

**Microbiological soil activity and physiological-biochemical processes of winter wheat plant at complex usage of microbiological preparations Ecophosphoryn, herbicide Calibre 75 and plant growth regulator Biosyl**

**A.Y.Tokar, I.B.Leontyuk, E.V. Bashta**

*Microbiological soil activity and physiological-biochemical processes of winter wheat sort Podolyanka were investigated at combined action of biopreparations used at seed and sowings treatments. The influence on microbiological soil activity and physiological processes of winter wheat plants were observed at usage of preparations Ecophosphorin, Agate-25, Calibre, Biosyl.*

**Key words: Winter wheat, Ekofosforyn, Agate-25K, Calibre, Biosyl**

Stabile and productive functionality of modern agro ecosystems could be only with help of special attention to problems in plant protection from pests, pathogens, weeds vital functions of which leads to significant yield losses.

In a long period in practice of agricultural production it is preferred chemical method of plant protection. But long and continually raising usage of pesticides negatively affects ecosystems: the pollution of environment leads to appearing of resistant strains, populations of pathogens and pests. Frequency of their appearing is much ahead than creating of new preparations.

The main part of integrated plant protection is bio method (usage of microbe preparations). They are characterized by high effectiveness, don't pollute environment and have selective effect.

Purpose of study: Last decades in world raises interest to biologization of plant growing, limitation of usage of chemical fertilizers and pesticides to acquire high quality production of plant growing. That's why it's significant problem of development of new high effective microbiological preparations and technologies of its appliance in plant growing and agriculture. However biological preparations

including microbiological, needed to deeper studying of its effect on plants and soil to various norms and methods of appliance in crop of agricultural cultures, Our studies is about that.

**Materials and methods of investigation.** Investigations was made in 2010-2011 years in field rotation of the Department of Biology of Uman National University of Horticulture, on podzolic chernozem, humus hard loamy on loess with humus content in the plow layer (0-30 cm) - 3.3%, mobile phosphorus 110-120 mg/kg and potassium 80-90 mg/kg according to Chirikov method, lighthydrolyzed nitrogen content is 100-110 mg/kg according to Cornfield method, pH of salt suspension - 5,6-5,8 and hydrolytical acidity is 28-32 mg/equ. per 1 kg of soil.

In field investigations was studied summary effect of biological and chemical preparations at seed treatment before planting and applying it after appearing of shoots on microbiological activity of soil and physic-biochemical processes in winter wheat sort Podolyanka. Soil cultivation according to conventional for Central Forest-Steppe of Ukraine.

Seeds before planting was treated by microbiological preparations Ecophosphoryn. There was made pre-planting treating with investigated and etalon preparations with following applying of biological and chemical preparations (Calibre without Biosyl and with it).

Repeats of the experiment - three times, the options placed systematically. Area accounting area - 50 square meters. Accounting and observation, physiological and biochemical, microbiological analyzes in the experiments carried out by conventional methods. Harvest collected direct harvesting.

Results of investigation. Good developed, optimal by area and dynamic of functionality of photosynthetic apparatus is main standart of high quality of modern sorts in agrophytocenoses. It must to provide the best for intensivity and quality in all stages of growth and development of plant. That's why task was to establish degree of influence of Ecophosphoryn on area of leaf surface of winter wheat, that provides the decisive role on formation of productivity of crop.

Established that treatment of seeds of winter wheat by investigated preparations significantly affects on increasing of area of leaf surface of winter wheat, which play significant role in formation of productivity of crop.

It's established that treatment of seeds with investigated preparations significantly increase area of leaf surface. So, if Calibre applied during earing phase of winter wheat the number of leafs on one plant increase with effect of Agath-25K on 108,5% and Ecophosphoryn 135,4% in comparison with control variant. It's also admitted that if Calibre + Biosyl applied on plants treated by Ecophosphoryn it increases number of leaves on 58,8%. (table 1).

One of significant physiological index, which characterize productivity of plants and determines effectivity of agro technological treats in time of formation of yield is productivity of photosynthetic activity per 1 square meter of leaf surface area.

