

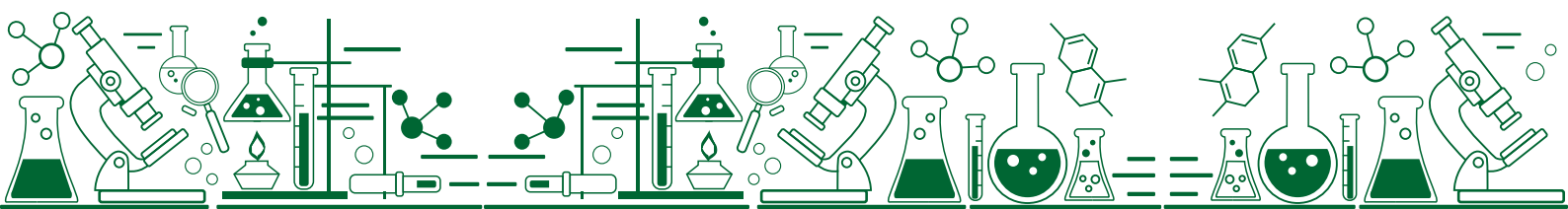


SUNAGRO
UKRAINE

INNOVATION SOLUTIONS



**FOR EFFICIENT
AGRICULTURAL PRODUCTION**



WHO WE ARE

Innovation Center of SUNAGRO UKRAINE LLC

is a scientific division of the Company focused on the development and testing of innovative and highly efficient solutions for sustainable and environmentally friendly agricultural production, and their implementation in agricultural production.

Our scientific team consists of highly qualified specialists holding academic degrees in microbiology, biotechnology, physiology, nutrition and plant protection. Annually, experts of our Center conduct numerous laboratory, vegetation, and field studies on innovative products and technologies, both domestically in Ukraine and internationally.



The **main focus of our activities** is the creation of biotechnological products for nature- and resource-conserving agricultural production, for the treatment of contaminated soils to remove chemical pollutants and heavy metals and to restore their natural fertility. The Center has its own collection of agriculturally beneficial microorganism strains, which enables us to create a wide range of microbiological fertilizers, biological plant protection agents, xenobiotic destructors, and soil remediation preparations.

Before getting listed in our Company's portfolio, **each preparation** goes through a lengthy process to confirm its efficacy and undergoes comparative testing against global benchmarks under the watchful eye of our expert team. While our proven solutions consistently deliver superior efficiency in agricultural production, we continue to explore new ways to increase crop productivity by unlocking the full genetic potential of agricultural crops.



WEALTH·N

Legume Inoculant

Composition: nitrogen-fixing microorganisms of the *Rhizobiaceae* family with the titer not less than 2.0×10^9 CFU/cm³



Preparative form: liquid
Packaging: 1 liter
Storage temperature: from 4 to 18°C
Expiry date: 6 months at temperatures from 4 to 10 °C;
 3 months at temperatures from 11 to 18 °C

Benefits / Advantages of use

- provides complete nitrogen nutrition of legumes during the vegetative period
- contains highly efficient strains of N-fixing bacteria
- contains natural polymers to protect bacteria from adverse environmental conditions
- aseptic packaging guarantees a high bacteria titer until the final expiry date of the preparation
- compatible with recommended chemical protectants

Recommended consumption rates in organic and integrated agriculture

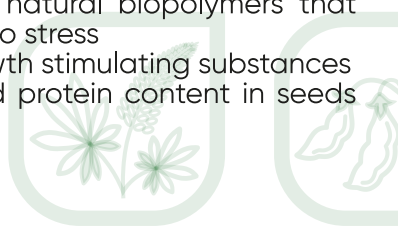
Crop	Active ingredient	Consumption rates	
		WEALS - N	Working solution
Soybean	<i>Bradyrhizobium japonicum</i>	1,0 - 1,5 l/t	6 - 8 l/t
Pea	<i>Rhizobium leguminosarum</i>		
Lupin	<i>Bradyrhizobium spp</i>		
Chickpea	<i>Mesorhizobium ciceri</i>		
Lentil	<i>Rhizobium leguminosarum</i>		
Bean	<i>Rhizobium phaseoli</i>		
Lucerne (Alfalfa)	<i>Sinorhizobium meliloti</i>	2,5-3,0 l/t	
Clover	<i>Rhizobium trifolii</i>		
Fodder Galega	<i>Rhizobium galegae</i>		
Birdsfoot trefoil	<i>Mezorhizobium loti</i>		
Sainfoin	<i>Rhizobium simplex</i>		

