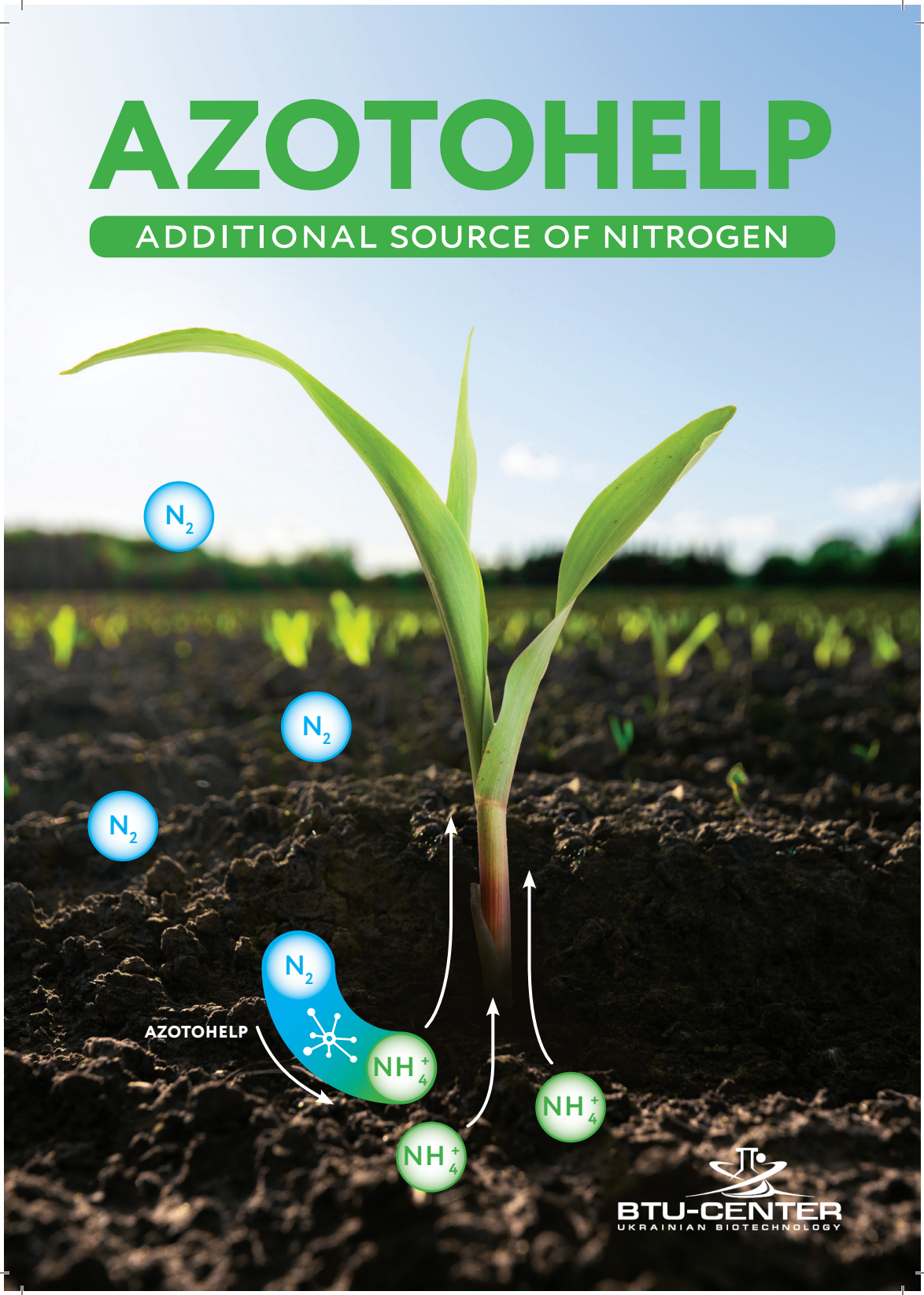
AZOTOHELP

ADDITIONAL SOURCE OF NITROGEN



What is Azotohelp

Azotohelp — bioactivator for plants growth promotion and nutrition, is based on N-fixing bacteria *Azotobacter chroococcum*

Competitive advantages:

- actively fixes the molecular atmospheric nitrogen and enriches the soil up 60 kg/ha (average — 20 kg/ha);
- synthesizes growth-stimulating substances;
- improves seed germination;
- stimulates development of the root system and plants;
- increases resistance of plants to stress factors;
- improves nutrient absorption;
- strengthens the immune system of plants;
- increases crop yield;
- soil fertility indicator.

