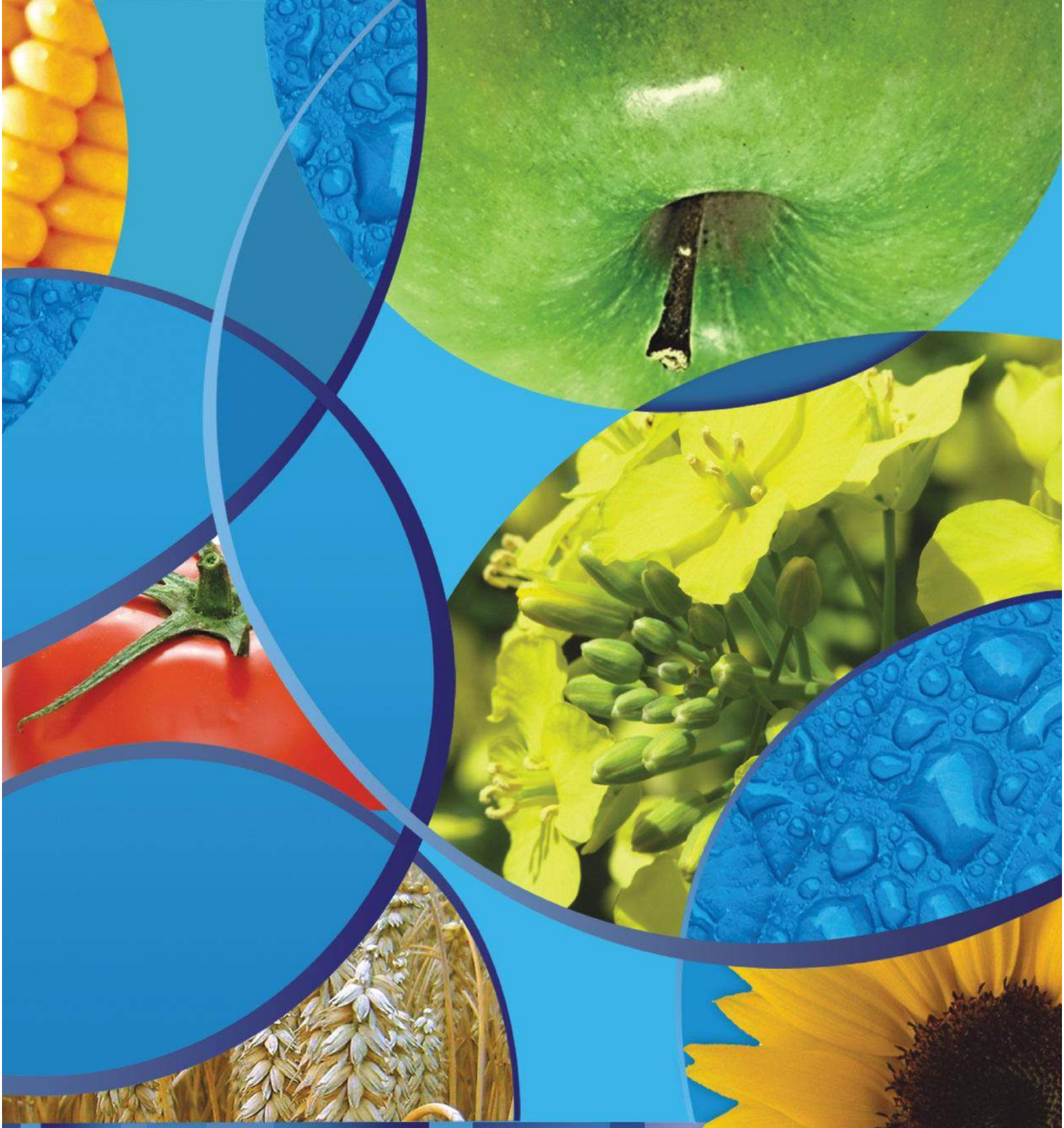


PRODUCT CATALOG

REACOM®

CHELATED MICRONUTRIENT FERTILIZERS

Table of contents

About REACOM

REACOM Research and Production Center is the only Ukrainian chelated microfertilizers developer and manufacturer.

The main task of REACOM is the implementation of highly effective plant nutrition technologies and scientific developments in agriculture, which will allow to significantly increase agricultural products yield and quality.

The top REACOM product is chelated microfertilizers containing microelements in biologically active form for pre-planting seeds treatment and foliar plants feeding.

Company history

Company history goes back to early 1970s when the studies of metal complexonates (chelates) started at the All-Union Chemical Reagents Scientific Research Institute by order of the Ministry of Chemical Industry of the USSR.

In 1980, in Dnipropetrovsk branch of the Institute (DOIREA), microelement chelates agricultural application studies began. In 1999, several years after the collapse of the USSR, the Institute employees founded REACOM Research and Production Center.

Scientific work was continued simultaneously with the launch of commercial production of chelated microfertilizers, which resulted in development of various chelated microelement compositions, given the needs of individual crops. Studies were performed in close cooperation with top scientific research institutes of Ukrainian Academy of Agrarian Sciences:

- Grain Farming Institute;
- Institute for Soil Science and Agrochemistry Research named after Sokolovsky;
- Sugar Beet Institute;
- Potato Farming Institute;
- Tairov State Research Institute for Viticulture and Wine Making;
- Oilseeds Institute, etc.

The studies included dozens of research operations to investigate efficiency of chelate microfertilizers for agricultural crops, several completed and defended thesis papers, and many registered patents.

REACOM staff led by Yuriy Turovsky, PhD in Technical Sciences, is a friendly team of specialists that successfully solves scientific, technical, and practical tasks on microfertilizers implementation and application. Most of the employees have university degree; there are two Doctors of Philosophy, three graduate students, one of whom recently successfully defended own thesis. In REACOM, you can always get a qualified advice on plant nutrition.

REACOM products undergo relevant certification and registration in accordance with applicable legislation. REACOM microfertilizers are certified by the Federal Agency on Technical Regulating and Metrology of Russia (Rosstandart).

The products are registered in the Ministry of Ecology and Natural Resources of Ukraine and the Ministry of Agriculture of the Russian Federation and are allowed to be applied in Ukraine and Russia.

REACOM microfertilizers:
Specifications, TU U 24.1–30431983—001—2001
Certificate of State Registration in Ukraine, A No. 03207
Certificate of State Registration in the Russian Federation, No. 0557–07–203–184–0–0–0–1
Certificate of Conformity No. ROSS UA.PN52.V01342

REACOM PLUS all-purpose fertilizer:
Specifications, TU U 24.1—30431983—004—2007
Certificate of State Registration in Ukraine, A No. 03812
Registration Certificate in the Republic of Moldova, No. F–024

CEREALS

Cereals
(wheat, barley, oats, rye, etc.)

REACOM-SR-CEREALS is a composition of chelated microelements with increased sticking properties for pre-planting cereal seeds treatment (simultaneously with dressing) and foliar cereals feeding, which contributes to higher cereal yields and quality.

REASTIM-CEREALS is a composition of HEDP - and humic substances-based chelated microelements for foliar cereals feeding, which contributes to higher yield quantity and quality.

Composition, g/L	P_2O_5	K_2O	S	Zn	Cu	B	Mo	Co	Humates
REACOM-SR-CEREALS	≥50	≥80	≥12	19	26	5	0.15	0.06	-
REASTIM-CEREALS	≥25	≥25	≥12	11	14	4	0.15	0.06	17

REACOM-PLUS-CEREALS is a composition of micro- and ultramicroelements in the form of HEDP - and colamine-based heteroligand chelated complexes with increased permeability, containing o-cresoxyacetic derivatives, a highly effective all-purpose plant growth stimulator, for pre-planting cereal seeds treatment (simultaneously with dressing) and foliar cereals feeding, which contributes to higher yield quantity and quality.

Composition, g/L	N	P_2O_5	K_2O	S	Zn	Cu	B	Mn	Mo	Co	Ni	Growth stimulator
REACOM-PLUS-S-CEREALS	5	≥25	≥45	≥15	22	25	6	-	0.15	0.07	-	1.5
REACOM-PLUS-R-CEREALS	5	≥25	≥45	≥15	18	19	5	7	0.15	0.07	0.3	2.5

REACOM-OPTIMUM-CEREALS is a composition of chelated microelements based on heteroligand carboxylate complexes with increased nitrogen content in nitrate and ammonia form, also containing chelated magnesium, for foliar cereals feeding, which contributes to higher yield quantity and quality.

