

PRODUKT
POLSKI

PRODUCER OF

FERTILIZERS
AND **BIO**STIMULATORS

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Welcome to Poli-Farm!

Our company has been producing preparations based on chitosan and other bioactive polymers of natural origin for over 20 years in order to best protect the health of our customers by producing wholesome, safe food. We offer both dietary supplements and a whole series of preparations for plant production. With our customers in mind, we are working on improving the formulas, and the effectiveness of the preparations is confirmed by scientific research and experience in leading institutes in Poland. We are also a manufacturer of products based on our recipes for private labels of domestic distributors and exporters.

**We invite you to cooperate,
Management Board of Poli-Farm Sp. z o.o.**



BETA-CHIKOL

GROWTH STIMULATOR



Characteristic

A plant growth stimulator that supports the natural defense mechanisms of plants by preventing infection (blocking receptors) and/or inhibiting the development of pathogens.

The unique formulation of the preparation developed by Polish scientists (by appropriate adjustment of the molecular weight, degree of deacetylation and pH) ensures high effectiveness in reducing the pressure of pathogens and at the same time helps to reduce the use of plant protection products. Unlike pesticides, the preparation is simultaneously active against viruses, fungi and bacteria and at the same time stimulates the secretion of phytoalexins, which reduces susceptibility to disease. The best results are obtained by using Beta-Chikol from the beginning of vegetation, alternating with plant protection products during the period of high pressure of pathogens. Used in the form of a foliar spray, it induces the closing of stomata, which reduces transpiration, and also reflects the sun's rays and prevents burns. Beta-Chikol used as a seed dressing significantly affects the germination and rooting of seedlings, and when introduced into the soil, it inhibits the development of soil diseases and has a deadly effect on nematodes.

Recommendations for use:

Vegetable plants grown under cover and in the ground

Seed treatment: Recommended concentration: 2.5% (250 ml of the agent in 10 liters of water). Soak the seeds for 5 hours immediately before sowing.

Spraying plants: Recommended concentration: 2.5% (250 ml of the agent in 10 liters of water) or a dose of 15-20 l/ha. The recommended amount of water is 600-800 liters. Apply the stimulator from the beginning of plant vegetation, thoroughly wetting the surface of the above-ground part of the plants. Repeat the procedure several times if necessary. Spraying plants with a hand, backpack or tractor sprayer

Orchard plants

Immediately before planting the plants, soak the root system in a 2.5% solution (250 ml of the agent in 10 liters of water). The minimum time for soaking the roots - 2 minutes. Spray the plants with a 1% solution (100 ml of the agent in 10 liters of water). The first spraying should be carried out in spring, after the appearance of the first leaves or before flowering in fruiting orchards/plantations, and the second spraying 2-3 weeks later or immediately after the end of flowering plants.

Ornamental plants (in the ground and under cover)

Use the growth stimulator:

For watering plants: Recommended concentration 0.5-1% (50-100 ml of the agent in 10 liters of water). Apply the agent immediately after planting the plants in the amount of 2-4 liters of working liquid per 1 m², depending on the size of the plants.

For spraying plants: Recommended concentration 0.5-2% (50-200 ml of the agent in 10 liters of water). The recommended amount of water is 500-1000 l/ha depending on the size of the plants. Spray plants after the beginning of vegetation. Repeat the treatment several times every 7-10 days.

Forestry

The recommended concentration is 0.5-2% (50-250 ml of the agent in 10 liters of water). Spray the plants directly after planting them into the ground and after two weeks of cultivation.

Available packages:

1L

5L

20L

1000L

Composition:

Chitosan lactate in concentration 22g/kg

Benefits of using:

Impact on the prevention and reduction of plant diseases

- gray mold of tomato in cultivation under cover
- Bacterial spotting of tomato
- sclerotia rot of cucumber in crops under shields
- angular blotch of cucumber in crops under shields
- bean ring disease
- Dieffenbachia leaf ring spot
- powdery mildew and downy mildew
- chrysanthemum white rust



PhytoChikol SL

NATURAL PLANT ELICITOR



Characteristic

Liquid plant elicitor with fungicidal, bactericidal and virucidal properties.

It stimulates the natural defense mechanisms of plants by preventing infection (blocking receptors) and/or inhibiting the development of pathogens. The unique formula of the preparation developed by Polish scientists, i.e. the appropriate adjustment of the molecular weight of chitosan oligomers, the degree of deacetylation and pH, results in high effectiveness in reducing the pressure of crop pathogens. Unlike pesticides, the preparation is simultaneously active against fungi, bacteria, viruses and viroids occurring in field crops and under covers. The best results are obtained by using the preparation preventively from the beginning of vegetation.