Titer:

> $1{,}0 \times 10^9$ CFU/cm^3

Available in liquid and peat forms

Certificated for organic agriculture:

- Listed in the Input list for organic farming in Germany.
- The product is confirmed by Organic Standard Certification (approved for the use in organic agriculture according to the IACB Equivalent Union Organic Production&Processing Standard for Third Countries to the Regulations EU №834/2007 and №889/2008).

We have conducted over 370 researchers

- individual – more than **120**
- with other biological products – more than **250**, including **115** at research stations

More than
130 000 ha
is treated with Azotohelp worldwide

Azotohelp is popular in 12 counties around the world:

Germany
Austria
Netherlands

Belgium
Bulgaria
Romania

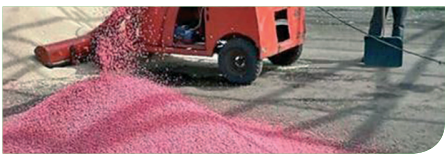
Poland
Ukraine
Moldova

Kazakhstan
Kyrgyzstan
N. Macedonia

87% of farmers have positive results, where income covers application cost

Average additional income per ha is more than **170 $**

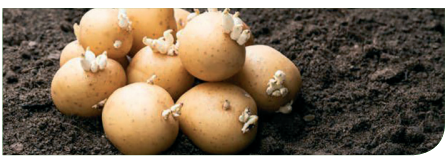
Intended use and application



pre-sowing seed treatment

foliar feeding (spraying) of plants during the growing season

root feeding, fertigation



treatment of potato tubers

Seed and seedling treatment should be carried out in the shade, avoiding direct sunlight; root and foliar feeding should be carried out in calm weather, in the morning or in the evening.

Application rate of Azotohelp

Crop	Pre-sowing treatment of seeds/tubers, l/ha	Root feeding, fertigation, l/ha	Foliar feeding (spraying) of plants during the growing season, l/ha
Grain	0.3-0.8	0.3-0.7	0.2-0.5
Legumes	0.2-0.8	0.3-0.5	
Technical	0.8-1.5	0.2-0.5	
Cereals	0.3-0.5	0.3-0.5	
Corn	0.5-1.0	0.3-0.7	
Potato	0.1-0.3	0.5-1.5	0.3-0.8
Vegetables	20.0-30.0 ml/kg		
Horticultural and ornamental plants		0.7-1.5	1.0-1.5
Berries		0.5-1.0	0.5-1.0

For enhanced N-fixation Azotohelp can be applied into the soil:

- Before beforesowing cultivation – 3-5 l/ha
- In furrow before sowing: 0,5-1,0 l/ha

Hormones produced by *Azotobacter chroococcum*

The bioactivator contains living natural associative bacteria *Azotobacter chroococcum*, which can release hormones of plant growth (phytogormones) and develop and fix atmospheric nitrogen.

Auxins

- They are accumulated in the growing parts of plants and contribute to the supply of nutrients and water
- Stimulate cell division and promote the formation of roots, especially lateral

Gibberellins

- Stimulate plant growth and development, promote seed germination
- Contribute to the flowering, formation of fruit and seeds
- Hinder leaf senescence

Cytokinins

- Regulate cell division, morphogenesis of sprout and root, chloroplast maturation, linear cell growth, formation of additional buds

All hormones work harmoniously,
the action of one is associated with the action of others.

The additional benefits:

Representatives of the genus Azotobacter also secrete exopolysaccharides, which help neutralize the toxic effects of heavy metals in soil and promote self-cleaning of soils contaminated with heavy metals, such as cadmium and mercury and lead.

Representatives of the genus Azotobacter can also biodegrade chloride-containing aromatic compounds

Ways of influence on agrocenosis

Microorganisms fix atmospheric nitrogen.	Caused by the activity of the living component of the preparation — bacteria *Azotobacter chroococcum*	**Productivity increases.**
Improving the absorption of nutrients by plants.	Thanks to organic acids and amino acids produced by microorganisms, which contribute to the transition of phosphorus, calcium, trace metals from the bound form to available for plants form	
Increased germination of seeds.	Due to the production of hormones (gibberellins) in the preparation.	
Root system development is stimulated and plant growth is accelerated.	Due to auxins, produced by microorganism (Azotobacter)	
The immunity of plants is strengthened.	Due to B vitamins, produced by microorganism (Azotobacter)	
Increases plant resistance to stress factors.	Due to the impact of a complex of biological substances, which contribute to improving plant nutrition and optimize plant development	