Composition, g/L	N	MgO	Fe	Zn	Cu	B	Mn	Mo
REACOM-OPTIMUM-CEREALS	≥100	35	5	10	20	1	11	0.03

REACOM-PLUS-ZINCOPHOS is a chelated composition containing phosphorus (P) as a macroelement and its antagonizer, zinc (Zn), in one concentrated solution, which serves for simultaneous zinc-phosphorus plants nutrition in critical growth periods and during autumn treatment of winter crops.

Composition, g/L	P_2O_5	K_2O	Fe	Zn	Cu
REACOM-PLUS-ZINCOPHOS	≥110	≥130	5	20	5

NEW!

REACOM-PLUS-ACTIVATOR is a liquid composition of microelements containing nitrogen (N) in amide form and potassium (K), bound by organic acid to have a stimulating effect, intended for use as an environmentally friendly foliar fertilizer of cereals (wheat, barley).

Composition, g/L	N	K_2O
REACOM-PLUS-ACTIVATOR	25	160

For better development of root system and improving winter cereals cold resistance, treatment can be only performed at min +10 °C when spraying and average daily temperature of +5 °C.

Application of REACOM microfertilizers contributes to:

- increased yield (by 10–20% for field crops);
- improved qualitative yield indicators (protein, gluten);
- increased plant immunity (resistance to diseases, drought, and cold);
- improved seeds quality (field germination, germinative energy);
- full absorption of nutrients (macrofertilizers efficiency).

Microfertilizers consumption rates

Product	Consumption rate			Treatment stage
	Seed treatment	Foliar feeding		
		REACOM	Working solution	
REACOM-SR-CEREALS	3-4 L/tn of seeds			Simultaneously with seed dresser
REACOM-PLUS-S-CEREALS	2-3 L/tn of seeds			Simultaneously with seed dresser
REACOM-SR-CEREALS		2-3 L/ha 2-3 L/ha	250–350 L/ha 250–350 L/ha	1. Tillering stage 2. Flag leaf stage
REASTIM-CEREALS		3-4 L/ha 3-4 L/ha	250–350 L/ha 250–350 L/ha	1. Tillering stage 2. Flag leaf stage
REACOM-PLUS-R-CEREALS		1.5-2 L/ha 1.5-2 L/ha	250–350 L/ha 250–350 L/ha	1. Tillering stage 2. Flag leaf stage
REACOM-OPTIMUM-R-CEREALS		3-4 L/ha	250-350 L/ha	From tillering stage
REACOM-CUPRUM CHELATE		1-2 L/ha		In addition to the above products, against strong nitrogen background
REACOM-PLUS-ZINCOPHOS		1.5-2 L/ha	250-350 L/ha	For autumn feeding of winter crops during tillering
REACOM-PLUS-ACTIVATOR REACOM-CUPRUM CHELATE		2-3 L/ha 2-3 L/ha	250-350 L/ha	Tillering stage

In the modern line of REACOM-PLUS foliar fertilizers, a new highly effective synthetic growth stimulator called cresatin (orthocresoxyacetic acid triethanolamine salt) is used, which has protective properties that improve plant resistance to unfavorable factors, increase growth of plant's vegetative system, and accelerate flowering and maturity.

In addition to selected ratio of all necessary chelated microelements (Fe, Zn, Cu, Mn, Mo, B), REACOM-OPTIMUM products contain nitrogen (N) in nitrate and ammonia form and chelated magnesium (Mg). Chelating agents in this composition and pH of aqueous solutions are selected to maximize absorption of all nutrients. Magnesium enhances activity of many enzymes involved in formation and transformation of carbohydrates, proteins, organic acids, fats, affects movement and transformation of phosphorus compounds, fruit formation and seeds quality, accelerates cereal seeds maturation; improves yield quality, fat and carbohydrates content in plants, and cold resistance of winter crops.

SPECIAL CHARACTERISTICS OF CEREALS (in terms of microelements)

Cereals have a very high need for copper. Characteristic for copper is that this microelement increases plants resistance against fungal and bacterial diseases, reduces occurrence of various types of smut in cereals, increases plants resistance to brown spots, fungal and bacterial diseases, etc. Given a strong deficit of copper, significant tillering occurs, though without further ear formation, and the entire stem gradually dries up.

Plant's copper increases hydrophilic colloids content and thus foliar feeding with this element is very effective in dry and hot summers. Copper positively affects the pollen viability, whether soil is moisturized optimally or suboptimally.

SUNFLOWER

Sunflower

REACOM-SR-SUNFLOWER is a composition of chelated microelements with increased sticking properties for pre-planting sunflower seeds treatment (simultaneously with dressing) and foliar sunflower feeding, which contributes to higher yield quantity and quality.

REASTIM-SUNFLOWER is a composition of HEDP - and humic substances-based chelated microelements for foliar sunflower feeding, which contributes to higher yield quantity and quality.

Composition, g/L	P_2O_5	K_2O	S	Zn	Cu	B	Mn	Mo	Co	Humates
REACOM-SR-SUNFLOWER	≥45	≥45	≥12	21	18	6	8	0.2	0.07	-
REASTIM-SUNFLOWER	≥25	≥25	≥12	11	11	4	5	0.1	00.6	17

REACOM-PLUS-SUNFLOWER is a composition of micro- and ultramicroelements in the form of HEDP - and colamine-based heteroligand chelated complexes with increased permeability, containing o-cresoxyacetic derivatives, a highly effective all-purpose plant growth stimulator, for pre-planting sunflower seeds treatment (simultaneously with dressing) and foliar sunflower feeding, which contributes to higher yield quantity and quality.

Composition, g/L	N	P_2O_5	K_2O	S	Zn	Cu	B	Mn	Mo	Co	Ni	Growth stimulator
REACOM-PLUS-S-SUNFLOWER	5	≥25	≥45	≥15	21	20	6	8	0.2	0.07	-	1.5
REACOM-PLUS-R-SUNFLOWER	5	≥25	≥45	≥15	21	20	6	8	0.2	0.07	0.3	2.5

REACOM-OPTIMUM-SUNFLOWER is a composition of chelated microelements based on heteroligand carboxylate complexes with increased nitrogen content in nitrate and ammonia form, also containing chelated magnesium, for foliar sunflower feeding, which contributes to higher yield quantity and quality.

Composition, g/L	N	MgO	Fe	Zn	Cu	B	Mn	Mo
REACOM-OPTIMUM-SUNFLOWER	100	35	3	7	2	6	6	0.06

Application of REACOM microfertilizers contributes to:

- increased yield (by 2.5-5 dt/ha);
- improved qualitative yield indicators (oil content);
- increased plant immunity (resistance to diseases, drought, and cold);
- improved seeds quality (field germination, germinative energy);
- full absorption of nutrients (macrofertilizers efficiency).

Microfertilizers consumption rates

Product	Consumption rate			Treatment stage
	Seed treatment	Foliar feeding		
		REACOM	Working solution	
REACOM-SR-SUNFLOWER	4-5 L/tn of seeds			Simultaneously with seed dresser
REACOM-PLUS-S-SUNFLOWER	2-3 L/tn of seeds			Simultaneously with seed dresser
REACOM-SR-SUNFLOWER REACOM-BORON CHELATE		3-4 L/ha 0.7–1 L/ha	250-300 L/ha	3-5 pairs of leaves
REASTIM-SUNFLOWER REACOM-BORON CHELATE		4-5 L/ha 0.7-1 L/ha	250-300 L/ha	3-5 pairs of leaves
REACOM-PLUS-R-SUNFLOWER REACOM-BORON CHELATE		1.5-2 L/ha 0.7-1 L/ha	250-300 L/ha	3-5 pairs of leaves
REACOM-OPTIMUM-SUNFLOWER REACOM-BORON CHELATE		3-4 L/ha 0.7-1 L/ha	250-300 L/ha	3-5 pairs of leaves

SPECIAL CHARACTERISTICS OF SUNFLOWER

(in terms of microelements)

It is important for sunflowers to use microelements that affect plant's fat content: boron and copper increase oil content, zinc increases phospholipids content, boron and zinc increase organic acids content. In addition, boron significantly reduces occurrence of white rot and other diseases in sunflowers, which contributes to yield preservation of and improvement of its quality.

Pre-planting treatment is very important. Microelements improve moisture inflow through seed coat. Increasing seeds' water content promotes microelements penetration into corcule, activating biological processes in seeds (reserve carbohydrates, proteins and fats hydrolysis) and increasing their viability, field germination, aboveground and root mass.