Recommendations for use:

CROPS	RECOMMENDATIONS FOR USE
BERRIESE (Strawberry, Raspberry, Blueberry, Blueberry, Chokeberry)	4-8 treatments every two weeks , starting from the first true leaves; Min. dose: 1.25 kg - max.: 5 kg per 100 l of working liquid; Min. dose of 2.5 kg per 200 l of working liquid in one treatment; max. dose of 5 kg per 400 l of working liquid in one treatment
GROUND VEGETABLES (cucumber, tomato, carrot, parsley, Chinese cabbage, head cabbage)	4-8 treatments every two weeks , starting from the first true leaves; Min. dose: 1.25 kg - max.: 5 kg per 100 l of working liquid; Min. dose of 2.5 kg per 200 l of working liquid in one treatment; max. dose of 5 kg per 400 l of working liquid in one treatment
GREENHOUSE TOMATO AND CUCUMBER	4-8 treatments every two weeks , starting from the first true leaves; Min. dose: 1.25 kg - max.: 5 kg per 100 l of working liquid; Min. dose of 2.5 kg per 200 l of working liquid in one treatment; max. dose of 5 kg per 400 l of working liquid in one treatment
CEREALS (winter wheat, spring wheat, malting barley)	4-8 treatments every two weeks , starting from the first true leaves; Min. dose: 1.25 kg - max.: 5 kg per 100 l of working liquid; Min. dose of 2.5 kg per 200 l of working liquid in one treatment; max. dose of 5 kg per 400 l of working liquid in one treatment
HERBS AND SPICES	V4-8 treatments every two weeks , starting from the first true leaves; Min. dose: 1.25 kg - max.: 5 kg per 100 l of working liquid; Min. dose of 2.5 kg per 200 l of working liquid in one treatment; max. dose of 5 kg per 400 l of working liquid in one treatment
MEADOWS AND PASSAGES	V4-8 treatments every two weeks , starting from the first true leaves; Min. dose: 1.25 kg - max.: 5 kg per 100 l of working liquid; Min. dose of 2.5 kg per 200 l of working liquid in one treatment; max. dose of 5 kg per 400 l of working liquid in one treatment
CEREALS - SEED TREATMENT	Before sowing in a dose of 1.25 - 2.5 kg per 10 l of water per ton of grain
POTATOES-TUBER SEALED	Before planting in a dose of 1.25 - 2.5 kg per 10 l of water per ton of tubers

Available packages:

1L

5L

20L

1000L

Composition:

Basic substance: Chitosan hydrochloride 40g/1kg

Benefits of using:

Impact on the prevention and reduction of plant diseases

- gray mold and bacterial mottling of tomato in cultivation under cover
- angular blotch and sclerotia rot of cucumber in cultivation under cover
- bean ring disease
- verticillium wilt in cereals and rapeseed
- powdery mildew and leaf spot in haskap berry cultivation
- soil diseases of seedlings of cereals, rape and potato tubers



POLIKRZEM PROTECT

NATURAL ACTIVATOR OF PLANT IMMUNITY



Characteristic

Plant resistance activator against sucking, biting and leaf-feeding pests.

Crystalline powder containing silicon derived from 100% natural micronized mineral with the addition of micronutrients necessary for plant growth and development. For preventive use in orchard, vegetable and agricultural crops, from the appearance of the first leaves. The preparation has a contact-deep effect. In mixtures with biopreparations, it extends the effect of the treatment on plants by up to 30%. The product dissolves and mixes very well.

Recommendations for use:

Cultivation	Dose	Date of application
Apples, pears	0,5-1 kg/ha	- green bud phase - 1 application - pink/white bud - 1 application - flowering - 1 application - bud growth - 1 application - fruit growth - 3 - 4 applications
Cherry, cherry, plum	0,5-1 kg/ha	- flowering - 1 application - bud growth - 2 applications - fruit growth - 2-3 applications
Strawberry	0,5-1 kg/ha	- hectare - inflorescence development - 1-2 applications - growth of buds - 2-3 applications - fruit growth - 1-2 applications
Raspberry, blueberry, haskap, currant	0,5-1 kg/ha	- inflorescence development - 2 applications - growth of buds - 2-3 applications - fruit growth - 2-3 applications
Chinese and head cabbage, broccoli, cauliflower	0,5-1 kg/ha	- 4-6 true leaves or after planting the seedlings - 1 application - formation of roses, tying the head, beginning of growth root thickening - 2-3 applications
Carrots, beetroot	0,5-1 kg/ha	- 2-3 true leaves - 1 application - beginning of root growth - 1-2 applications
Cucumber, tomato, pepper	0,5-1 kg/ha	- 4-6 true leaves - 1 application - after the formation of flower buds - 1-2 applications - fruit setting and growth - 2 applications
Onion, leek	0,5-1 kg/ha	- phase of 2-3 true leaves - 1 application - phase of 2-3 true leaves - 1 application
Beans, peas	0,5-1 kg/ha	- phase of 2-3 true leaves - 1 application - phase of 6-8 true leaves - 1-2 applications
Lettuce	0,5 kg/ha	- 7 days after planting the seedlings - 1 application - tying the head - 1-2 applications
Corn	0,5-1 kg/ha	- phase of 4-6 true leaves - 2 applications
Cereals	0,5-1 kg/ha	- phase 3-5 true leaves - 1 application - the end of the tillering phase to the second phase of the elbow - 1-2 applications
Winter rape	0,5-1 kg/ha	- phase 4-6 true leaves - 1 application - in spring - growth of the main shoot - 1 application - green bud - 1-2 applications
Potatoes	0,5-1 kg/ha	- phase of 6-8 true leaves - 1 application - leaves cover 60-80% of the surface - 1 application - flowering - 1-2 applications
White beet	0,5-1 kg/ha	- 4-6 unfolded leaves - 1 application - leaves cover 10-20% of row spacing - 1-2 applications

Available packages:

3KG

6KG

18KG

Composition:

K₂O - 3,2 %, CaO - 2,8%, Fe₂O₃ - 1,1 %, SiO₂ - 62%

Benefits of using:

