

LIPOSAM

BIOLOGICAL ADHESIVE



- Fixes pesticides, fertilizers and stimulants on the surface of the leaf and prevents them from dripping
- Increases draught resistance of a plant
- Prevents washing of soil herbicides



WHAT IS LIPOSAM

LIPOSAM is a complex biological adhesive agent that prevents the dripping of pesticides, fertilizers and stimulants from the surface of the leaf and enhances plant resistance to stress factors.

Working substance:

Water-soluble composition of biopolymers of natural origin with adhesive qualities.

Properties of Liposam®:

- **fixes** the biologicals and other plant protection and nutrition preparations on the planting material, ensures their close contact with the treated surface
- **forms** a protective elastic net that retains moisture, does not destroy the natural shell of the seeds, breathing and photosynthesis are free
- **provides** high efficiency of soil herbicides under adverse weather conditions
- **stabilizes** the effect of herbicides, fungicides and insecticides
- **protects** plants during the growing season from sunburn, drought
- **provides** better absorption of macro -, micronutrients during foliar feeding



Practiced in **12 countries** worldwide, both in organic farming and integrated pest management (IPM)



More than **2 million hectares** of farmland are treated with Liposam® annually



The efficiency was noted by **86% of farmers**



Compatible in tank mixtures with the most active substances



Liposam® is certified for organic farming,

which is confirmed by international certificate Organic standard that is recognized in the EU (approved for using in organic farming in accordance with Equivalent standard of organic production and processing IACB for the third countries with EU Regulations N°834/2007 and N°889/2008).





LIPOSAM UNIQUENESS

Liposam® is the pride of BTU-CENTER!

The uniqueness of this preparation is enabled by specific spatial configuration of macromolecules of biopolymers, which forms on the surface of the leaf a **net-like cover** that softly covers the plants and pods without hampering the growth, breathing and photosynthesis processes.

Unlike synthetic adhesive agents, which break a wax layer of the leaf, Liposam® **acts gently** making no harm to this natural shell, thanks to what the plants became less vulnerable to the diseases.

Besides, getting into the surface of the plant, Liposam® drops **occupy the area which is 1,2-2 times bigger** than without the preparation. Together with this, **the height of the drop is decreasing by 10-30%** depending on the concentration of solution and drop size. Such spreading of solution on the leaf not only makes the contact of working solution but also prevents sunburns that can be caused by lenticular drop.

Moreover, being the product of life of agronomical valuable microorganisms, this adhesive agent is also an **additional source of plant nutrition**.



R&D Head, PhD and cofounder of BTU-CENTER Bolohovska Valentyna and chief microbiologist Nahorna Olga have received State Prize of Ukraine in the field of science and technology for the development of unique polymers that became the basis for the creation of Liposam®.





LIPOSAM WITH HERBICIDES

While applying together with **soil herbicides** Liposam® fixes chemical preparation in the upper soil layer prevents washing out and damaging of root system.

At the expense of retention of the working solution in the upper soil layer the effect of herbicides on weed increases and its phytotoxicity towards cultivated plants decreases as the majority of them grow from the soil layer 5-10 cm and that is where they face the increased concentration of herbicides but the root system of the plants is not influenced by its harmful effect.

It is important to use Liposam® with **post-emergent herbicides** as it fixes herbicides on weeds.

NO TO HERBICIDES LEACHING

Aghesive LIPOSAM®:

- Fixes herbicide on the upper layer in soil and protects from leaching down
- Stabilizes herbicide effect in arid conditions
- Decreases chemical load on the plant



APPLICATION METHODS AND NORMS

Application methods



Application together with soil herbicides



Pre-sowing seeds treatment



Pre-planting potato tubers, and bulbs treatment



Application together with biological and chemical plant protection and nutrition preparations by plants spraying during the growing season



Pre-planting seedlings treatment with soaking roots

! Application by drone is possible



Application norms:

Crop	Seeds, potato tubes and bulbs treatment		Soaking plant roots		Plants spraying during the growing season	
	LIPOSAM®, l/t	Working solution, l/t	LIPOSAM®, ml/1000 unit	Working solution, l/1000 unit	LIPOSAM®, l/ha	Working solution, l/ha
Cereals	0,15-0,3	10-15	-	-	0,15-0,3	50-300
Legumes		5-10				
Groats		10-15				
Industrial crops		15-25				
Potato		30-50				
Beetroot	0,5-1,0	10-15	10,0-20,0	20-50	0,5-1,0	300-500
Vegetable crops Flowers	7,0-10,0 ml/kg	0,7-1,0 l/kg				
Grapes, berries	-	-	-	-	1,0-2,0	500-800
Horticulture crops, decorative trees and bushes					1,0-2,0	
With soil herbicides: LIPOSAM® adhesive 0,5-0,8 l/ha, Working solution 150-300 l/ha						

EVIDENCE BASE

LABORATORY TRIAL 1.