CORN

Corn

REACOM-PLUS-CORN is a highly effective product for both pre-planting corn seeds treatment (possibly simultaneously with dressing), and for foliar corn feeding, containing a set of chelated (i.e. in a biologically active form effectively absorbed by plants) microelements (option: a mixture with pesticides).

Composition, g/L	N	P_2O_5	K_2O	S	Zn	Cu	B	Mn	Mo	Co	Ni
REACOM-PLUS-CORN	5	≥40	≥40	≥15	27	6	3	5.5	0.2	0.2	0.1

Application of REACOM microfertilizers contributes to:

- increased yield (by 8–10 dt/ha);
- improved photosynthesis (chlorophyll biosynthesis, enzymes activation);
- increased plant immunity (resistance to diseases, drought, and cold);
- improved seeds quality (field germination, germinative energy);
- full absorption of nutrients (macrofertilizers efficiency).

Microfertilizers consumption rates

Product	Consumption rate			Treatment stage
	Seed treatment	Foliar feeding		
		REACOM	Working solution	
REACOM-PLUS-CORN	3-4 L/tn of seeds			Simultaneously with seed dresser
REACOM-PLUS-CORN		3-4 L/ha	250-350 L/ha	3-5 leaves
REACOM-ZINC CHELATE		1-2 L/ha		

SPECIAL CHARACTERISTICS OF CORN (in terms of microelements)

Corn shows increased need for zinc. Deficit of zinc in corn is manifested by formation of a white sprout or whitening at the top. Note that foliar zinc application under high temperature increases colloidal bound water content in plants, reduces protein synthesis violation and hydrolysis intensity, slows ammonia and other toxic substances accumulation in tissues.

In case of zinc deficit, carbohydrates and proteins incomplete oxidation products (incl. polyphenols, phytosterol, and lecithin) accumulate in cell vacuoles; leaves have more reducing sugars and phosphorus and less sucrose and starch. In the absence of zinc, glucose phosphorylation is disrupted. Zinc deficit causes significant decrease of growth hormone called auxin in plants. Zinc also has fungicidal properties, which reduce occurrence of corn diseases. Boron and copper accelerate flowering and cobs formation.

Rape

REACOM Research and Production Center, in cooperation with the Oil Crops Institute (Zaporizhzhya) and Institute for Soil Science and Agrochemistry Research (Kharkiv), Ukrainian Academy of Agrarian Sciences, has been developing and producing a set of products for growing winter and spring rape suitable for soil and climatic conditions of Ukraine. Each product is optimally suited for use at various stages of plant development.

REACOM-SR-RAPE is a composition of chelated microelements with increased sticking properties for pre-planting rapeseed treatment and autumn foliar feeding of winter rape in order to improve plants immunity and cold resistance.

REASTIM-RAPE is a composition of humic substances and microelements in chelated form for foliar spring feeding of winter and spring rape, contributing to higher yields. Synergistic (joint) action of chelated microelements and humic substances increases product efficiency.

Composition, g/L	P_2O_5	K_2O	S	Zn	Cu	B	Mn	Mo	Co	Humates
REACOM-SR-RAPE	≥45	≥45	≥15	14	10	4.5	10	0.15	0.05	-
REASTIM-RAPE	≥25	≥25	≥7	8.5	6	3	6	0.1	0.03	15

REACOM-PLUS-ZINCOPHOS is a chelated composition containing phosphorus microelement (P) and its antagonizer, zinc (Zn), in one concentrated solution, which serves for simultaneous zinc-phosphorus plants nutrition in critical growth periods and during autumn treatment of winter rape.

Composition, g/L	P_2O_5	K_2O	Fe	Zn	Cu
REACOM-PLUS-ZINCOPHOS	≥11	≥130	5	20	5

For better development of root system and improving cold resistance of winter rape, treatment can be only performed at min. +10 °C when spraying and average daily temperature of +5 °C.

Microfertilizers consumption rates

Product	Consumption rate			Treatment stage
	Seed treatment	Foliar feeding		
		REACOM	Working solution	
REACOM-SR-RAPE	3-4 L/tn of seeds			Simultaneously with seed dresser
REACOM-SR-RAPE REACOM-BORON CHELATE		0.7–1 L/ha 0.7–1 L/ha	250–350 L/ha	1. 4-6 pairs of leaves, together with fungicides 2. Budding and early flowering
REACOM-SR-RAPE REACOM-BORON CHELATE		2-3 L/ha 0.7–1 L/ha	250–350 L/ha	
REASTIM-RAPE REACOM-BORON CHELATE		1.5-2 L/ha 0.7–1 L/ha	250–350 L/ha	1. 4-6 pairs of leaves, together with fungicides 2. Budding and early flowering
REASTIM-RAPE REACOM-BORON CHELATE		3-5 L/ha 0.7–1 L/ha	250–350 L/ha	
REACOM-PLUS-ZINCOPHOS REACOM-BORON CHELATE		1.5 L/ha 0.5 L/ha	250–350 L/ha	For autumn feeding of winter rape, 4-6 pairs of leaves, together with fungicides

SPECIAL CHARACTERISTICS OF RAPE
(in terms of microelements)

Of all minerals important for rape, boron is the most vital. This microelement plays an important role in root system growth, flowering, and pollination. Boron is involved in plant tissue formation and strengthening and improves the water balance.

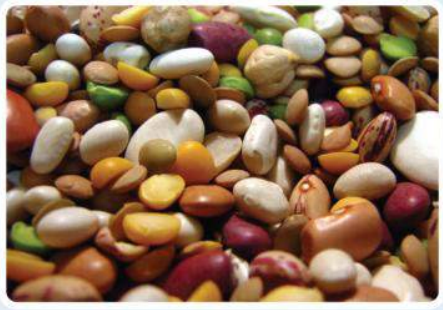
Legumes

REACOM-SR-LEGUMES is a composition of chelated microelements with increased sticking properties for pre-planting soybean, pea, lupine, etc. treatment and foliar feeding of leguminous crops before flowering, which improves yields and product quality.

Composition, g/L	P_2O_5	K_2O	S	Zn	Cu	B	Mn	Fe	Mo	Co
REACOM-SR-LEGUMES	≥45	≥45	≥7	6.5	5	7	12	9	6	1

Application of REACOM microfertilizers contributes to:

- increased yield (by 10–20% for field crops);
- improved qualitative yield indicators (protein);
- increased plant immunity (resistance to diseases, drought, and cold);
- improved seeds quality (field germination, germinative energy);
- full absorption of nutrients (macrofertilizers efficiency).

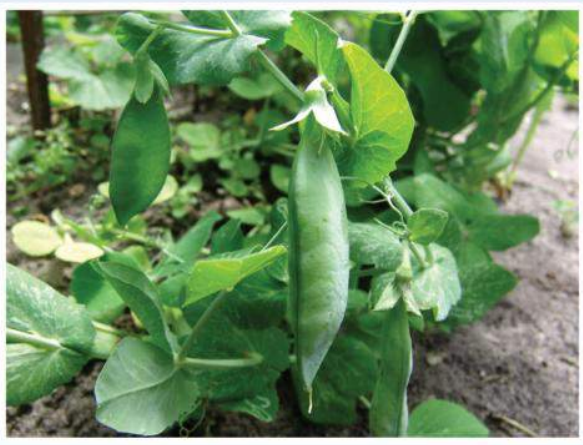


Microfertilizers consumption rates

Product	Consumption rate			Treatment stage
	Seed treatment	Foliar feeding		
		REACOM	Working solution	
REACOM-CP-LEGUMES	3-4 L/tn of seeds			Simultaneously with seed dresser
REACOM-CP-LEGUMES		3-4 L/ha	250-350 L/ha	Pre-flowering
REACOM-MOLYBDENUM CHELATE or REACOM-BORON CHELATE+MOLYBDENUM		0.5–1 L/ha or 1-2 L/ha		
REACOM-MANGANESE CHELATE		0.5 L/ha		When using glyphosate herbicide

SPECIAL CHARACTERISTICS OF LEGUMES (in terms of microelements)

For legumes, normal molybdenum supply is necessary. Physiological role of molybdenum is associated with air nitrogen fixation, nitrate nitrogen reduction in plants, participation in redox processes, carbohydrate metabolism, and chlorophyll and vitamins synthesis. In case of molybdenum deficit, a large amount of nitrates accumulate in plants tissues and normal metabolism in plants is disturbed. Molybdenum deficit also decelerates biological nitrates reduction and amines, amino acids, and proteins synthesis. This deteriorates yield quality and quantity.



