

## Bio fertilizers in Central Russia region.

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- **Leading NGO** – Russian Society of Biotechnologists, [www.biorosinfo.ru](http://www.biorosinfo.ru)
- **Internet resources on biofertilizers in Central Russia region:** [www.cbio.ru](http://www.cbio.ru), [www.industrial-innovations.ru](http://www.industrial-innovations.ru)
- **The list of contacts** of bio fertilizer producers, leading research Institutes and scientists conducted development and field experiments with bio fertilizers:

- **Bio fertilizer producers:**

- **PitBioTech (ЗАО НПП “ПитБиоТех”)**

- Address: 301840, Russia, Tulsкая oblast, Efremov town, Moscovskaya zastava street, 1.

- **JSC “Industrial Innovations”**

- Address: 127486, Russia, Moscow, Korovinscoe shosse, 10, buld. 2, office 39

- **Leading research Institutes:**

- *State Research Center for Applied Microbiology and Biotechnology, Federal Service of Surveillance of the field of Consumer Right Protection and Human Welfare.*

- Address: 142279 Russia, Moscow region, Obolensk town

- Leading scientists: S.K. Zhigletsova, I.A. Dunaitsev

- *Research Center for Toxicological and Hygienic Regulation of Biopreparations, Federal Medico-Biological Agency.*

- Address: 142 253 Russia, Moscow region, Serpukhov town, Lenina street, 102a

- Leading scientists: S.G.Besaeva

- *Moscow State University (soil science department),*

- Address: 119899 Russia, Moscow, Leninskie gory, MSU

- Leading scientists: E.P.Durinina, E.S.Komarovskaya, O.A.Pahnenko

- *Agricultural Microbiology Research Institute*

- Address: 196608, Russia, Saint-Petersburg- Pushkin, Podbelskogo street, 3

- Leading scientists: I.A.Arhipchenko

- *Agricultural Production Research Institute*

- Address: Russia, Kursk, Kirpichnaya str., 10

- Leading scientists: V.I. Lazarev, Kandiba E.V.

- **Short summary of published research results on the efficiency of biofertilizers**

The review of the recent publications in Russian on the opportunity of using microorganisms for the development of bio P fertilizers including prospects of complex preparations providing both plant protection and improvement for P nutrition was published by Agrochemistry journal in 2010 [1] .

The results of laboratory tests of strains collection developed in leading research Institutes in Russia show that the following strains are the most efficient and perspective for industrial cultivation in Russia as bio P fertilizers and plant protectors against plant deceases caused by Fusarium (F.graminearium, F.culmorium, F.avenaceum): Pseudomonadaceae fluorescence P 469., Bacillaceae subtilis IMP 215 [1]. The group of scientists from Soil Science department of Moscow State University conducted trials of bio fertilizers developed in Agricultural Microbiology Research Institute. According to the obtained experimental data (the laboratory and field tests) the application of biofertilizers **Bamil** (contains Bacillus Micrococcus Clavibacter), **Ekud** (contains Bacillus Staphylococcus hominis), **Pudret**(contains Bacillus Staphylococcus) and **Omug** (contains Bacillus Micrococcus Clavibacter) to the several varieties of Podzol soils located in Central Russia region resulted in increased activity of nitrification process. Due to application of biofertilizers the soil pH (KCl solution) raised, the content of exchangeable K increased, and CO<sub>2</sub> emission has grown [2, 3]. As example, the results of field trials investigated the effect of biofertilizer Omug (in the rates of 4-6 tonnes of bio fertilizer per ha) on crop productivity are summarized in the tabl. 1 below [4].

**Table.1** *The effect of bio fertilizer Omug on crop productivity*

Crop	Yield increase (% to the control)
Beetroot	26-95
Onion	24-76
Garden radish	26
Carrot	30-69
Potato	69-155
Marrow	32-78
Cereals (barley and wheat)	5-7

Effectiveness of bio fertilizers **Azotovit** (contains Azotobacter chroococum) and **Bactophosphin** (contains Bacillus mucilaginosus) have been tested in field trials with winter and spring wheat, spring barley, potato, sugar beet in different soils in Central Russia.

