegar to an extract (on Chirykov) - 10,0-13,1 mg and exchange potassium (on Maslova) - 17,1-20,0 mg on 100 grams of soil. Reaction of a soil solution close to neutral (pH 6,9). The saturation bases changes within the limits of 30-40 mg-equ./100 grams of soil. The density of the top layer of soil makes 1,05-1,17 grams/sm<sup>3</sup>. The circuit of research includes: *eight three-field crop rotations* (peas - wheat winter - beet sugar; pairs black - wheat winter - beet sugar; peas - wheat winter - corn; soya - wheat winter corn; peas - wheat a winter wheat winter; peas - wheat winter - barley summer; esparcet sandy - wheat winter-barley summer; peas - wheat winter - sunflower); and *three four-field crop rotation*: (esparcet sandy - wheat winter beet sugar - barley summer; peas - wheat winter - beet sugar - barley summer; peas - wheat winter – corn-corn). Saturation by grain crops represented: for three-field crop rotations of 33,3-66,7-100 %; for four-field - 50-75-100 %. Technology of cultivation of agricultural crops standard for conditions of a zone. frequency of experience quadruple.

Biological activity of a soil determined by technique of Mishustin's and Petrova's [5]. Duration of an exposition of a linen cloth made 60 day.

**Results of researches.** Feature of weather conditions for 2009-2011 of researches during an exposition of a linen cloth was insufficient humidifying. Receipt of deposits made close 35-50 % from long-term norm, and excess of daily average temperature of air made 2,2-3,0 °C in comparison with long-term.

During an estimation of intensity of decomposition of cellulose in crops wheat winter depending on predecessors decrease in biological activity of soil in a layer of 10-20 sm on 1-2,5 % and 20-30 sm on 5 % compared with the top layer of soil 0-10 see have been revealed.

Among three-field crop rotations high activity of decomposition of cellulose in crops wheat winter for the period of researches, both in the top layer of 0-10 sm and in other layers of 10-30 sm it is marked in a crop rotation 7 with the predecessor espatcet sandy which raised after barley summer and after peas - (a crop rotation 8) which raised after sunflower. On the average in an arable layer to a soil the level of biological activity in these crop rotations made 19,9 % (tab. 1).

**Table 1. Intensity of decomposition of a linen cloth in crops wheat winter depending on predecessors and saturation grain, 2009-2011, % to initial weight**

Crop rotation	The predecessor, before predecessor	Particle grain in a crop rotation, %	Intensity of decomposition of a linen cloth, percent			
			layer of soil, sm			
			0-10	10-20	20-30	0-30
2	Pairs black - beet sugar	33,3	14,2	13,9	14,4	14,2
1	Peas - beet sugar	66,7	19,2	18,1	14,3	17,2
7	Esparcet-barley summer	66,7	21,4	19,0	19,3	19,9
8	Peas - sunflower	66,7	21,4	21,5	16,6	19,9
3	Peas - corn	100	20,0	18,2	15,1	17,8
4	Soya - corn	100	15,9	17,0	16,6	16,5
5	Peas - wheat winter	100	18,7	17,1	14,5	16,8
	Wheat winter - peas	100	14,2	13,7	13,3	13,7
6	Peas - barley summer	100	18,0	17,7	16,9	17,6
9	Esparcet-barley summer	50,0	21,7	21,3	20,4	21,1
10	Peas - barley summer	75,0	18,9	18,3	18,6	18,6
11	Peas - corn	100	21,2	21,2	17,3	19,9
LSD <sub>05</sub>			3,53	3,26	3,19	1,37

It is revealed, that accommodation wheat winter in a crop rotation with beet sugar (a crop rotation 1) causes decrease in activity of decomposition of a linen cloth in all researched layers and on the average 17,2