Beet (sugar, red, fodder)

REACOM-BEETROOT is a highly effective product for pre-planting treatment and foliar feeding of sugar, red, or fodder beet, containing a set of chelated (i.e. in a biologically active form effectively absorbed by plants) microelements.

REACOM-BORON CHELATE is a liquid concentrated solution based on organic polyborates. Due to its organic form, boron, which is a part of the microfertilizer, is well absorbed by plants (especially after foliar feeding) and strengthens root system.

Chelated microfertilizers, REACOM-R-BEET and REACOM-BORON CHELATE, were developed in cooperation with Sugar Beet Institute and Institute of Agrochemistry and Soil Science for domestic soil and climatic conditions.

New highly productive beet varieties have intensive metabolism and require high amount of all nutrition elements, including microelements. Therefore, when growing sugar beet using intensive technology, the need for microelements is increased as the rate of macrofertilizers consumption by plants changes.

Using microfertilizers significantly improves beet growing profitability and is one of key elements of current beet growing technology. Microelements percentage in the products is well balanced based on beet needs.

Composition, g/L	P_2O_5	K_2O	S	Zn	Cu	B	Mn	Mo	Co
REACOM-R-BEET*	≥45	≥45	≥12	6	7	9	9	4	1
*the product has increased sticking properties									

When using microfertilizers in tank mixtures, it is most advisable to add REACOM into a mixture with fungicides and inadvisable to mix it with herbicides.

Application of REACOM microfertilizers contributes to:

- increased yield (by 30-50 dt/ha);
- increased sugar content (by 1.0–1.5% abs., i.e. sugar output increased by 0.4–0.7 tn/ha);
- increased plant immunity (resistance to diseases, drought, and cold);
- strong root system (especially secondary root system);
- reduced occurrence of root rot;
- full absorption of nutrients (macrofertilizers efficiency).

Microfertilizers consumption rates

Product	Consumption rate			Treatment stage
	Seed treatment	Foliar feeding		
		REACOM	Working solution	
REACOM-R-BEET		2-3 L/ha	250-350 L/ha	1. Before leaves come in contact in between rows
REACOM-BORON CHELATE		0.7-1 L/ha		
REACOM-R-BEET		2-3 L/ha	250-350 L/ha	2. 3-4 weeks after the 1st treatment
REACOM-BORON CHELATE		0.7-1 L/ha		

SPECIAL CHARACTERISTICS OF SUGAR BEET (in terms of microelements)

Beets demonstrates high demand for manganese and boron. Manganese deficit causes slow root system development. Manganese enhances hydrolytic processes, which, in turn, increases amino acids quantity, promotes photosynthetic assimilates flow from leaves to roots and other organs.

In nitrate nutrition, manganese behaves as a reducing agent; in ammoniac nutrition, as an oxidizer. Due to this manganese can affect sugar formation and protein synthesis.

Boron is involved in oxygen supply to tissues and carbohydrates flow from lamina to other plant parts.

Improving boric nutrition causes higher sugar content in sugar beet plants.

Boron deficit causes rottenness in sugar beet core and black spotting in red beet. Also, boron deficit slows down sugars oxidation and cellular proteins synthesis.

Beet strongly needs molybdenum and cobalt. Cobalt has a positive effect on respiration, energy metabolism, and sugars accumulation. Molybdenum is necessary for protein, vitamin C, and carotene synthesis, carbohydrates synthesis and flow in plants and for application of phosphorus. Molybdenum is virtually not absorbed from acidic soils, therefore foliar feeding is of special importance.

Buckwheat

REACOM-SR-BUCKWHEAT is a composition of chelated microelements for pre-flowering foliar feeding of buckwheat.

REACOM-BORON CHELATE is a liquid concentrated solution based on organic polyborates.
Because of its organic form, boron, which is a part of the microfertilizer, is well absorbed by plants (especially after foliar feeding), strengthens root system, improves flowering and pollination.

Composition, g/L	P_2O_5	K_2O	S	Zn	Cu	B	Mn	Mo	Co
REACOM-R-BUCKWHEAT	≥30	≥45	≥12	6	7	9	9	4	0.06

Microfertilizers consumption rates

Product	Consumption rate			Treatment stage
	Seed treatment	Foliar feeding		
		REACOM	Working solution	
REACOM-R-BUCKWHEAT		3-4 L/ha	250-350 L/ha	Budding, before mass flowering
REACOM-BORON CHELATE		0.7-1 L/ha		

SPECIAL CHARACTERISTICS OF BUCKWHEAT (in terms of microelements)

Foliar feeding during budding and mass flowering of buckwheat growth increase yield due to better plant development and higher number of grains per ear. Foliar feeding is especially effective when soil is sufficiently moistened. Fertilizers which do not contain chlorine (it adversely affects buckwheat yield) are particularly favorable. In particular, REACOM microfertilizers do not contain chlorine but contain potassium, boron, molybdenum, manganese, which are particularly important for buckwheat. Bee pollination is an integral part of buckwheat cultivation and microelements application improves pollen formation, which increases melliferous capacity.

Grapes

REACOM Research and Production Center, in cooperation with Tairov State Research Institute for Viticulture and Wine Making (Odesa) and Institute for Soil Science and Agrochemistry Research named after Sokolovsky (Kharkiv), Ukrainian Academy of Agrarian Sciences, has been developing and producing a set of microfertilizers for grapes growing.

REACOM-R-GRAPES is a composition of chelated microelements for stalks and seedlings treatment, and foliar feeding of grapes.

REACOM-BORON CHELATE is a liquid concentrated solution based on organic polyborates. Due to its organic form, boron, which is part of the microfertilizer, is effectively assimilated by plants.

REACOM-IRON CHELATE is a liquid concentrated solution of iron chelate (Fe3+).

REACOM-ZINC CHELATE is a liquid concentrated solution of zinc chelate (Zn2+).

Composition, g/L	P_2O_5	K_2O	S	Zn	Cu	B	Mn	Mo	Co
REACOM-R-GRAPES	≥45	≥45	≥11	17	12	5	12	0.15	0.1

Application of REACOM-R-GRAPES microfertilizer contributes to:

- increased yield (by 15-20%);
- better development of seedlings root system;
- improved intergrowth of scion and rootstock;
- increased resistance to diseases, drought, and cold;
- improved fruit formation;
- full absorption of nutrients by plants;
- increased sugar content (by 1-2%);
- improved taste of berries and juice.

Microfertilizers consumption rates

Product	Consumption rate			Treatment stage
	Seed treatment	Foliar feeding		
		REACOM	Working solution	
REACOM-R-GRAPES		4-6 L/ha	600-1,000 L/ha	1. Pre-flowering
REACOM-BORON CHELATE		1-2 L/ha		
REACOM-R-GRAPES		4-6 L/ha	600-1,000 L/ha	2. Pre-maturation
REACOM-BORON CHELATE		1-2 L/ha		
REACOM-ZINC CHELATE		2-5 L/ha	600-1,000 L/ha	In case of zinc deficit
REACOM-IRON CHELATE		5-6 L/ha	600-1,000 L/ha	In case of signs of chlorosis

SPECIAL CHARACTERISTICS OF GRAPES (in terms of microelements)

Grapes are very responsive to foliar feeding with microelements. Microelements contribute to sugars, aromatic and coloring substances accumulation in berries, accelerate enzymatic processes and maturation, improve taste. Using boron enhances sugars flow from leaves to berries and prevents formation of small berries. Copper facilitates ascorbic acid and sugars accumulation in plant. Molybdenum promotes carbohydrates and organic acids synthesis, increases rate of use of absorbed nitrogen by plant for protein synthesis.

For garden crops (all-purpose)

REACOM-PLUS-SO (GARDEN) is a composition of chelated microelements for foliar feeding of vegetables, fruits and berries, and flower crops in drip irrigation systems and pre-planting seeds treatment.

REACOM-PLUS-SO (GARDEN) is a composition of micro- and ultramicroelements in the form of HEDP - and colamine-based heteroligand chelated complexes with increased permeability, containing o-cresoxyacetic derivatives, a highly effective all-purpose plant growth stimulator, for pre-planting cereal seeds treatment (simultaneously with dressing) and foliar feeding of vegetables, fruits and berries, and flower crops, soil dressing in drip irrigation systems, which contributes to higher yield quantity and quality.