INDUSTRIAL TRIALS

Location: **Germany, Gehrden**
Crop: **winter rape**
Soil: **loam**

Application rate

Leaf application	Trial	Nitrogen fertilizer + Azotohelp 0.5 l/ha
	Control	Nitrogen fertilizer only

Trials result

	Yield, t/ha	Increment over control, t/ha	%
Trial	4,35	0,29	7,2
Control	4,06	-	-

Location: **Ukraine, Institute of Agriculture of North-east of Ukraine, NAAS**

Crop: **sunflower**

Soil: **low-humus chernozem**

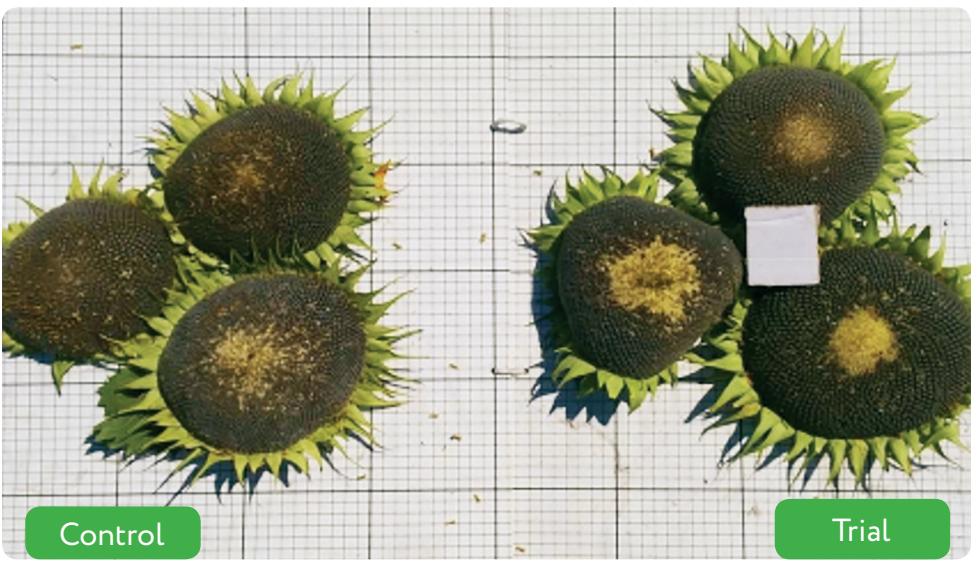
pH – 6,0 (saline extraction,
pH – 7,9 (water extraction)
Level of humus content: 4,2 – 4,8 %
Alkaline hydrolyzable nitrogen – 107
Soil available phosphorus and potassium – 62,7 and 67,5 mg/kg

Application rate

Foliar feeding (spraying) in stage 2-3 pair of leaves	Trial	The institute technology + Azotohelp 0,5 l/ha
	Control	The institute technology

Trials result

	Yield, t/ha	Increment over control, t/ha	%
Trial	3,69	0,64	20,98
Control	3,05	-	-



Location: **Ukraine, Institute of Agriculture of North-east of Ukraine, NAAS, Sumy region**

Crop: **corn**

Soil: **low-humus chernozem**

pH – 6,0 (saline extraction)
pH – 7,9 (water extraction)
Level of humus content: 4,2 – 4,8 %
Alkaline hydrolyzable nitrogen – 107
Soil available phosphorus and potassium – 62,7 and 67,5 mg/kg

Application rate

Foliar feeding (spraying) in stage 3-5 leaves	Trial	The institute technology + Azotohelp 0,5 l/ha
	Control	The institute technology

Trials result

	Yield, t/ha	Increment over control, t/ha	%
Trial	9,94	1,54	18,33
Control	8,40	-	-

Location: **Ukraine, Institute of agriculture of Steppe zone NAAS of Ukraine, Kirovograd region**

Crop: **soybean**

Soil: **loam**

Application rate

Foliar feeding (spraying) in stage 2-3 triple leaves	Trial	The institute technology + Rizoline 2l/t + Rizosave 1l/t +Azotohelp 0,3 l/ha + Liposam 0,3 l/ha
	Control	The institute technology

Trials result

	Yield, t/ha	Increment over control, t/ha	%
Trial	2,67	0,23	9,4
Control	2,44	-	-

Location 1: **Germany, Dietingen**

Crop: **wheat winter**

Soil: **clay**

Level of humus content: 4 %

Location 2: **Ukraine, Institute of agriculture of steppe zone NAAS of Ukraine, Kirovograd region**