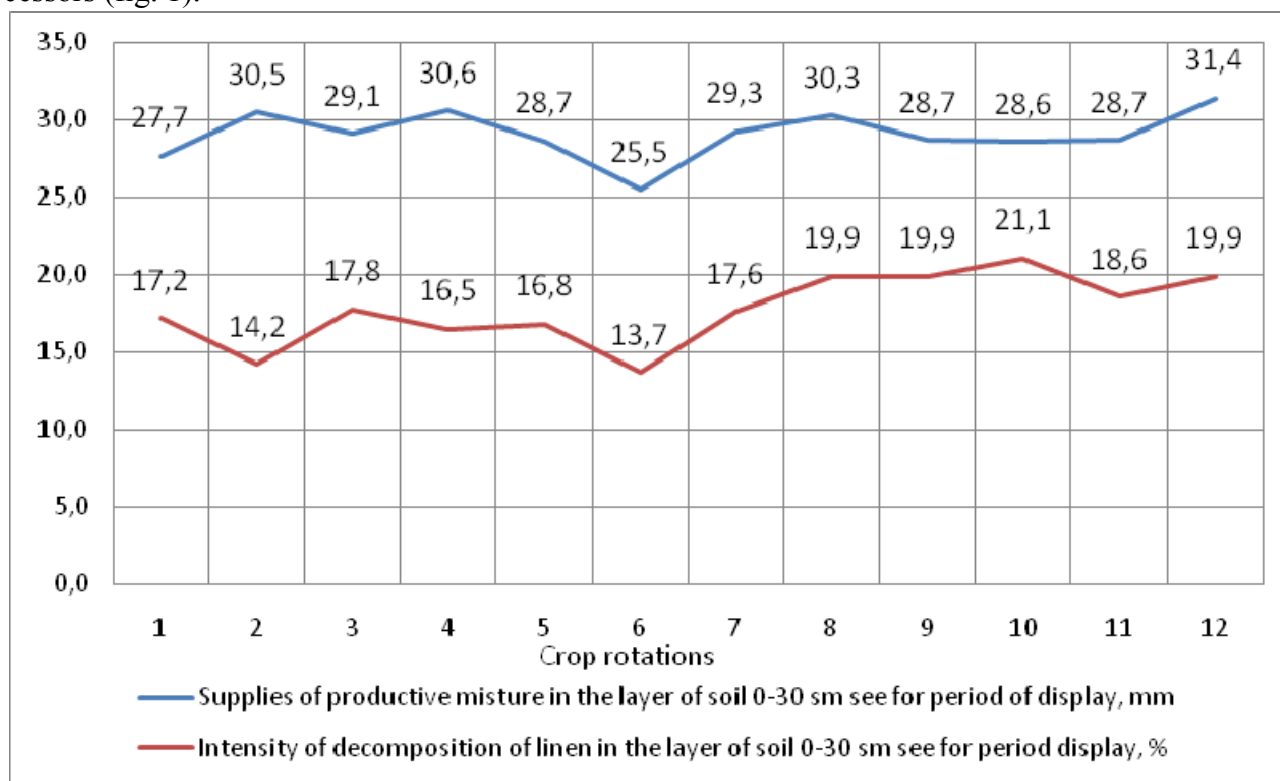
% from its weight. With repeated accommodation wheat winter (a crop rotation 5) biological activity of soil appeared the lowest - 14,2 %. During researches it has been revealed, that accommodation wheat winter the ambassador of a soya (a crop rotation 4) with a particle of grain 100%, positively influenced intensity of decomposition of a linen cloth in the bottom layers of soil. In a superficial layer of soil it made 15,9 % then, as with a deepening by 10-20 and 20-30 sm - 17,0; 16,6 % accordingly. Such phenomenon speaks late cleaning of a soya, compared with other predecessors (peas, esparcet, wheat winter) insufficient stocks of a productive moisture and smaller quantity of the vegetative rests a surface while biogenic processes passed in the bottom layers of soil.

It is proved, that the vegetative rests of leguminous cultures contain enough of nitrogen in comparison with cereals and assist activation of microbiological processes and it is better mineralization [6].

Accommodation of a field pair black (2) after beet sugar resulted a crop rotation to decrease in biological activity of soil in crops wheat winter, values was within the limits of 13,9-14,4 %.

High biological activity in an arable layer in crops wheat winter among four-field crop rotations it is marked after esparcet. It raised on a green forage and placed after beet sugar (a crop rotation 9) - 21,1 % with a particle of grain 50 %. Cultivation of wheat winter in a crop rotation 11 after peas with two fields of corn predetermined growth of biological activity in an arable layer of soil on 6-33 % compared with three-field grain crop rotations.

During the analysis of biological activity of soil in crops wheat winter it has been revealed, that decomposition of cellulose is in direct dependence on contents of a productive moisture in soil and predecessors (fig. 1).



**Fig. 1. Intensity of decomposition of cellulose depending on contents of a productive moisture in soil, average for 2009-2011.**

Thus it has been determined, that high biological activity of soil of 21,1 % was reached in crops wheat winter the after esparcet (a crop rotation 10) where contents of a productive moisture in an arable layer of soil made 28,6 mm, and saturation grain made 50 %.

Cultivation wheat winter after wheat winter predetermined infringement of a water mode of soil and this decrease in biological activity of soil. At the same time, the optimum water mode was created at its cultivation on a pair black, nevertheless biological activity of soil was low through insufficient quantity of the vegetative rests that is caused by specificity of the predecessor.

Thus accommodations wheat winter after the best predecessor in a crop rotation with optimum saturation by grain crops and observance of technology of cultivation enables to increase a level of biological activity of soil, to improve biogenic transformation of organic substance by microorganisms, and at the same time to improve sanitary a condition and a fertile soil.

**Conclusions.** During an establishment of influence of predecessors wheat winter on processes of decomposition of vegetative components in soil it is revealed:

- 1). High biological activity in an arable layer of soil is reached after leguminous grasses long-term - esparcet - 18,6 % and leguminous peas and a soya - 21,1; 16,5 % accordingly.
2. Under condition of cultivation wheat winter the ambassador pair black and the ambassador wheat winter, intensity of decomposition of cellulose is reduced on 17-35% concerning leguminous predecessors.

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