Composition, g/L	N	P_2O_5	K_2O	S	Zn	Cu	B	Mn	Mo	Co	Growth stimulator
REACOM-SR-SO (GARDEN)	-	≥45	≥45	≥11	16	13	5	11	0.15	0.07	-
REACOM-PLUS-SO (GARDEN)	5	≥25	≥45	≥15	22	22	7	9	0.25	0.07	2.5

Feeding with REACOM microfertilizers contributes to:

- increased yield (by 20-30%);
- accelerated flowering and fruit inception;
- full absorption of nutrients by plants;
- increased resistance to diseases, drought, and cold;
- improved taste of fruits;
- reduced nitrates content in fruits;
- increased product shelf life.

Microfertilizers consumption rates

Product	Consumption rate			Treatment stage
	Plants	Foliar feeding		
		REACOM	Working solution	
REACOM-SR-SO (GARDEN) or REACOM-PLUS-SO (GARDEN)	Tomatoes, cucumbers, aubergines, pepper	0.6-0.9 L/ha 0.6-0.9 L/ha 1.2-1.8 L/ha 2.4-3.6 L/ha	200-300 L/ha 200-300 L/ha 200-300 L/ha 400-600 L/ha	3-4 true leaves 2-3 weeks after the 1st treatment 2-3 weeks after the 2nd treatment 2-3 weeks after the 3rd treatment
REACOM-SR-SO (GARDEN) or REACOM-PLUS-SO (GARDEN)	Cabbage, carrot, onion	0.5-0.75 L/ha 1-1.5 L/ha 1.5-2 L/ha	200-300 L/ha 200-300 L/ha 300-400 L/ha	3-4 true leaves 2-3 weeks after the 1st treatment 2-3 weeks after the 2nd treatment

Soil grown vegetables

REACOM-R-TOMATOES and **REACOM-R-CUCUMBERS** are combinations of chelated microelements for foliar feeding of tomatoes, pepper, aubergines, cucumbers, and melons and gourds, soil dressing in drip irrigation systems and pre-planting seed treatment.

Composition, g/L	P_2O_5	K_2O	S	Fe	Zn	Cu	B	Mn	Mo	Co
REACOM-R-TOMATOES	≥30	≥30	≥8	8	9	5	3	5	0.1	0.03
REACOM-R-CUCUMBERS	≥30	30≥	≥8	7	8	5	3	5	0.1	0.03

Feeding with REACOM microfertilizers contributes to:

- increased yield (by 20-30%);
- accelerated flowering and fruit inception;
- full absorption of nutrients by plants;
- increased resistance to diseases, drought, and cold;
- improved taste of fruits;
- reduced nitrates content in fruits;
- increased product shelf life.

Microfertilizers consumption rates

Product	Consumption rate			Treatment stage
	Plants	Foliar feeding		
		REACOM	Working solution	
REACOM-R-TOMATOES	Tomatoes, aubergines, pepper	0.6-0.9 L/ha 0.6-0.9 L/ha 1.2-1.8 L/ha 2.4-3.6 L/ha	200-300 L/ha 200-300 L/ha 200-300 L/ha 400-600 L/ha	3-4 true leaves 2-3 weeks after the 1st treatment 2-3 weeks after the 2nd treatment 2-3 weeks after the 3rd treatment
REACOM-R-CUCUMBERS	Cucumbers, melons and gourds	0.8-1.2 L/ha 0.8-1.2 L/ha 1.2-1.6 L/ha 2.8-4.2 L/ha	200-300 L/ha 200-300 L/ha 300-400 L/ha 400-600 L/ha	3-4 true leaves 2-3 weeks after the 1st treatment 2-3 weeks after the 2nd treatment 2-3 weeks after the 3rd treatment

In case of signs of chlorosis (iron deficit), it is recommended to use REACOM-IRON CHELATE microfertilizer.

To prevent diseases, increase the number of ovaries, and improve vegetables and fruits quality, it is recommended to perform pre-flowering treatment with REACOM-BORON CHELATE in the amount of 0.8-1 L/ha per 200-300 L/ha of working solution.

Drip irrigation: In case of drip irrigation, REACOM microfertilizer consumption rate is ~8-10 L per 1 ha over the entire vegetation period. It is recommended to perform four 2-3 L/ha feedings with a microfertilizer concentration in a nutrient solution of 20-100 mL/m3 of irrigation water. Before preparing nutrient solutions containing other fertilizers and plant protection agents, their compatibility shall be checked.

Pre-planting seeds treatment: Soak seeds in 5–10% aqueous solution of microfertilizers for max 4 hours. The solution can be used multiple times. After soaking, dry the seeds or plant immediately.

POTATOES

Potatoes

REACOM-SR-POTATOES is a set of chelated microelements for tubers treatment, foliar potatoes feeding, and root fertilizing in drip irrigation systems.

Composition, g/L	P_2O_5	K_2O	S	Zn	Cu	B	Mn	Mo	Co
REACOM-SR-POTATOES	≥45	≥45	≥11	16	15	5	11	0.15	0.1

Application of REACOM microfertilizer contributes to:

- increased yield (by 20-30%);
- improved tuber formation;
- full absorption of nutrients by plants;
- increased plant immunity;
- improved taste of potato;
- reduced nitrates content in tubers;
- increased product shelf life.

Pre-planting tuber treatment: It is advisable to perform the treatment simultaneously with dressing (seed dresser rate shall be reduced by 20–30%).

Small amounts of tubers: Dip tubers in a 5–10% aqueous solution of microfertilizers for 3–4 seconds. The solution can be used multiple times. After dipping, dry the tubers or plant them immediately.

Significant amounts of tubers: Product consumption rate is 3-4 L per ton of tubers. Working solution consumption rate is 10–20 L/tn. Treatment method shall allow uniform covering of tuber surface with working solution.

To prevent diseases, increase the number of ovaries, improve flowering, and improve potato quality, it is recommended to perform pre-flowering treatment with REACOM-BORON CHELATE in the amount of 0.8-1 L/ha per 200-300 L/ha of working solution.

Microfertilizers consumption rates

Product	Consumption rate			Treatment stage
	Tubers treatment	Foliar feeding		
		REACOM	Working solution	
REACOM-SR-POTATOES	3-4 L/tn of tubers		10–20 L/tn	Simultaneously with seed dresser
REACOM-SR-POTATOES		2.5–3 L/ha 2.5–3 L/ha	300-350 L/ha 300-350 L/ha	1. Pre-flowering 2. 2-3 weeks after the 1st treatment

Drip irrigation: In case of drip irrigation, REACOM microfertilizer consumption rate is ~8-10 L per 1 ha over the entire vegetation period. It is recommended to perform four 2-3 L/ha feedings with a microfertilizer concentration in a nutrient solution of 20-100 mL/m3 of irrigation water. Before preparing nutrient solutions containing other fertilizers and plant protection agents, their compatibility shall be checked.

SPECIAL CHARACTERISTICS OF POTATOES *(in terms of microelements)*

Potatoes need high amounts of many microelements. E.g., manganese enhances hydrolytic processes, which, in turn, increases amino acids quantity, promotes photosynthetic assimilates flow from leaves to roots and other organs.

Copper's positive effect on protein synthesis in plants and, therefore, plant tissue's water-holding capacity is proved. By contrast, copper deficit reduces tissue colloids' hydrophilic property. Apparently, copper used as a fertilizer is important for making plants resistant to drought, frost, and bacterial diseases. In case of boron deficit, growth points die. Heavy deficit causes formation of anthocyan. Cracks and internal brown spot appear on tubers, the size of which decreases.

Lawn grass and conifers

REACOM-R-LAWN AND CONIFERS is a highly concentrated composition of microelements for root fertilizing and foliar feeding of lawn grass and conifers.

Composition, g/L	P_2O_5	K_2O	S	Fe	Zn	Cu	B	Mn	Mo	Co
REACOM-R-LAWN AND CONIFERS	≥45	≥60	≥8	15	8	6	3	6	0.1	0.03

Application of REACOM microfertilizers contributes to:

- full absorption of soil nutrients;
- saturated dark-green color;
- high grass density and stronger plant stand;
- increased resistance to diseases, drought, and cold;
- good root-taking after planting;
- relieved stress load after pesticidal treatment.

Microfertilizers consumption rates

Feeding.

First feeding shall be made after wintering; thereafter, plants shall be fed with intervals not less than 2-3 weeks:

Lawn grass: Solve 2—2.5 L of microfertilizer in 400-500 L of water and spray or irrigate with the solution 1 ha of lawn.