Crop: **wheat winter**

Soil: **typical chernozem**

pH – 5,8 (saline extraction)
Level of humus content: 4,69 %
Alkaline hydrolyzable nitrogen – 13,7
Soil available phosphorus and potassium – 10 and 15 mg/100 g

Application rate 1

Foliar fertilizing: ES 30; ES 31-32; ES 39	Trial	The farm technology + Azotohelp: 0,5l/ha + 0,5 l/ha + 0,5 l/ha
	Control	The farm technology

Trials result 1

	Yield, t/ha	Increment over control, t/ha	%
Trial	8,82	+0,17	1,96
Control	8,65	-	-

Application rate 2

Pre-sowing seed treatment	Trial	The institute technology + Azotohelp 1,5 l/t
	Control	The institute technology

Trials result 2

	Yield, t/ha	Increment over control, t/ha	%
Trial	6,01	+0,42	7,51
Control	5,59	-	-

Location: **Ukraine, Institute of Feed Research and Agriculture of Podillya NAAS, Khmelnytsky region**

Crop: **wheat winter**

Soil: **weakly podzolized low-humus chernozem**

pH— 5,8-6,2
Level of humus content: 4,69 %
Alkaline hydrolyzable nitrogen — 17-19,3
Soil available phosphorus and potassium — 20,8-22,6 and 8–12 mg/100 g

Application rate 1

Pre-sowing tillage of soil	Trial	The institute technology + Azotohelp 3 l/ha
	Control	The institute technology

Trials result 1

	Yield, t/ha	Increment over control, t/ha	%
Trial 1	6,05	+0,71	13,29
Control 1	5,34	-	-

Application rate 2

Pre-sowing seed treatment	Trial	The institute technology + Azotohelp 1,5 l/t
	Control	The institute technology

Trials result 2

	Yield, t/ha	Increment over control, t/ha	%
Trial 2	6,15	+0,81	15,16
Control 2	5,34	-	-

Application rate 3

Pre-sowing seed treatment; tillering stage	Trial	The institute techn. + Azotohelp 1,5 l/t + 0,5 l/ha
	Control	The institute technology

Trials result 3

	Yield, t/ha	Increment over control, t/ha	%
Trial 3	6,22	+0,88	16,47
Control 3	5,34	-	-

Location: **Germany, Rütenbrock**
Crop: **potato**

Application rate

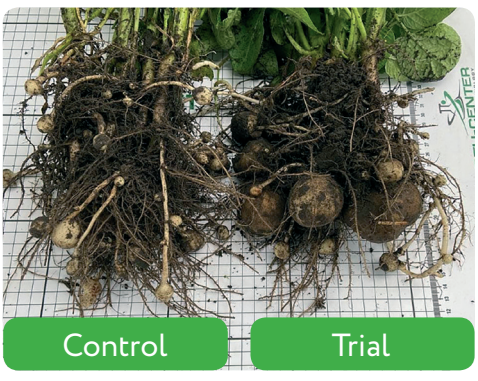
Treatment of potato tubers	Trial	The farm technology + Azotohelp 0,5 l/ha
	Control	The farm technology

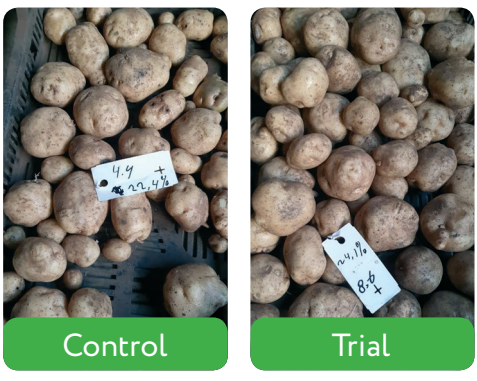
Trials result

	Yield, t/ha	Increment over control, t/ha	%
Trial	52,60	+4,90	10,27
Control	47,70	-	-

Starch

	Content, %	t/ha	Increment over control, t/ha
Trial	23,9	12,57	2,55
Control	21	10,02	-


Control Trial


Control Trial

Location: **LWK Niedersachsen Bezirksstelle Emsland, Germany**

Crop: **potato**

Soil: **sand**

pH – 5,2
P – 6,3; P_2O_5 – 14,4
K – 15,6; K_2O – 18,8

Application rate

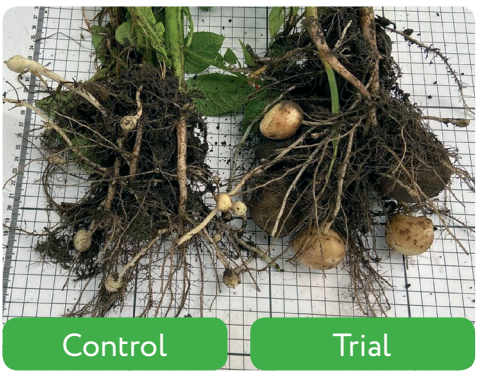
Treatment of potato tubers; Shoots; Before blooming	Trial	The farm technology + Azotohelp 0,7l/t + 0,3l/ha + 0,3l/ha
	Control	The farm technology