- silicon accumulates in the cell walls of plants, making it difficult for pests to bite and suck
- increases the concentration of chlorophyll in the leaf tissue, which accelerates the process of photosynthesis
- stimulates the formation of a thicker leaf blade, which allows the plant to absorb and transport more water and nutrients
- the plant uses silicon to create an additional, external barrier covering the cells, making it difficult for pathogens to penetrate inside the plant
- used in mixtures with biopreparations improves the effectiveness of the treatment

PoliComplex

LIQUID ORGANIC-MINERAL FERTILIZER



Available packages:

1L

5L

20L

1000L

Composition:

Nitrogen (N) - 5.9% (m/m), Phosphorus (P₂O₅) - 4.3% (m/m), Potassium (K₂O) - 6.1% (m/m), Magnesium (MgO) - 1.6% (m/m), Sulfur (SO₃) - 3.8% (m/m), Iron (Fe) - 1322 (mg/kg), Manganese (Mn) - 1551 (mg/kg), Copper (Cu) 500-1000 (mg/kg), Zinc (Zn) 1500-3000 (mg/kg), Boron (B) - 817 (mg/kg), Molybdenum (Mo) - 264 (mg/kg), Organic substance min. 48% (m/m); liquid form.

Benefits of using:

Effect on plant nutrition

- increases the intensity of biomass growth
- improvement of yield quality parameters
- increases the dry matter content of crops, especially generative parts and fruit
- contributes to reducing the number of fungicide applications
- enables optimization of doses of soil fertilizers, i.e. their reduction up to 30% (based on soil chemical analysis)

Characteristic

Innovative organic and mineral fertilizer in the form of a liquid concentrate.

Fertilizer ingredients in the form of nanoparticles are quickly absorbed by plants. Intended for use in the cultivation of agricultural, fruit and vegetable plants. It contains an optimal composition of macro- and micronutrients complexed with amino acids and fulvic acids, optimal for plants. The fertilizer, rich in 11 nutrients, was developed on the basis of the average demand of 19 species of crops. The fertilizer dissolves perfectly and mixes with other agrochemicals.

Recommendations for use:

Cultivation	No surgery	Dose* (l/ha)	Date	Comments
Cereals winter	1.	3,0 - 5,0	BBCH 14-16	Phase 4-6 leaves
	2.	3,0 - 5,0	BBCH 21-23	Beginning of tillering
	3.	3,0 - 5,0	BBCH 29-32	End of tillering to phase II elbows (T1)
	4.**	3,0 - 5,0	BBCH 39-42	Flag leaf until the beginning of thickening leaf sheath (T2)
Rape winter and spring	1.	3,0 - 5,0	BBCH 14-16	Phase 4-6 leaves
	2.	3,0 - 5,0	BBCH 32-35	Elongation of the main shoot
	3.	3,0 - 5,0	BBCH 51-57	Before flowering, green bud
	4.**	3,0 - 5,0	BBCH 65-67	End of flowering
Beetroot sugar	1.	3,0 - 5,0	BBCH 14-16	Phase of 4-6 true leaves
	2.	3,0 - 5,0	BBCH 32-35	20-40% covered inter-rows
	3.	3,0 - 5,0	BBCH 36-37	60-70% covered inter-rows
Cereals spring	1.	3,0 - 5,0	BBCH 14-16	Phase 4-6 leaves
	2.	3,0 - 5,0	BBCH 29-32	End of tillering to phase II elbows (T1)
	3.	3,0 - 5,0	BBCH 39-42	Flag leaf until the beginning of thickening leaf sheath (T2)
	4.**	3,0 - 5,0	BBCH 49-59	End of heading to flowering (T3)
Corn	1.	3,0 - 5,0	BBCH 14-16	Phase of 4-6 true leaves
	2.	3,0 - 5,0	BBCH 18-20	Phase of 8-10 true leaves
Potato	1.	3,0 - 5,0	BBCH 23-25	After emergence, part growth aboveground
	2.	3,0 - 5,0	BBCH 38-40	At 80% of the inter-rows compact, at the beginning of tuberization
	3.	3,0 - 5,0	BBCH 52-54	First flower buds and inflorescence on the main shoot are visible
	4.	3,0 - 5,0	BBCH 67-69	At the end of flowering

POLIPOTAS PK 16.56

CRYSTALLINE FERTILIZER WITH HIGH POTASSIUM CONTENT



Characteristic

Specialist foliar fertilizer with high potassium content.

Fertilizer in the form of a crystalline powder containing quickly and almost 100% assimilable forms of potassium and phosphorus in combination with natural adjuvants. The innovative formula ensures perfect solubility and quick use of fertilizer ingredients. For use in orchard, vegetable and agricultural crops, in phases of high demand for potassium or phosphorus, or in the situation of limited uptake of these ingredients by the roots. The product does not contain nitrogen. It mixes perfectly.