Conifers and ornamental plans: Solve 1-2 L of microfertilizer in 300-400 L of water and spray over needles or pour under root or in 25 cm deep holes near plants in the amount of 5-20 L of solution per 1 tree or bush (depending on plant's age).

Pre-planting seeds treatment: Soak seeds in 5–10% aqueous solution of microfertilizers for max 4 hours. The solution can be used multiple times. After soaking, dry the seeds or plant immediately.

SPECIAL CHARACTERISTICS OF LAWN GRASS AND CONIFERS (in terms of microelements)

These crops are used mostly for decorative purposes, therefore components that both improve plant immunity and intensify green color are the most important during feeding. Of all microelements, iron plays a key role in chlorophyll biosynthesis. That is why any factor that limits iron availability for plants causes heavy diseases such as chlorosis. In case of high iron deficit, plants die.

REACOM-PLUS-ZINCOPHOS

A chelated composition, containing, in one concentrated solution, phosphorus as a macroelement in the form of phosphites (PO_3) and phosphonates, and microelements, such as zinc, iron, and copper which is used for foliar feeding during root system development.

Composition, g/L	P_2O_5	K_2O	Fe	Zn	Cu
REACOM-PLUS-ZINCOPHOS	≥110	≥130	5	20	5

Phosphorus as a macroelement (P) and its antagonizer, zinc (Zn), serve for simultaneous zinc-phosphorus plants nutrition in critical growth periods and during autumn treatment of winter crops.

REACOM-PLUS-PHOSPHORUS ACTIVE

Microfertilizer for foliar plant feeding, contains phosphorus in well-absorbed form, for periods of active growth.

Composition, g/L	P_2O_5	K_2O
REACOM-PLUS-PHOSPHORUS ACTIVE	≥300	≥300

In REACOM's microfertilizers, phosphorus has a form of phosphites (PO_3), which do not react with metal microelements and thus do not inhibit their action in relation to each other. If supplied during foliar feeding, phosphorus supports plant root system development.

Phosphorus increases plants cold-resistance, accelerates their development and maturation, stimulates fruiting, supports intensive growth of root system, and consequently enhances drought-resistance. Plants have the highest sensitivity to phosphorus deficit in early period of growing, when their underdeveloped root system assimilates nutrients poorly.

REACOM-PLUS-Sila

Microfertilizer containing active micellar silicon, which is required to strengthen plant's immune system, especially in stressful conditions (drought, insects, diseases).

Composition, g/L	P_2O_5	K_2O	SiO_2	Fe	Zn	Cu	B	Mn
REACOM-PLUS-Sila	≥50	≥90	100	0.3	0.5	0.5	0.15	0.2

Silicon is a very important nutrient for plants. It is a vital component of epidermal cell walls. It strengthens the plants so much that they can resist diseases and insects attack, can stand drought, heat, and pressure.

BORON CHELATE

Organic polyborates-based liquid concentrated solution, intended for use as an environmentally friendly microfertilizer for feeding agricultural crops sensitive to boron deficit. Due to its organic form, boron, which is a part of the microfertilizer, is well absorbed by plants (especially after foliar feeding).

Composition, g/L

REACOM-BORON CHELATE 150	B – 150, N – 60, amines
REACOM-BORON CHELATE 100	B – 100, N – 40, amines

Of all the microelements, boron is especially important. For normal plant development, it needs to be fed with boron, as its flow through the plant is usually complicated. In case of boron deficit, roots and aboveground part slow down their growth. Growth points die because the cells of meristem, a young growing tissue, stop their fission. Boron takes part in pollen germination and ovary growth, so when in case of its deficit, plant's seeds production decreases. Boron plays an important part in sugar movements; many organoboron compounds are growth promoters.

Crops sensitive to deficit:	Visual signs of a deficit:
Sunflower; Sugar and fodder beet; Rape; Legumes; Vegetable crops; Apple tree; Grapes.	Slow development of growth points; Slow pollen development, reduced ovaries count and deteriorated fruits growth; Fruits cracking with internal necrosis which reduces plant resistance to various diseases (e.g., heart rot in sugar beetroots).

BORON CHELATE+MOLYBDENUM

Organic polyborates and chelated molybdenum-based liquid concentrated solution, intended for use as an environmentally friendly microfertilizer for feeding agricultural crops sensitive to boron and molybdenum deficit (legumes and sugar beet).

Composition, g/L

REACOM-BORON CHELATE+MOLYBDENUM	B – 100, Mo – 10, amines

MOLYBDENUM CHELATE

Liquid concentrated solution containing chelated molybdenum, intended for use as an environmentally friendly microfertilizer for feeding agricultural crops sensitive to molybdenum deficit (legumes and sugar beet).

Composition, g/L

REACOM-MOLYBDENUM CHELATE	Mo – 40

Molybdenum is important for both plants and microorganisms; it regulates photosynthesis and respiration. It activates nitrogen fixation by nodule bacteria.

Molybdenum is accumulated mostly in young growing organs, is a part of ferments which regulate nitrogenous metabolism in plants, participate in nucleic acids (RNA and DNA) and vitamins synthesis, and regulates photosynthesis and respiration. In case of molybdenum deficit, many vital processes in plants are deteriorated, nitrates accumulate in plant tissues, which is especially dangerous in case of excessive use of nitrogen fertilizers (including manure): the higher nitrogen fertilizers doses are used, the greater amount of molybdenum is required by plants.

Crops sensitive to deficit:	Visual signs of a deficit:
Cereal grains; Legumes; Sugar beet; Tomatoes; Cabbage; Alfalfa.	Slow plant growth and development, chlorotic color (similar to nitrogen deficit); Old leaves chlorosis, especially at leaf top.

ZINC CHELATE

Liquid concentrated solution containing chelated zinc, intended for use as an environmentally friendly microfertilizer for feeding agricultural crops sensitive to zinc deficit.

Composition, g/L

REACOM-ZINC CHELATE	Zn–70 (HEDP)
REACOM-ZINC CHELATE 100	Zn–100, carboxylic acids, amines

Zinc, which is part of microfertilizer, is well absorbed by plants (especially after foliar feeding). Zinc plays an important role in redox processes in plant body, being a constituent part of enzymes, and directly participates in chlorophyll formation and promotes vitamins synthesis. Zinc increases sucrose and starch synthesis as well as carbohydrates and protein substances content.

Crops sensitive to deficit:	Visual signs of a deficit:
Corn; Soybean; Bean; Potatoes; Linen; Grapes; Apple and pear trees.	In corn with zinc deficit, whitening or chlorosis of upper leaves is observed; Shorter internodes; Small yellow spots and chlorotic spots in dicotyledonous crops; Yellow chlorotic interveinal strips in cereals; Premature death of shoots and loss of leaves in fruit plants; Decelerated growth and disrupted cell functions.

MANGANESE CHELATE

Liquid concentrated solution containing chelated manganese, intended for use as an environmentally friendly microfertilizer for feeding agricultural crops sensitive to manganese deficit.

Composition, g/L

REACOM-MANGANESE CHELATE	Mn – 40

Manganese is vital for plants as it catalyzes carboxylation reactions and plays an important role in photosynthesis and respiration. It accumulates mostly in leaves and growth points — in a young growing tissue with the highest physiological activity. Presence of manganese in nutrient solution improves roots respiration and significantly increases nitrate nitrogen absorption.

Particularly distinctive feature of manganese is its ability to oxidize iron compounds. In case of manganese deficit, iron accumulates in a ferrous form and, being toxic, poisons plant tissue. Therefore, there shall be certain percentage of iron and manganese in a nutrient solution, namely: iron = 4 times manganese.

Crops sensitive to deficit:	Visual signs of a deficit:
Cereals; Sugar beet; Legumes; Potatoes; Cabbage; Pears and cherries.	Focal leaves chlorosis (small yellow spots appear between veins and the affected areas die later on); "Gray spots" in cereals; "Spotted jaundice" in red, sugar, and fodder beet; Old leaves chlorosis in fruits, especially in pears and cherries.

MAGNESIUM CHELATE

Liquid concentrated solution containing chelated magnesium, intended for use as an environmentally friendly microfertilizer for feeding agricultural crops sensitive to magnesium deficit.

Composition, g/L

REACOM-MAGNESIUM CHELATE	N – 45, MgO – 75

Magnesium is a part of chlorophyll, which determines its importance in plant life: it participates in carbohydrate metabolism, enzymes action and in fruit formation. In case of magnesium deficit, it moves hard from leaves to reproductive organs.