Biological effect of the inoculant

- depending on the crop, converts 90-300 kg/ha of atmospheric nitrogen to a form bioavailable to plants
- contains a complex of natural biopolymers that increase plant resistance to stress
- provides plants with growth stimulating substances
- increases crop yield and protein content in seeds and vegetative mass

Instructions for use

- Use WEALTH - N in the form of an aqueous solution for pre-sowing inoculation of legume seeds by mechanized (using any type of seed treatment machine) or manual seed treatment
- treat seeds in the shade or in a sheltered place, avoiding direct sunlight, no more than 20-25 days before sowing; it is also recommended to use the AKTYV-R microflora activator. After treatment, package the seeds and store them in a well-ventilated room protected from sunlight
- in the case of tank mixtures with recommended pesticides, add chemical components to the solution first and the biological product last. Such a mixture should be used within 2 hours.



RAISE·N

Nitrogen fixer

Composition: nitrogen-fixing microorganisms *Azotobacter spp.*, *Azospirillum spp.* with the titer not less than 1.0×10^9 CFU/ml



Preparative form: liquid
Packaging: 1 liter
Storage temperature: from 4 to 15°C
Expiry date: 6 months

Benefits/Advantages of use
• reduces nitrogen fertilizer consumption rates by 25–35%
• increases seed germinating ability and germination energy, stimulates the development of the plant root system
• activates beneficial soil biota and helps restore soil fertility
• aseptic packaging guarantees high bacterial titer until the final expiry date of the preparation
• compatible with recommended chemical protectants

Recommended consumption rates in organic and integrated agriculture

Crops	Consumption rates	
	RAISE - N	Working solution
Pre-sowing treatment of agricultural crop seeds		
Cereals, grain legumes	1,0–1,5 l/t	8–10 l/t
Corn, sunflower, rapeseed	4,0–5,0 l/t	
Soil spraying before cultivation, disking		
Spring and autumn soil treatment	1,0–1,5 l/h	350–450 l/h
Root soaking of seedlings and nursery plants (5–10 min.)		
1.0–1.5 l of preparation/100 l of water/2000 pcs. of seedlings or nursery plants		

Biological effect of the preparation

- depending on the crop, converts 40–80 kg/ha of atmospheric nitrogen to a form bioavailable to plants
- produces signaling compounds that optimize the internal balance of phytohormones
- ensures plant resistance to adverse environmental conditions
- improves soil agroecological properties
- suppresses the development of phytopathogens throughout the vegetative period

Instructions for use

- use RAISE - N in the form of an aqueous solution for pre-sowing inoculation of seeds, soil application, soaking of seedlings and root nutrition of plants
- in the case of tank mixtures with recommended pesticides, add chemical components to the solution first and the biological product last. Such a mixture should be used within 2 hours
- treat seeds and planting stock in the shade or in a sheltered place, avoiding direct sunlight, no more than 3–5 days before planting. Soil treatment should be made during the periods of minimal solar activity (in the morning, in the evening, at night or during cloudy weather)
- it is also recommended to use the AKTYV-R microflora activator to enhance the physiological properties of microorganisms



RAISE·PK

Phosphorus-potassium mobilizer

Composition: phosphorus- and potassium-mobilizing microorganisms *Bacillus spp.*, *Penicillium spp.*, *Trichoderma spp.* with the titer not less than 1.0×10^9 CFU/ml



Preparative form: liquid

Packaging: 1 liter

Storage temperature: from 2 to 15°C

Expiry date: 6 months

Benefits/Advantages of use

- reduces phosphorus-potassium fertilizer consumption rates
- optimizes the absorption of magnesium, iron and other trace elements
- increases seed germinating ability and germination energy, stimulates the development of the plant root system
- activates beneficial soil biota and helps restore soil fertility
- aseptic packaging guarantees high titer of microorganisms until the final expiry date of the product