Recommendations for use:

Cultivation	Dose kg/ha	Application deadline
Tomato, field tomato, pepper, zucchini, and eggplant	2,5 - 4,0	1-2 treatments from the beginning of fruit growth to harvest
Apple, pear, cherry, sweet cherry, plum, vine	2 - 3	2 treatments: 2 and 4 weeks before harvest
Strawberry, raspberry, blueberry, honeyberry	2 - 3	2-3 treatments: every 7-10 days from the beginning of fruit coloring
Carrot, parsley, parsnip, celery	2,5 - 3,0	1-2 treatments in the phase of increasing tuber diameter
Potato	2 - 3	3 treatments: closing the rows, before flowering, after flowering
Cereals	1,5 - 2,5	2 treatments: before flowering
Corn	1,5 - 2,5	2 treatments: the first after obtaining 5-6 leaves, the second 7 days later
White beet	2 - 2,5	3 treatments: after the phase of 6-8 leaves, from the phase of covering 90% of inter-rows every 14 days
Crops under cover	200 - 350 g/100 l	3-4 treatments from the beginning of fruit growth to harvest

Available packages:

2,5KG

5KG




15KG

Composition:

Phosphorus pentoxide (P_2O_5) soluble in water - 16%
Potassium oxide (K_2O) soluble in water - 56%

Benefits of using:

Effect on plant nutrition

-  improves the growth and ripening of fruits and vegetables
-  increases dry matter and Brix in yield
-  improves coloration

PoliBioN

AMINO ACID - PEPTIDE FERTILIZER



Characteristic

Liquid organic amino acid and peptide fertilizer in the form of a high-quality protein hydrolyzate of natural origin.

The product contains a repetitive profile of L-amino acids: glycine, proline, hydroxyproline, glutamic acid, alanine, arginine, aspartic acid, serine, histidine, lysine, leucine, valine, phenylalanine, isoleucine, threonine, tyrosine, cysteine, methionine. The fertilizer is intended for feeding with organic nitrogen, increasing the tolerance of plants to stress and their regeneration after stress, increasing the assimilation of nutrients when used with mineral fertilizers and increasing the effectiveness of protective treatments. For use in orchard, vegetable and agricultural crops, foliar application and/or by fertigation. Slightly acidic, completely soluble in water. It mixes perfectly. It has the properties of reducing the surface tension of the usable liquid.

Recommendations for use:

CULTIVATION	DOSE	THE DATE OF THE PROCEDURE
APPLE, PEAR, CHERRY, CHERRY, PLUM, STRAWBERRY, RASPBERRY, BLUEBERRY	1-3 L	Apply foliar throughout the growing season at intervals of 7-14 days, together with feeding and/or plant protection treatments, in the event of severe stress, the dose of the fertilizer should be doubled.
CUCUMBER, TOMATO, CARROT, PARSLEY, CHINESE CABBAGE, HEAD CABBAGE, ONION	1-2 L	Apply foliar throughout the growing season at intervals of 7-14 days, together with feeding and/or plant protection treatments, in the event of severe stress, the dose of the fertilizer should be doubled.
CEREALS, CORN, RAPESEED, SUGAR BEET, POTATO	0,5-1,5 L	Apply foliar throughout the growing season at intervals of 7-14 days, together with feeding and/or plant protection treatments, in the event of severe stress, the dose of the fertilizer should be doubled.

Available packages:

1L

5L

20L

1000L

Composition:

Total nitrogen (N) - 9% (m/m), Organic nitrogen (N org) - 9% (m/m), Total amino acids > 54% (m/m), Organic carbon > 24.5% (m/m)

Benefits of using:

Effect on plant nutrition

- nourishes and biostimulates thanks to absorbable amino acids and peptides
- improves the assimilation of macro (NPK), meso (CaMgS) and microelements in mineral forms
- increases the effectiveness of protective treatments in mixtures with pesticides
- extends the wetting of the leaf with the working liquid

PhytoChikol Calcium

LIQUID CALCIUM FERTILIZER



Characteristic

Innovative liquid calcium fertilizer combined with a natural plant elicitor - liquid chitosan and ionized silver.

The preparation is used to supplement plants with calcium in the phases of strong demand for this nutrient, while inducing resistance to fungal, bacterial and viral diseases. It reduces the occurrence of physiological diseases caused by calcium deficiencies and increases the natural resistance of plants to diseases and abiotic stresses.

Recommendations for use:

PLANT	DOSE L/HA	AMOUNT OF WATER IN L	NUMBER OF APPLIC.	APPLICATION DATES
APPLES, PEARS	3-5	300-500	2-6	From the beginning of flowering, then at intervals of 7-14 days
CHERRY, SOUR CHERRY, PLUM	3-5	300-500	3	From the start of vegetation to harvest
STRAWBERRY, RASPBERRY	2-3	300-500	3-4	From the beginning of flowering every 7-14 days
CUCUMBER, TOMATO, CARROT, PARSLEY, CHICKEN CABBAGE, HEAD CABBAGE	3-5	300-500	3	2 weeks after planting the seedlings, then two treatments 14 days apart
WINTER RAPE	2-3	200-300	2-3	In autumn, after the formation of the first leaves and in spring, after the start of vegetation
POTATO	2-3	200-300	3-4	In the phase of 4-6 leaves and before closing the inter-rows at intervals of 10 days
WHITE BEET	2-3	200-300	2-3	In the phase of 4-6 leaves and before inter-row closure
WINTER CEREALS	2-3	200-300	2	In the phase of tillering and shooting at the stem

Available packages:

1L

5L

20L

1000L

Composition:

Calcium - CaO 12.0% (m/m), ionized silver - 10 ppm/kg, chitosan hydrochloride - 15 g/kg

Benefits of using:

- reduces the occurrence of physiological diseases of fruits and vegetables
- increases plant resistance to fungal, bacterial and viral diseases
- strengthens and stabilizes the structure of cell walls
- improves the proper development and growth of individual generative organs of plants (flowers, buds)
- improves the efficiency of pollination and fruit setting increases the firmness of fruits and vegetables
- improves the extension of the shelf life of fruits and vegetables

PhytoChikol Copper

LIQUID COPPER FERTILIZER



Characteristic

Innovative liquid copper fertilizer combined with a natural plant elicitor - liquid chitosan and ionized silver.