Crops sensitive to deficit:	Visual signs of a deficit:
Sugar beet; Corn; Sorghum; Potatoes; Grapes	Old leaves yellowing between veins; In case of high deficit of magnesium, leaves fall prematurely; Chlorotic spots along the lamina of cereals.

IRON CHELATE

Liquid concentrated solution containing chelated iron, intended for use as an environmentally friendly microfertilizer to prevent and control chlorosis (iron deficit) in fruit, berry, vegetable, ornamental, field crops, and grapes.

Composition, g/L

REACOM-IRON CHELATE	Fe – 30

Iron deficit causes intensive leaves chlorosis, primarily in juvenile leaves. It is typical that chlorosis manifests itself between veins, while the yellow surface of leaves is covered with a grid of green veins.

Crops sensitive to deficit:	Visual signs of a deficit:
Corn; Legumes; Potatoes; Cabbage; Tomatoes; Grapes; Fruit crops; Ornamental plants.	Chlorotic (light yellow) color of fresh shoots and juvenile leaves; In cereals, chlorosis manifests itself as alternating yellow and green stripes along the leaf; Sometimes, iron deficit may cause fresh shoots necrosis.

COPPER CHELATE

Liquid concentrated solution containing chelated copper, intended for use as an environmentally friendly microfertilizer for feeding agricultural crops sensitive to copper deficit, especially cereals.

Composition, g/L

REACOM-COPPER CHELATE	Cu – 43

Copper plays a specific role in plant life: regulates photosynthesis and concentration of growth inhibitors formed in plant, water metabolism, and carbohydrates redistribution, forms a part of enzymes, increases resistance to lodging and contributes to their frost, heat, and drought resistance.

Crops sensitive to deficit:	Visual signs of a deficit:
Cereals; Rice; Potatoes; Apple and pear trees; Green vegetables.	Juvenile leaf tips necrosis with subsequent chlorosis and rolling; Pollen grains release slows down, and, consequently, plant pollination decreases. Significant decrease in crop yield (if there are no visual signs of microelement deficit); Cereals may have whitened leaf tips, underdeveloped ears (so-called "treatment disease" or "white plague"), or excessive tilling capacity.

REACOM-PLUS-CALCIUM CHELATE+BORON

Chelated composition, containing calcium and boron as microelements in one concentrated solution in a highly digestible biologically active form. Applied for foliar feeding of legumes, garden, and fruit crops, including apple trees and grapes.

ATTENTION. In the same tank mixture, can be jointly used with EDTA-based microelement products only!

Composition, g/L

REACOM-PLUS-CALCIUM CHELATE+BORON	Ca – 60, B - 6

The uniqueness of this product is that it combines two elements that, in standard products, prevent each other to be absorbed by plant (by forming an insoluble calcium borate), but in the living organism actively supplement and enhance the cumulative effect.

Cell membrane has one of the most important functions in plant. Its good condition is a guarantee of plant immunity. Inactive calcium (Ca) and boron (B) ions play an important role in membranes formation. In synergy, they enhance the effect of each other: calcium with pectin (a polysaccharide) forms a powerful base of shell structures — calcium pectate, and these sugars are delivered by boron (B)!

REACOM microfertilizers for hydroponic greenhouses

REACOM Research and Production Center has been developing and producing liquid metal complexonates-based microfertilizers for hydroponic greenhouses for many years.

REACOM microfertilizers for hydroponic greenhouses are highly concentrated liquid solutions of EDTA-based complexonates (chelates) of microelements (Fe, Zn, Cu, B, Mn and Mo), which are greatly compatible with high Ca^{2+} (calcium) and Mg^{2+} (magnesium) content solutions. Can be used in hard water.

Metal content in REACOM microfertilizers is well balanced depending on the needs of particular plant category, which ensures normal plant development, protects against diseases and contributes to production of an ecologically clean and high yield.

Composition, g/L	Fe	Zn	Cu	B	Mn	Mo
REACOM-PLUS-GREENHOUSE	20	3.3	1.5	3.5	6	0.5
REACOM-PLUS-IRON CHELATE	30	-	-	-	-	-

REACOM liquid microfertilizers for hydroponic greenhouses - consumption rate

Drip irrigation: 60-100 mL per 1000 L of irrigation water;

Spraying:

- the first spraying of fresh shoots shall be made with a working solution with a microfertilizer concentration of 25-30 mL per 10 L;

- subsequent spraying of working solution with a microfertilizer concentration of 50-60 mL per 10 L of water.

Advantages of REACOM microfertilizers

1. Microfertilizer compositions have been designed for domestic soil and climatic conditions jointly with specialized institutes of Ukrainian Academy of Agrarian Sciences.

2. Microelements percentage in the products is balanced based on the needs of particular crops.

3. Microelements in the products have a biologically active (chelated) form, so they are easily and quickly absorbed by plants.

4. In terms of microelements quantity per hectare, REACOM microfertilizers are significantly ahead of similar imported products.

5. The cost of one gram of chelated microelements in REACOM microfertilizers is several times lower than that of similar products.

6. 1-Hydroxy Ethylidene-1,1-Diphosphonic Acid (HEDP) is used as a chelating agent in REACOM microfertilizers production, which, in terms of biology and agrochemistry, has the following advantages vs. other chelating agents:
- its structure is the closest to that of natural polyphosphates-based compounds (when it dissolutes, chemical compounds easily absorbed by plants are formed);
- HEDP-based chelates can be used on soils with a pH of 4.5-11;
- it is a growth regulator and demonstrates antiviral properties;

7. REACOM microfertilizers are liquid, which means that they are well soluble and convenient to use.

8. They are compatible with most plant protection products.

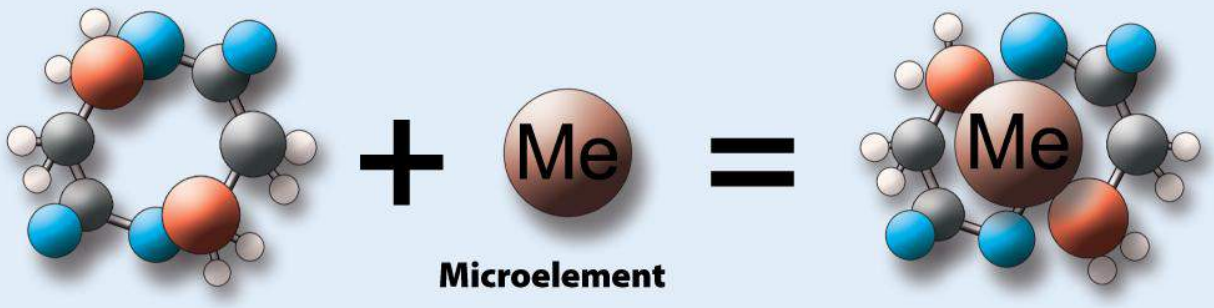
9. Possess fungicidal properties (since they contain copper and zinc ions), which allows reducing seed dresser rate during pre-planting seed treatment by 30% and increasing resistance to various diseases subject to foliar feeding.

10. They have sticking and film-forming properties, due to which evenly cover seeds and leaf surface and are effectively absorbed by plants.

11. They contain phosphorus and potassium in available form.

12. REACOM is able to produce custom composition based on customer requirements.

13. Ability to get qualified advice from products manufacturers and developers.



Chelating Agent + **Microelement** = **Chelat**

REACOM chelated microfertilizers application technology

To achieve the maximum microfertilizers efficiency, it is advisable to use microelements by pre-planting seed treatment with subsequent foliar feeding or fertilizing through drip irrigation systems. This ensures maximum absorption of microfertilizer (up to 90%) vs. max. 20-30% in case of standard soil dressing.

Pre-planting seeds treatment:

REACOM microfertilizers are typically added mechanically, together with seed dressers, using machines such as PS-10, Mobitoks, PSSh-5, KPS-10, or other equipment allowing uniform seeds treatment.

Seed dresser amount, when used jointly with REACOM, shall be reduced by 25-30% of recommended value since REACOM has fungicidal properties due to the presence of copper (Cu^{2+}) and zinc (Zn^{2+}) ions.