Recommended consumption rates in organic and integrated agriculture

Crops	Consumption rates	
	RAISE - PK	Working solution
Pre-sowing treatment of agricultural crop seeds		
Spring and winter cereals	1,0–1,5 l/t	8–10 l/t
Corn, sunflower, rapeseed	4,0–5,0 l/t	
Soil spraying before cultivation, disking		
Spring and autumn soil treatment	1,0–1,5 l/h	350–450 l/h
Root soaking of seedlings and nursery plants (5–10 min.)		
1.0–1.5 l of preparation/100 l of water/2000 pcs. of seedlings or nursery plants		

Biological effect of the preparation

- microorganisms of the preparation transform insoluble compounds of potassium, iron, zinc, organic/inorganic compounds of phosphorus to a form bioavailable to plants
- increases the efficiency of use of mineral fertilizers which allows to significantly reduce fertilizer consumption rates
- suppresses the development of fungal and bacterial phytopathogens throughout the entire vegetative period
- optimizes the assimilation of phosphorus and potassium by plants when used in combination with organic-mineral and mineral fertilizers

Instructions for use

- use RAISE - PK in the form of an aqueous solution for pre-sowing inoculation of seeds, soil application, soaking of seedlings and root nutrition of plants
- in the case of tank mixtures with recommended pesticides, add chemical components to the solution first and the biological product last. Such a mixture should be used within 2 hours
- treat seeds and planting stock in the shade or in a sheltered place, avoiding direct sunlight, no more than 3–5 days before planting. Soil treatment should be made during the periods of minimal solar activity (in the morning, in the evening, at night or during cloudy weather)
- it is also recommended to use the AKTYV-R microflora activator to enhance the physiological properties of microorganisms



ATTIS

Stress protector

Composition: amino acids - 30 g/l, humic acids - 10 g/l, natural polysaccharides - 20 g/l, enzymes and hormones of microbial origin - 0.06 g/l



Preparative form: liquid
Packaging: 1 liter
Storage temperature: from 0 to 25°C
Expiry date: 12 months

Benefits/Advantages of use

- contains elicitors of induced systemic plant resistance
- promotes effective adaptation of plants to stress
- has high physiological efficiency and prevents crop yield losses

Recommended consumption rates in organic and integrated agriculture

Crops	Application phase	Consumption rates
Cereals	in the autumn: tillering (t° not lower than 5°C)	1,0 - 2,0 l/h
	in the spring: end of tillering - beginning of booting	1,0 - 3,0 l/h
	in the flag leaf phase	1,0 - 3,0 l/h
Legume grains	in the 5-6 leaf phase	1,0 - 2,0 l/h
	in the budding phase	1,0 - 3,0 l/h
Corn, sunflower	in the 5-7-leaf phase	1,0 - 3,0 l/h
Rapeseed	in the autumn: simultaneously with the application of growth regulators	1,0 - 3,0 l/h
	in the spring: after restoration of vegetation in tank mixtures	1,0 - 2,0 l/h
Sugar beet	in the leaf inter-row closure phase (together with fungicides)	1,0 - 2,0 l/h

Biological effect of the preparation

- the efficiency of the preparation is achieved by two active compounds - trehalose-6-phosphate and ACC-deaminase, which induce systemic resistance of plants to stress and ensure rapid adaptation
- amino- and humic acids help plants that have already been affected by negative factors to recover more quickly and increase their resistance to adverse conditions in the future
- contains compounds that regulate the internal balance of plant hormones

Instructions for use

- use ATTIS in the form of an aqueous solution for spraying plants during the vegetative period, usually before the onset of stress factors
- we recommend to perform plant treatment during the periods of minimal solar activity (in the morning, in the evening, at night or during cloudy weather)
- the preparation is compatible with most chemical and biological preparations. Before use in the tank mixture, conduct a test for the presence of precipitation
- optimum number of treatments - 2-3 during the vegetative period



AKTYV-R

Microflora Enhancer

Composition: exopolysaccharides and lipopolysaccharides of microbial origin



Preparative form: liquid

Packaging: 1 liter

Storage temperature: from minus 10 to 40°C

Expiry date: 12 months

Benefits/Advantages of use

- increases the efficiency of early seed inoculation
- increases the efficiency of biological preparations in arid conditions
- activates beneficial soil biota and improves soil fertility
- retains soil moisture around the seeds and accelerates germination