The preparation is used in the cultivation of fruit, vegetable and cereal plants. It is used to supplement copper in a situation of increased demand for this ingredient while inducing resistance to fungal, bacterial and viral diseases. The preparation increases the natural resistance of plants to abiotic stresses.

Recommendations for use:

CULTIVATION	DOSE L/HA	QUANTITY WATER IN L	NUMBER OF APPLIC.	DATE OF APPLICATION
APPLES, PEARS	1,5-2,5	500-700	2-6	From the beginning of flowering, then at intervals of 7-14 days
CHERRY, SOUR CHERRY, PLUM	1,5-2,5	500-700	3	From the start of vegetation to harvest
STRAWBERRY, RASPBERRY, BLUEBERRY, BLUEBERRY	1,5-2,5	500-700	3-4	Before flowering and after flowering every 7-10 days
CUCUMBER, TOMATO, CARROT, PARSLEY, CABBAGE, ONION	1-2	400-600	3-4	2 weeks after planting the seedlings, then two treatments 14 days apart
WINTER RAPE	1-2	300-400	2-3	In autumn, after formation of the first leaves and in spring, after start of vegetation
POTATO	1-2	300-400	2-3	In the 4-6 leaf phase and before closing the inter-rows at intervals of 10 days
WHITE BEET	1-2	300-400	2-3	In the 4-6 leaf phase and before inter-row closure
WINTER CEREALS	1-2	300-400	2-3	In the phase of tillering and shooting at the stem

Available packages:

1L

5L

20L

1000L

Composition:

Total copper (Cu) - 5.0% (m/m) including water-soluble copper (Cu) - 5.0% (m/m), ionized silver - 20 ppm/kg, chitosan hydrochloride - 20 g/ kg

Benefits of using:

- improves the health of plants during cultivation and storage
- increases plant resistance to fungal, bacterial and viral diseases
- stimulates the development of young plant parts, their subsequent growth and fruit ripening
- increases nitrogen utilization
- increases the mechanical resistance of cereals to lodging
- stimulates the development of conductive tissue, i.e. the transport of water and nutrients
- causes an increase in biomass and improves the quality parameters of the yield

PoliHumik

GROWTH STIMULATOR



Available packages:

1L

5L

20L

1000L

Composition:

Content of humic substances: 15% m/m, including: humic acids: 13.5% m/m, fulvic acids: 1.5% m/m, potassium (K): 2.8% m/m, boron (B) : 0.4% m/m, organic carbon: 20% m/m

Benefits of using:

Effect on plant nutrition

- higher yields
- greater growth of green mass
- reducing leaching of nutrients from the soil
- reducing leaching of herbicides in mixtures
- stabilizes the level of humus in the soil

Characteristic

Liquid organic plant growth stimulator and soil improver. A unique formula of humic, fulvic and humin acids combined with natural adjuvants and boron.

The humic acids contained in the product are produced in the process of extraction of lignite leonardites - the richest source of naturally occurring humic substances. The product improves the nutritional status of plants and soil fertility. It stimulates the life processes of soil microorganisms and plants, and also accelerates the decomposition of crop residues and soil pollutants. Supplements boron deficiency, an essential micronutrient for plants, and reduces leaching of herbicides.

Recommendations for use:

Agricultural crops

Recommended dose: 5 l of the stimulator in 300 l of water per ha immediately after planting, the second dose of 10 l of the stimulator in 500 l of water per ha in the 2-3 leaf stage. The PoliHumik stimulator should be used in the form of a spray.

Orchard crops

Soil - at the beginning of vegetation, spray the surface of the soil around the plants or strips along the rows of plants, using 15 l of the stimulator per 1 ha, using 500 l of water.

Foliar - spray with a 1% solution (fill up 5 l of the stimulator with water to 500 l). The first treatment should be carried out after the appearance of the first fully grown leaves or before flowering in fruiting orchards/plantations, and the second spraying - 3 weeks later or after flowering.

Vegetable crops

In the ground and under cover, the recommended dose is 5-7.5 l of the stimulator per hectare in 500 l of water immediately after planting (50-75 ml of the stimulator in 5 l of water per 100 m²). The second dose 2-3 weeks after planting, in the amount of 5-7.5 l of the stimulator per hectare in 500 l of water (50-75 ml of the stimulator in 5 l of water per 100 m²).

Ornamental plants

Rooting cuttings: Recommended dose for soil application:

5 l of the stimulator in 500 l of water per 1 ha (50 ml of the stimulator in 5 l of water per 100 m²). Use the stimulator once for watering immediately after sowing or seedling.

Spraying seedlings: Recommended dose: 5 to 7.5 l of the stimulator in 500 l of water per 1 ha (50-75 ml of the stimulator in 5 l of water per 100 m²).

Treatment of plants after sowing or planting in permanent cultivation: Recommended dose for soil application: 5 l of the stimulator in 20,000 l of water per 1 ha (50 ml of the stimulator in 200 l of water per 100 m²).