Working solution preparation and simultaneous seed treatment and dressing:

1. Prepare the required quantity (see table) of REACOM microfertilizer per 1 tn of seeds (e.g., 3-4 L for wheat).
2. Prepare the required quantity of seed dresser (25-30% less than the recommended value).
3. Prepare the required amount of water, so that the total volume of working solution (REACOM + seed dresser + water) is the same as recommended for treatment of 1 tn of seeds (e.g., 10 L for cereals).
4. Before mixing, it is recommended to check the products for compatibility. For that purpose, prepare a small amount of working solution (e.g., take 30-40 mL of REACOM, dilute with water to 90 mL, add seed dresser in the amount corresponding to 90 mL of solution, and mix). The mixture should not have a sediment. Slight solution turbidity is acceptable.
5. Dilute REACOM product with the estimated amount of water and add the prepared amount of seed dresser while stirring.
6. Pour ready solution into the reservoir of mechanized seed dresser or use another treatment method allowing to uniformly cover the seeds with working solution.

The REACOM microfertilizers consumption rates for seeds treatment are specified in respective pages of the catalog for particular crops.

Foliar crops feeding (spraying):

Foliar feeding is the most efficient and cost-effective way to apply microfertilizers. Getting on leaf surface, chelated microelements easily penetrate into its tissues, where they involved in the metabolism within as little as few hours.

Microfertilizers are well combined with the most plant protection products, which allows to simultaneously perform disease control, insects control, and plants feeding. Microfertilizers also remove plant stress from chemicals.

Any standard domestic or foreign equipment may be used for crops spraying. Consumption rates are specified in respective pages of the catalog for particular crops.

Working solution shall be prepared immediately before the use as follows:

1. Fill spray tank by 50-70% with water;
2. Add carbamide while stirring (if necessary);
3. Pour required quantity REACOM microfertilizer;
4. Added plant protection product while stirring (if necessary);
5. Add water to spray tank to reach full volume.

REACOM chelated microfertilizers application technology (continued)

Note: It is recommended to preliminary prepare working solution in a small volume to test it for compatibility. Absence of sediment means the solution is compatible.

Recommended microfertilizers content in working solution is 1.5% (volumetric).

Depending on application conditions of application (types of atomizers, aviation, leaf surface growth, etc.), the content may be different.

When treating juvenile upper leaves of vegetable crops, or before the flowering of fruits or berries, working solution content shall be ~0.25-0.3% (volumetric).

When treating plants or trees the leaves of which no longer grow before the maturation, when flower or fruit buds are being formed, working solution content shall be ~0.5-1.0% (volumetric).

Temperature mode of application

For foliar application, working solution temperature shall be approx. +20 °C, but not less than +10 °C, and air temperature shall be not less than + 10 °C and not more than +25 °C (subject to average daily temperature of at least +5 °C, i.e. during the vegetation period). Feeding shall be made early in the morning or in the evening, do not apply in case of intensive solar exposure.

REACOM microfertilizers application in drip irrigation systems

Approximate amount of chelated microfertilizers to be applied during drip irrigation:

1. Total microfertilizers consumption is 8-10 L per 1 ha per season.

2. With a water consumption of 10 m3 per 1 ha per hour and 10 hours of watering:

2.1. Apply the first dose of microfertilizers when a plant has 3-4 true leaves. If microfertilizers are applied for as much as 10 hours, the required concentration is 20 mL per 1 m3 of water. If microfertilizers are applied for 5 hours, the required concentration is 40 mL per 1 m3 of water.

2.2. The second treatment shall be performed 2-3 weeks after the first one with the same concentration.

2.3. The third treatment shall be performed 2-3 weeks after the second one with a concentration of 30 mL per 1 m3 of water (subject to 10 hours of watering) or 60 mL per 1 m3 of water (subject to 5 hours of watering).

2.4. If necessary, the 4th treatment can be performed 2-3 weeks after the third one with the same concentration.

3. Total dose of microfertilizers per season can be increased to 15 L/ha (at the discretion of agriculturist).

In case of strong microelements deficit in the soil, foliar feeding (2-3 L/ha subject to total water consumption of 300-400 L) is also desirable. The last treatment 2-3 weeks before fruits maturation allows to improve product quality.

NEW

REACOM-LIQUID COMPLEX FERTILIZERS (NPK)

Special innovative orthophosphoric acid salts-based NPK compositions for foliar feeding and soil dressing.

Advantages of REACOM-LCF fertilizers:

1. High absorption of fertilizer elements.
2. 100% orthophosphoric form of phosphorus, easily accessible to plants (pure orthophosphoric acid free of toxic heavy metal impurities is used).
3. Nitrogen could be in two main forms: amide and ammonia (no nitrates).
4. Absorbed at low soil temperatures.
5. Neutral pH.
6. Each drop of fertilizer has the same composition.
7. Do not cause equipment corrosion.
8. Do not contain free ammonia.
9. Enviromentally friendly fertilizers.

REACOM-LCF-16:20:0

Theoretically, 1:1:1 NPK ratio is the most favorable and optimal for plants. In this fertilizer, nitrogen to phosphorus ratio is close to optimal for plants.

Composition, g/L	N		P_2O_5	K_2O	Properties	
REACOM-LCF-16:20:0	200, incl.		250	0	pH	ρ
	ammonia nitrogen - 85	amide nitrogen - 115			6.4–6.7	1.26-1.28

REACOM-LCF-9:18:9

Completely ballastless, containing no ions of sodium or chlorine, fertilizer with three basic nutrition elements in the best form for absorption.

Composition, g/L	N		P_2O_5	K_2O	Properties	
REACOM-LCF-9:18:9	120, incl.		240	110	pH	ρ
	ammonia nitrogen - 50	amide nitrogen - 70			6.8-7.2	1.30-1.32

REACOM-LCF-14:18:0+microelements

In this fertilizer, macroelements are combined with microelements for balanced plant nutrition during active growth of root and vegetative systems.

Composition, g/L	N		P_2O_5	K_2O	Cu	Zn	Mn	Properties	
REACOM-LCF-14:18:0+microelements	180, incl.		225	2.5	1.6	1.6	0.7	pH	ρ
	ammonia nitrogen - 76	amide nitrogen - 104						6.3-6.6	1.24-1.27

Application method:

Experts recommend to perform foliar feeding with LCF for winter crops during tillering, stem elongation, especially on fields that have not received the necessary amount of phosphorus fertilizers since autumn. LCF shall be applied in doses of 5-20 L/ha. It increases winter wheat yield by 9-14%. Protein content increases by 0.5-1% on average, gluten by 3%.

Foliar feeding is especially important in case of late, long, and cold spring. At low temperatures (8-10 °C), nitrogen and phosphorus intake from soil to plant roots and their movement to the aboveground organs decrease. Consequently, organic compounds synthesis slows down, and plant organism growth and development deteriorates,

At even lower temperatures (5-6 °C or less), nitrogen and phosphorus absorption decreases sharply. Foliar feeding with LCF makes it possible to quickly eliminate the deficit in plant nutrition, improve general plant condition, accelerate plant organism growth and development, increase chemicals consumption by crops from 40-50% when using dry fertilizers to 90-100% when treating vegetative mass by foliar application of fertilizer solutions.

It can be used for root nutrition of plants together with soil herbicides and other plant protection products and apply using the same methods as for solid fertilizers - in a dose of up to 25 L/ha.

REACOM-PLUS-ACTIVATOR

One of the newest foliar feeding product from REACOM is **REACOM-PLUS-ACTIVATOR**, a stimulating product, which directs plant's hormonal mechanism changing the temperature of its organs.

REACOM-PLUS-ACTIVATOR is a foliar fertilizer for stimulating and activating plant growth processes at important stages of plant's vegetative and root system development. The product contains easily accessible organic forms of nitrogen and potassium, which trigger hormonal mechanisms of redistribution of growth substances and nitrogen accumulation.

Using REACOM-PLUS-ACTIVATOR guarantees:

- increased yield quantity and quality at low costs;
- continuous growth of root system for effective nutrients absorption;
- optimal hormonal balance plant organs growth and development;

REACOM-PLUS-ACTIVATOR helps reduce plant stress from the following factors:

- drought;
- low temperatures;
- nutrients deficit;
- stress from the use of herbicides or pesticides.

The product contains nitrogen in organic form (25 g/L) and potassium (160 g/L).

Doses and times of application: **REACOM-PLUS-ACTIVATOR** shall be used in the initial stages of plant development (for winter wheat, during tillering).

Consumption rate is 1-3 L/ha. It is recommended to use jointly with **REACOM-COPPER CHELATE** (dose, 1 L/ha) in the same tank mixture.

Fig.1 REACOM microfertilizers effect on winter wheat yield in dry 2015 season. Institute for Soil Science and Agrochemistry Research named after Sokolovsky