Winter and spring wheat field trails located in Kursk oblast on chernozem soils were conducted by Agricultural Production Research Institute. According to the results obtained the treatments of wheat seeds before planting by Azotovit and Bactophosphin increased the number of grains in the ear, weight of 1000 grains and significantly decrease the number of plants subject to diseases (such as Brawn rust and Septoria leaf blotch). The results are summarized in the tables 2, 3 and 4 below [5].

**Table. 2** *The effect of Azotovit and Bactophosphin application on the share of wheat plant subject to diseases (in %)*

	Spring wheat		Winter wheat	
	Brawn rust	Septoria leaf blotch	Brawn rust	Septoria leaf blotch
Control	5.9	37.5	13.8	24.5
Application of Azotovit into soil before planting	3.2	29.7	7.1	20.2
Application of Bactophosphin into soil before planting	2.0	34.7	8.8	14.1

**Table.3** *Effect of Azotovit and Bactophosphin application on the yield of spring wheat*

Treatment	Average Yield for 3 years, t/ha	Yield increase	
		t/ha	%
Control (without biofertilizers)	2.60	-	
Application of Azotovit into soil before planting	2.98	0.38	14.6
Application of Bactophosphin into soil before planting	2.86	0.26	10.0

**Table.4** *Effect of Azotovit and Bactophosphin application on the yield of winter wheat*

Treatment	Average Yield for 3 years, t/ha	Yield increase	
		t/ha	%
Control (without biofertilizers)	2.73		
Application of Azotovit into soil before planting	3.04	0.31	11.3
Application of Bactophosphin into soil before planting	3.0	0.27	9.8

Potato field trails located in Braynskaya oblast on grey soils were conducted by Agrochemical Service Research Institute. According to the results obtained the treatments Azotovit and Bactophosphin increased yield and quality of potato, and decrease the number of plants subject to late blight and virus diseases. The results are summarized in the table 5 below [5].

**Table.5** *Effect of Azotovit and Bactophosphin application on the yield and share of diseased plants of potato.*

Treatment	Share of diseased plants, late blight (%)	Share of diseased plants, virus diseases (%)	Yield, t/ha	Yield increase, t/ha
Control N90P90K90	8.3	14.9	36.8	
Bactophosphin+ N90P90K90	6.4	14.1	38.6	1.8
Azotovit+ N90P90K90	6.0	14.0	43.2	6.4

Sugarbeet field\_trails located in Kursk oblast on chernozem soils were conducted by Agricultural Production Research Institute. According to the results obtained the treatments of soil before sugar beet planting by Azotovit and Bactophosphin increased the yield on 7.4-13.4 t/ha and content of sugar on 2.14%. The results are summarized in the table 6 below [5].

**Table.6** *Effect of Azotovit and Bactophosphin application on the yield and quality of sugar beet.*

Treatment	Yield, t/ha	Yield increase, t/ha	Sugar content, %
Control, without any fertilizers	279		19.64
N90P90K90	36.5	8.6	19.64
Application of Azotovit into soil before planting	41.3	13.4	20.7
Application of Bactophosphin into soil before planting	35.3	7.4	22.08

#### References:

1. S.K. Zhigletsova, I.A. Dunajtsev, S.G. Besaeva. Possibility of application of microorganisms for solving problems of ecological and food safety. *Agrochemistry*, 2010, N6, pp. 83-96.
2. T.Y.Kutyova, E.P. Durinina, N.E.Muravyova, A.V. Sheyko. Microbial fertilizers Bamil, Omug, Ekud, Pudret their properties, influence on soil and crops. *Herald of Moscow State University, Soil Science series*, 2002, N4, pp.40-46.
3. E.P.Durinina, E.C. Komarovskaya, T.U. Kuteva, I.A.Arhipchenko. Effect caused by biofertilizer Bamil on P tranformtion in Podzol soil and crop productivity. *Agrochemistry*, 2001, N11, pp.43-48.
4. I.A.Arhipchenko. Recommendations on application biofertilizer Omug for vegetables. Published by Agricultural Microbiology Research Institute, 2009.
5. V.I.Lazarev, E.V. Kandiba Biofertiluizers: Azotovit and Bactophosphin. Published by Agricultural production Research Institute, 2004.