APOL-HUMUS

GROWTH STIMULATOR



Available packages:

1L

5L

20L

1000L

Composition:

Quality requirements of the growth stimulator: total carbon content (C org.) in soluble forms of humic substances, at least 5.5 g/l, density, at least 1.00 g/cm³, liquid form, solution.

Benefits of using:

Effect on plant nutrition

- creates a lumpy structure of the soil, improves air-water relations
- reduces the risk of drought by increasing water capacity
- reduces leaching and retains nutrients in the root zone
- supports the decomposition of crop residues
- maintains the level of caries
- causes increased absorption of solar energy, thus making it better thermal properties
- supports the growth of microorganisms

Characteristic

Organic plant growth stimulator with a unique formulation of potassium humate containing humic and fulvic acids in combination with natural adjuvants.

The product has a positive effect on the thermal parameters of the soil and the life processes of soil microorganisms, which accelerates the decomposition of post-harvest residues and soil pollutants. Apol-Humus unlocks microelements in the soil as well as improves the development of root hairs and thus increases the assimilability of nutrients, which results in an increase in the quantity and quality of green mass and the yield.

Recommendations for use:

Ornamental plants

Rooting cuttings: Recommended dose for soil application:

5 l of the stimulator in 500 l of water per 1 ha (50 ml of the stimulator in 5 l of water per 100 m²). Use the stimulator once for watering immediately after sowing or seedling.

Spraying seedlings: Recommended dose: 5 to 7.5 l of the stimulator in 500 l of water per 1 ha (50-75 ml of the stimulator in 5 l of water per 100 m²).

Treatment of plants after sowing or planting in permanent cultivation:

Recommended dose for soil application: 5 l of stimulator in 20,000 l of water per 1 ha (50 ml of stimulator in 200 l of water per 100 m²).

Orchard plants

Soil - at the beginning of vegetation, spray the surface of the soil around the plants or strips along the rows of plants, using 15 l of the stimulator per 1 ha, using 500 l of water.

Foliar - spray with a 1% solution (fill up 5 l of the stimulator with water to 500 l). The first treatment should be carried out after the appearance of the first fully grown leaves or before flowering in fruiting orchards/plantations, and the second spraying - 3 weeks later or after flowering.

Vegetables

In the ground and under cover, the recommended dose is 5-7.5 l of the stimulator per hectare in 500 l of water immediately after planting (50-75 ml of the stimulator in 5 l of water per 100 m²). The second dose 2-3 weeks after planting, in the amount of 5-7.5 l of the stimulator per hectare in 500 l of water (50-75 ml of the stimulator in 5 l of water per 100 m²).

Cereals

Recommended dose: 5 l of the stimulator in 300 l of water per ha immediately after planting, the second dose of 10 l of the stimulator in 500 l of water per ha in the 2-3 leaf stage. The APOL-HUMUS stimulator should be used in the form of a spray.

APOL-HUMUS – naturalna stymulacja zbóż



W uprawie zbóż najważniejszą fazą rozwojową jest krzewienie. W tej fazie zaczyna kształtować się struktura plonu – liczba roślin, pędów i kłosów na jednostce powierzchni. Nie zawsze pogoda sprzyja właściwemu rozwojowi roślin, a na działanie czynników stresowych narażone są zarówno oziminy, jak i zboża jare.

Opracowała: Dr Agnieszka Rutkowska,
IUNG-PIB w Puławach

Przetwać niekorzystne warunki

W naszym klimacie zimy są coraz bardziej kapryśne, bezśnieżne, przeplatane okresami odwilży i dużego mrozu.

Podczas odwilży znika okrywa śnieżna, gleba rozmraża i przy sprzyjających warunkach rośliny mogą ruszyć z wegetacją. Przy kolejnej fazie mrozów następuje wymarzenie, na które najbardziej narażone są rośliny, które jesienią nie zdołały się dostatecznie rozkrzewić. Z kolei pszenica jara stosunkowo słabo się krzewi, do uzyskania zwarłego łanu potrzebuje większej ilości wysiewu. Negatywne skutki wiosennego niedoboru wody, występujące równocześnie z wysokimi temperaturami, trudno ograniczyć poprzez zabiegi agrotechniczne. Uwzględniając, że w uprawie zbóż jarych mamy zdecydowanie krótszy okres wegetacji, analogicznie krótszy jest też czas na pobranie składników pokarmowych.

Czy jest jakiś sposób, aby pomóc roślinom przetwać niebezpieczeństwo wymarzenia, a zbożom jarym zapewnić lepszy start w warunkach wiosennych niedoborów wilgoci w glebie? Dużą rolę mogą odegrać tu stymulatory wzrostu, które z jednej strony pozwolą na złagodzenie negatywnego wpływu pogody na plonowanie roślin, czyniąc je bardziej odpornymi na czynniki stresowe, z drugiej, będą je stymulować do jeszcze bardziej efektywnego wykorzystania warunków przyrodniczych. Jednym z nich jest APOL-HUMUS stymulator wzrostu na bazie kwasów humusowych.