Table 1. Influence of Ecophosphoryn on formation of leaf apparatus of winter wheat (earring phase)

Variant of investigation	Amount of leafs on one plant, pts	% to control amount	Area of leaf from one plant, cm <sup>2</sup>	% to control amount	Area of leafs, m <sup>2</sup> /ha	% to control amount
Applying of caliber after plant shooting, 45 g/ha						
Control	8,2	100	90,8	100	43584	100
Agath-25k	8,9	108,5	98,3	108,3	47970,4	110,1
Ecophosphoryn	8,1	135,4	92,9	102,3	54287,5	124,7
Applying of caliber (45 g/ha) + Biosyl (10 ml/ha) after plant shooting						
Control	6,7	100	87,3	100	40332,6	100
Agath-25k	9,4	140,3	93,7	107,3	44039,0	109,2
Ecophosphoryn	11,5	158,8	106,4	121,9	52242,4	129,5

The index of pure productivity of photosynthesis in all variants of investigation in comparison with control were rising, but the most high value was made by applying ecophosphoryn to caliber treated shoots of plants they were rising by 10,6 g/m<sup>2</sup> per day or 130,9% and if caliber + biosyl were applied after plant shooting this value rises to 11,5 g/m<sup>2</sup> or 123,7%. (table 2).

Table 2. Influence of ecophosphoryn on pure productivity of winter wheat.

Variant of investigation	g/m <sup>2</sup> per day	% to control
Applying of Caliber after plant shooting, 45 g/ha		
Control	8,2	100,0
Agath-25k	8,4	103,7
Ecophosphoryn	10,6	130,9
Applying of Caliber (45 g/ha) + Biosyl (10ml/ha) after plant shooting		
Control	9,3	100,0
Agath-25k	9,8	105,4
Ecophosphoryn	11,5	123,7

The fertility of soil depend on microbiological processes which pass inside. Microorganisms is a most important link in rotation of all biogenic elements which takes part on processes of soil formation and formation of soil fertility. That's why during investigation of action of biopreparations we need to know their influence on processes in plants and on micro flora in soil, which plays significant role in supplying plants with nutrients, therefore formation of yield and its quality.

Our investigations established that after 10-25 days after applying of preparations the number of microorganisms in comparison with control have raised and depend on seed treatment and applying of preparations after plant shooting. The most microorganisms were investigated during uniting of seed treatment with applying of caliber (45 g/ha) with Biosyl (10 ml/ha) after plant shooting, in comparison with control it have raised after 10 days after applyin of preparations on 15,5 - 19,4% and after 25 days on 15,3-19,1% (table 3).

Orientation of microbiological processes depends on not only qualitative and quantitative content of soil micro flora, but from activity of microorganisms, which causes different processes in soil. Processes of nitrification, nitrogen fixation, dissolution of cellulose plays significant role in formation of soil fertility. But intensity of this processes says not only about activity of appropriate groups of microorganisms, but about connection between all complex of conditions of soil. [5].

Table 3. Influence of Ecophosphoryn on overall number of rhizosphere micro flora.

Variant of investigation	Overall amount of microorganisms			
	After 10 days		After 25 days	
	Thousands pts. per 1g of soil	% to control	Thousands pts. pre 1g of soil	% to control
After plant shooting applying of caliber, 45g/ha				
Control	1202	100,0	1235	100,0
Agath-25k	1532	127,5	1544	125,0
Ecophosphoryn	1642	136,6	1658	134,3
After plant shooting applying of caliber (45g/ha) + Biosyl (10 ml/ha)				
Control	1349	100,0	1368	100,0
Agath-25k	1558	115,5	1577	115,3
Ecophosphoryn	1611	119,4	1629	119,1

In our investigations we discovered that most sensitive to preparations appeared nitrifiers of 1st and 2nd phases of nitrification. In all variants of investigation after 10 days after applying caliber after plant shooting, with or without Biosyl we found that amount of nitrifiers was lower than in control variant. During inoculation of seed with agath-25k quantity of nitrifiers of 1st phase in comparison with control were 94,5 and 95,3; and 2nd phase 93,2 and 96,1%. The highest amount of nitrifiers of 1st phase was 95,4 and 98,8%, and 2nd phase 98,8 and 97,8% to control (table 4).

Table 4. Influence of Ecophosphoryn on amount of physiological groups of microorganisms in winter wheat rhizosphere.