Recommended consumption rates in organic and integrated farming

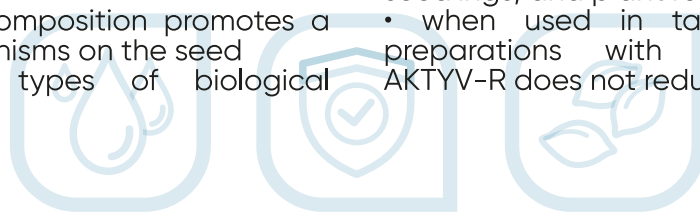
Crops	Preparation consumption rates	Working solution rates
Treatment of seeds of agricultural field crops	1,0 l/t	6-10 l/t

Biological effect of the preparation

- microbial biopolymers increase the efficiency of inoculants, enhance the survival of microorganisms and protect them from negative effects of external factors
- the natural lipogenic composition promotes a better fixation of microorganisms on the seed
- compatible with all types of biological preparations

Instructions for use

- use AKTYV-R with any biological preparations in the form of an aqueous solution for pre-sowing inoculation of seeds, soil application, soaking of seedlings, and plant root nutrition
- when used in tank mixtures of biological preparations with recommended pesticides, AKTYV-R does not reduce the efficiency of the latter



7 BASIC RULES FOR THE USE OF BIOLOGICAL PREPARATIONS

A huge mistake among agricultural manufacturers is attempting to combine several processes into a single technological method, such as application of chemical protection agents, biological preparations, trace elements or growth regulators. Microorganisms are living beings, so the efficiency of their use depends on the adherence to several basic rules:

- 1.** Trace elements play an important role in the biochemical processes of plants, yet most of them are heavy metals, and their concentration in tank mixtures can be toxic to microorganisms. Hence, it's advisable to refrain from combining bacteria with trace elements for seed treatment or soil application.
- 2.** When treating seeds with any (recommended) chemical pesticides in combination with inoculants, it's essential to dilute the chemical preparation in water first and then add the biological preparation.
- 3.** All microorganisms are susceptible to solar ultraviolet radiation. While many companies add chemical ultraviolet filters or loose carriers to liquid biological preparations to shield bacteria from UV rays, it's prudent not to overlook simple rules such as conducting seed treatment indoors or in sheltered places, and applying a microbial preparation to soil during the periods of low solar activity (6:00 p.m. to 10:00 a.m.) or under cloudy conditions. The use is also permitted during the daytime in sunless weather at temperatures not lower than 15°C. Optimal conditions ensuring the efficiency of the preparation are pH levels of 5.0-7.0, temperatures ranging 15-40°C, and soil moisture levels of 60-70%.
- 4.** Microbial preparations are quite sensitive to storage time and conditions. Ideally, they should be stored at temperatures ranging 2 - 8°C. While numerous advancements in technology mitigate the effects of high temperatures on microbial viability, adherence to these storage requirements is crucial to prevent preparation spoilage and save time, effort, and resources.
- 5.** Applying microbial preparations foliarly during the plant growth stage may actually seem pointless and makes many farmers skeptical, since it is well known that bacteria die in sunlight. As a matter of fact, the efficiency of biological preparations in this case stems not from the bacteria themselves, but from the byproducts of their synthesis, which include not only phytohormones, antibiotics, amino acids, or organic acids, but also lots of signaling molecules capable of effectively regulating plant metabolism. Moreover, their quantity and ratio are naturally balanced. Here, combining them with chemical protectants or growth regulators is possible, although caution is needed because the presence of two or more growth regulating substances can have an antagonistic rather than synergistic effect.
- 6.** Combining several biological preparations with different properties isn't always effective. Microorganisms use plant root secretions for nutrition, and introducing two or more beneficial bacteria into the rhizosphere may foster their competition for resources, diminishing the efficiency of each. This is particularly relevant for legume crop inoculants.
- 7.** And here is the fundamental rule: when in doubt about the correct use of biological preparations, don't hesitate to contact the manufacturer for detailed instructions. This will benefit both you and the manufacturer, as it will prevent unnecessary complications for you, while providing the manufacturer with valuable feedback to improve the development of new preparations.



CONTACT INFORMATION

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All the products of SUNAGRO UKRAINE LLC are certified by Organic Standard in accordance with the Standard for the Production of Auxiliary Products to be Used in Organic Agriculture and Processing (in accordance with the requirements of the Standard equivalent to EU Regulations 834/2007 and 889/2008)".