Siła kwasów humusowych

APOL-HUMUS jest naturalnym stymulatorem wzrostu wytwarzanym z kwasów humusowych pozyskiwanych z węgla brunatnego oraz torfu. Kwas humusowy powodują wzrost pojemności wodnej gleby, poprawiają strukturę gleby, zwiększają jej aktywność mikrobiologiczną, przez co wpływają na lepsze pobieranie składników pokarmowych. Przy wyczerpywaniu



Wpływ stymulatora wzrostu APOL-HUMUS na rozwój systemu korzeniowego u pszenicy ozimej (faza kłoszenia).

puli substancji humusowych z gleby wzrasta zapotrzebowanie roślin na składniki wnoszone w nawozach mineralnych. Kwas humusowy zwiększając przyswajalność fosforu, magnezu żelaza i cynku dla roślin. Wzmagają proces syntezy chlorofilu, cukrów, aminokwasów. Co bardzo ważne, wpływają na metabolizm azotu, zapobiegając jednocześnie tworzeniu azotanów, przez co znacznie zwiększają efektywność wykorzystania azotu z nawozów, a co za tym idzie pozwalają na zmniejszenie dawki nawozów azotowych.

Związki te wpływają na aktywność hormonalną roślin, determinując w określony sposób reakcję obronną roślin na niekorzystne warunki środowiska, w tym stres suszy czy niskich temperatur. Powodują wzrost przepuszczalności błon komórkowych, a tym samym skuteczniejszy transport związków mineralnych do miejsc aktywnych metabolicznie. Kwas humusowy bardzo silnie oddziałuje na rozwój korzeni, dlatego często określa się go jako stymulator wzrostu i rozwoju korzeni. Młode rośliny silnie reagują na działanie kwasów humusowych, stąd zaleca się stosować je we wcześniejszych fazach rozwojowych.

Skuteczność potwierdzona

Skuteczność stymulatora wzrostu APOL-HUMUS w uprawie pszenicy ozimej odmiany Figura badano w Rolniczym Zakładzie Doświadczalnym IUNG-PIB, w Grabowie (woj. mazowieckie). Doświadczenie założono na glebie płowej wytworzonej na glinie lekko należącej do kompleksu

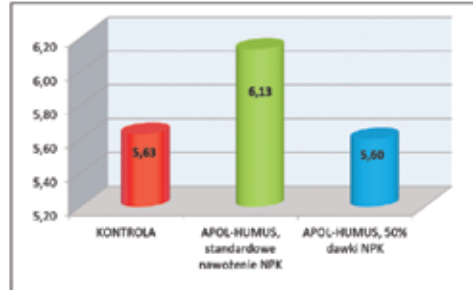
żytniego bardzo dobrego. Gleba charakteryzowała się odczynem obojętnym, wysoką zasobnością w fosfor, potas oraz magnez. W doświadczeniu badano wpływ stymulatora wzrostu APOL-HUMUS na wzrost, rozwój oraz plonowanie pszenicy ozimej na tle obiektu kontrolnego, w którym nie stosowano oprysku stymulatorem, zgodnie ze schematem:

- Obiekt 1 – kontrola, bez stosowania APOL-HUMUS, standardowa dawka NPK
- Obiekt 2 – oprysk stymulatorem APOL-HUMUS, standardowa dawka NPK
- Obiekt 3 – oprysk stymulatorem APOL-HUMUS, dawka NPK zredukowana o 50%

W obiektach ze standardową dawką nawozów zastosowano 60 kg P₂O₅/ha, 90 kg K₂O/ha (Polifoska „6”) i 170 kg N/ha w formie saletry amonowej. We wszystkich obiektach doświadczalnych stymulator APOL-HUMUS stosowano w łącznej dawce 16 l/ha (5 l/ha + 5 l/ha + 5 l/ha + 1 l/ha), przy czym pierwszą dawkę zastosowano 25 października, kiedy pszenica była w fazie pięciu liści, drugą 24 kwietnia (początek strzelania w źdźbło), trzecią – 7 maja; widoczne (drugie kolanko) i ostatnią 22 maja (otwieranie się pochwy).

W fazie kłoszenia pszenicy pobrano próby roślinne i określono plony korzeni i masy nadziemnej roślin.

APOL-HUMUS bardzo silnie wpływał na przyrost masy korzeniowej, szczególnie w przy zredukowanej ilości stosowanych nawozów mineralnych. To oczywiście pozwoliło na wyprodukowanie większej



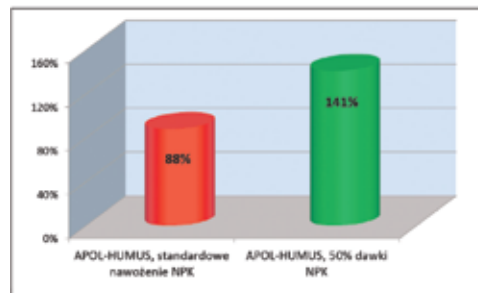
Wpływ stymulatora wzrostu APOL-HUMUS na plonowanie pszenicy ozimej.

biomasy nadziemnej. Rośliny, na które stosowano APOL-HUMUS charakteryzowały się większym wgięciem, liście pozostawały dłużej zielone na skutek zwiększenia zawartości chlorofilu. W efekcie dłużej wykazywały aktywność fotosyntetyczną, co przełożyło się na zwiększenie plonów ziarna.

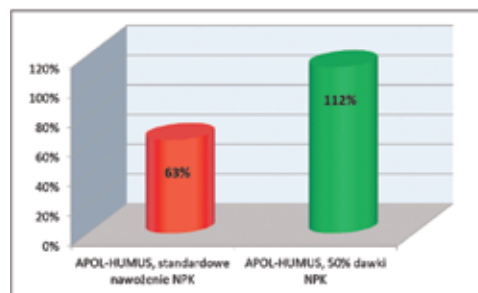
W końcu to co najważniejsze – stymulator APOL-HUMUS bardzo korzystnie wpłynął na efektywność wykorzystania składników pokarmowych z nawozów, szczególnie azotu. Pszenica, pod którą zastosowano jedynie 85 kg N/ha plonowała na takim samym poziomie jak ta, którą nawożono dawką dwukrotnie większą.