Trials result

	Yield, t/ha	Increment over control, t/ha	%
Trial	51,14	+0,59	1,17
Control	50,55	-	-

Starch

	Content, %	t/ha	Increment over control, t/ha
Trial	20,97	10,72	0,21
Control	20,80	10,51	-



Location 1: **Ukraine, Institute of vegetable and melon NAAS, Kharkiv region**
Crop: **cucumber**
Soil: **chernozem**

Location 2: **Ukraine, Vinnytsia National Agrarian University, Vinnytsia region**
Crop: **cucumber**
Soil: **chernozem**

Application rate 1

Pre-sowing seed treatment	Trial	Azotohelp 40 ml/kg
	Control	Water

Trials result 1

	Yield, t/ha	Increment over control, t/ha	%
Trial 1	52,5	5	10,5
Control 1	47,5	-	-

Application rate 2

3 times foliar feeding (spraying) of plants during the growing season	Trial	The institute technology + Azotohelp 0,5 l/ha
	Control	The institute technology

Trials result 2

	Yield, t/ha	Increment over control, t/ha	%
Trial 1	61,1	18,5	43
Control 1	42,6	-	-

Location: **The Institute of applied Biotechnology, Kiev Ukraine Laboratory trial**

Crop: **Strawberry**

Substrate: **chernozem, selected in the field of intensive crop rotation.**

Soil agrochemical properties: **pH – 5,7**

The humus content level: **medium**

The level of mineral nitrogen: **medium**

The level of supply of mobile forms of phosphorus and potassium: **high**

The weight of soil in each vessel: **1,4 kg**

Application rate

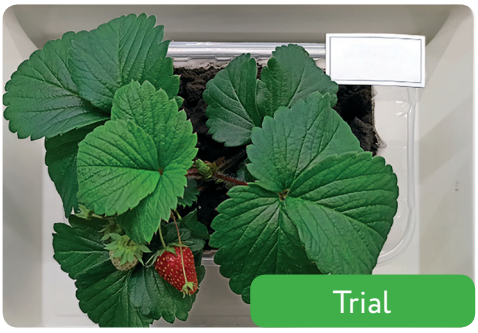
Fertigation. Biopreparation solution was injected into the root zone once a week, 50 ml in one container	Trial	Azotohelp 35 ml/10 l
	Control	Watering with water without biopreparations

Trials result

	Weight of vegetative mass formed above the ground	Number of formed sprouts	Number of formed flowers	Number of formed berries
Trial	10,5	3	16	11
Control	7,3	2	5	3

Increment over control

g/pcs	3,2	1	11	8
%	43,8	50	220	267



About BTU-CENTER

BTU-CENTER company is a Ukrainian manufacturer of microbial and enzyme products for agriculture. It produces products for plant protection and nutrition, soil recovery, biological product for cattle farming, and others. In general, we have developed more than **65 biological products**.

More than 20 years expertise in field crops, horticulture and covered soil

has a broad portfolio of 65 products (70% — based on microorganisms)

one of the 25% largest producers of the world biological products industry

the largest producer and exporter of microbial preparations in Ukraine

More than 2000 scientific and field studies annually

More than 4 mln ha of arable land worldwide is treated with BTU-CENTER's biologicals

Production

- Museum of strains, selection
- Manufacturing and R&D laboratories
- 4 production lines, industrial and small packaging
- Logistics park and cooling warehouses

Institute of Applied Biotechnologies

- R&D development and innovations introduction
- Studying of efficiency in various agro-climatic conditions and compatibility with plant protection products and fertilizers
- Diagnostics of seed, plants, soil

International activity

- Research and registration of biological products abroad
- Participation in international events, membership in associations
- Support and development of the partner network

Consultancy office

- Development and adaptation of technical solutions for organic and integrated farms
- Agronomical support of the use of biological products
- Marketing and raising awareness about biotechnology

IBMA
INTERNATIONAL BIOCONTROL MANUFACTURERS ASSOCIATION

BTU-CENTER is the only Ukrainian company that become an official Member of the International Biocontrol Manufacturers' Association (IBMA).

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