Variant of investigation	Nitrifiers of 1st phase		Nitrifiers of 2nd phase	
	After 10 days		After 25 days	
	Thousands pts. per 1g of soil	% to control	Thousands pts. per 1g of soil	% to control
After plant shooting applying of caliber, 45g/ha				
Control	30,7	100	35,3	100
Agath-25k	29,0	94,5	32,9	93,2
Ecophosphoryn	29,3	95,4	34,7	98,3
After plant shooting applying of caliber (45g/ha) + Biosyl (10 ml/ha)				
Control	32,1	100	35,9	100
Agath-25k	30,6	95,3	34,5	96,1
Ecophosphoryn	31,7	98,8	35,1	97,8

## Conclusion

1. Seed treatment with investigated preparations of ecophosphoryn significantly influenced on formation of photosynthetic apparatus of plants of winter wheat of sort Podolyanka. Plants of this variant were characterized by higher area of leaf surface which was higher on 17,6-21,9% than control.
2. The best index of pure productivite of photosynthesis of winter wheat in comparison with control on both agricultural backgrounds was obtained after seed treatment with Ecophosphoryn - 10,6 and 11,5 g/m<sup>2</sup> per day or 130,9% and 123,7%.
3. Seed treatment with bioactive substances didn't depress life of soil micro flora. Their quantity were higher than on control variant on 10 and 25 days after applying of preparations. The most sensitive appeared nitrificators of 1st and 2nd phases of nitrifications.

## REFERENCES

1. Лісовий М.П. Не заходи боротьби – а методи захисту / М.П.Лісовий // Захист рослин. – 2000. – № 1. – С.2 – 5.
2. Джитрей В.С. Екологія та охорона навколишнього природнього середовища / В.С. Джитрей. – К.: Знання, 2000. – 203 с.
3. Волкогон В.В. Охорона навколишнього середовища / В.В.Волкогон // Мікробіологічний журнал. – 2000. – 62 (№2). – С.51-58.
4. Найденов А.С. Эффективность применения биопрепаратов на посевах с.-х. культур в условиях Краснодарского края /А.С.Найденов, С.С.Терехова, Г.А.Рушер. – Краснодар: Кубанский гос. аграрн. ун-т, 2003. – С.4.
5. Патика В.П. Вплив альбобактерину і поліміксобактерину на мікробіологічні процеси в ризосфері ріпаку і соняшника / В.П. Патика, Г.О. Цигур // Агрохімія і ґрунтознавство. – Харків, 2002. Спец випуск, Книга друга. – 210 с.

**МІКРОБІОЛОГІЧНА АКТИВНІСТЬ ҐРУНТУ І ФІЗІОЛОГІЧНІ  
ПРОЦЕСИ В РОСЛИНАХ ПШЕНИЦІ ОЗИМОЇ ЗА КОМПЛЕКСНОГО  
ЗАСТОСУВАННЯ МІКРОБІОЛОГІЧНОГО ПРЕПАРАТУ  
ЕКОФОСФОРИН, ГЕРБИЦИДУ КАЛІБР 75 І РЕГУЛЯТОРА РОСТУ  
РОСЛИН БІОСИЛ**

*А.Ю. Токар, І.Б. Леонтюк, О.В. Башта*

*Наведено результати досліджень сумісної дії біопрепаратів за передпосівного обробітку насіння і внесення по сходах на мікробіологічну активність ґрунту та фізіолого-біохімічні процеси пшениці озимої сорту Подолянка. З'ясовано, що препарати Екофосфорин, Агат – 25К, Калібр, Біосил впливали на мікробіологічну активність ґрунту та фізіологічні процеси в рослинах пшениці.*

***Ключові слова:* пшениця озима, Екофосфорин, Агат – 25К, Калібр, Біосил**

**Микробиологическая активность почвы и физиологические процессы в  
растениях пшеницы озимой при комплексном применении  
микробиологических препаратов Экофосфорин, гербицида Калибр 75, и  
регулятора роста растений Биосил**

*А.Ю. Токар, И.Б. Леонтюк, Е.В. Башта*

*Приведены результаты исследований совместного действия биопрепаратов при обработке семян перед посевом с последующим внесением по всходах на микробиологическую активность почвы и физиолого-биохимические процессы пшеницы озимой сорта Подолянка. Изучено что препараты Экофосфорин, Агат – 25К, Калибр, Биосил влияют на микробиологическую активность почвы и физиологические процессы в растениях пшеницы.*

***Ключевые слова:* пшеница озимая, Экофосфорин, Агат-25К, Калибр, Биосил**