APOL-HUMUS pozwala zatem na ograniczenie zużycia mineralnych nawozów azotowych, co jest bardzo istotne zarówno ze względów ekonomicznych, jak również środowiskowych.

Nawożenie jest niezbędnym zabiegiem agrotechnicznym, bez którego nie można utrzymać żyzności gleby na właściwym poziomie, nie uzyska się również pożądanego plonu o właściwych parametrach jakościowych. Stymulacja preparatem APOL-HUMUS pozwala jednak zwiększyć efektywność nawożenia oraz złagodzić skutki stresu, na jaki narażone są rośliny w czasie wegetacji.



Przyrost masy korzeniowej pszenicy ozimej w fazie kłoszenia pod wpływem stosowania oprysku stymulatorem APOL-HUMUS.



Przyrost masy nadziemnej pszenicy ozimej w fazie kłoszenia pod wpływem stosowania oprysku stymulatorem APOL-HUMUS.



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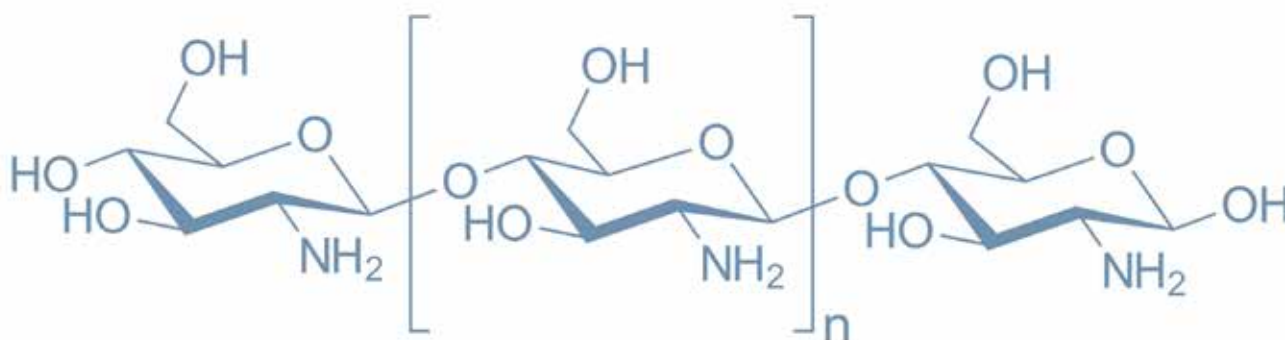
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Chitosan

biologically active oligomer



The development of agriculture depends on many factors, not only on weather conditions and the varieties used, but also on progress in the production of plant protection products, fertilizers and growth stimulants. In modern plant cultivation, new solutions are constantly being sought that would help to obtain high and stable fields while limiting the chemical substances introduced into the final product and the environment. One of the oligomers particularly recommended in agricultural crops turned out to be chitosan, obtained in the process of chitin deacetylation, which can be used in both standard and microcrystalline form. It is a natural, non-toxic and biodegradable substance.

Research conducted by prof. Henryk Struszczyk on the use of chitosan with liquid fertilizers showed an increase in the adhesion of nutrients from fertilizers to plants and an increase in resistance to washing by water. The polymer applied to the plant in the form of a spray creates a flexible semi-permeable membrane that does not inhibit growth and at the same time protects against excessive radiation and transpiration. In the literature, we can find many publications on the use of chitosan for refining seed material of cultivated plants. The experiments were conducted by G. Korbecka-Glinka, M. Wiśniewska-Wrona and E. Kopania showed a positive effect on the transfer of active substances and microorganisms, and the oligomers contained in seed coatings or dressings may contribute to reducing the adverse impact of the environment and pathogens on seed germination, plant growth, also in under stress caused by high salinity and low temperature.

Seed coating with preparations containing chitosan not only has a beneficial effect on germination, but above all provides the plant with a better start, activating natural resistance to pathogens. Chitosan coatings ensure good water permeability and release of other nutrients. The application of chitosan on the propagation material usually consists in treating seeds, bulbs or seedlings by soaking them for a sufficiently long time in the oligomer solution, and studies confirm its effectiveness in the cultivation of cereals, tomatoes and bulb plants. Chitosan oligomers also play the role of elicitors, because they support the natural defense functions of plant organisms, such as the accumulation of reactive oxygen species, biosynthesis of phenolic compounds and lignification of cell walls. In addition to inducing physiological defense mechanisms, chitosan directly affects pathogens, inhibiting their growth. Thanks to these properties, it is used to protect plants against phytopathogens and herbivorous insects, it also stimulates plant growth and increases their tolerance to abiotic stresses such as drought, salinity and high temperature.

Chitosan oligomers do not have a withdrawal period, so they can be successfully used in crops with a short vegetation period as well as those whose crops are harvested at short intervals. There is also no residue in the crop and it has a positive effect on storage. Chitosan is a molecule with great potential for use in plant cultivation from the moment of sowing and throughout the growing season, and the need to eliminate excess chemical substances constantly encourages scientists to research and search for newer and newer technologies.

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