Influence on the migration of nutrients and matter in the 0-50cm soil layer

Soil: **typical low-humus chernozem**
Culture: **absent**
Repetition: **2x**
Care: **daily watering – 50ml per one item**



The working solution was treated into the surface without soil mixing

Control
Chemical analogue...
Liposam®

Filtrate received, ml

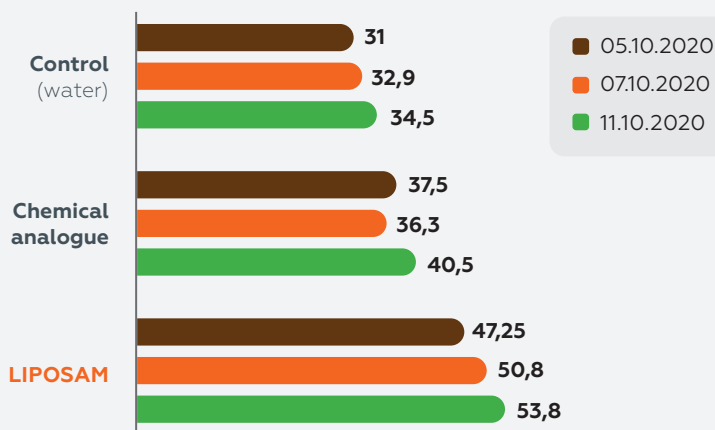
Control (water)		305
Chemical analogue		360
LIPOSAM		285

After filtrates have been received, corn was sowed into moisture-saturated cylinder.





Average plant height of 5 pcs, sm



Conclusions:

1. The analogue preparation reduced the water-holding capacity of the soil by 13-18%, while Liposam[®], on the contrary, and increased it by 2-7% compared to the control.
2. The application of a typical analogue preparation and Liposam[®] on the surface of chernozem reduced the migration of organic, mineral and organo-mineral components beyond the 0-50 cm layer by 25-41% compared to the control.
3. Biological adhesive Liposam[®] fixes herbicides in the upper soil layer and protects against leaching, stabilizes herbicide in dry conditions and reduces the chemical load on cultivated plants.



LABORATORY TRIAL 2.

Retention capacity of Liposam® during phosphorus flushing

Laboratory trial

% of active substance remained on the leaves after rain simulation

Crop	Water	Liposam	Proportion of fixation due to the use of Liposam
	30 min. after application		
Tobacco	20	42	+22 (+100%)
Sunflower	25	36	+11 (+50%)
Corn	17	31	+14 (+100%)
60 min. after application			
Tobacco	26	62	+36 (+138%)
Sunflower	26	50	+24 (+92%)
Corn	26	50	+24 (+92%)
Zucchini	17	46	+29 (+170%)
Apple	4	24	+20 (+500%)





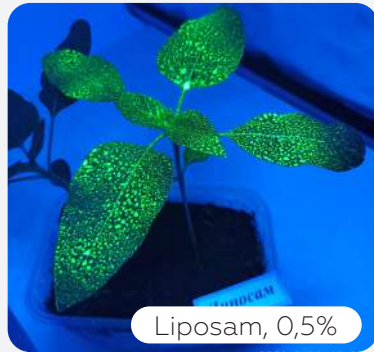
LABORATORY TRIAL 3.

Visualization of the ability of Liposam® to attach to the leaves

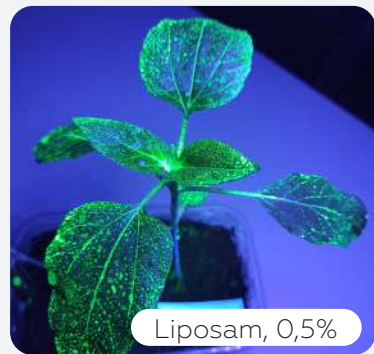
2-3 injections of adhesive solution were applied to objects and water to the control. 1 g / 100 ml of fluorescent paint was added to the solutions.

Plants leaves after 3-5 min of washing (rain model)

18 hours before applying (before the rain model)



Plants leaves after 3-5 min of washing (rain model)





TRIAL 4.

Liposam effect on the drought tolerance of sunflower **corn**

Location: North-East Institute of Agriculture NAAS, Ukraine, 2021

Crop: corn

Soil: typical low-humus chernozem slightly alkaline

Scheme of trial:

1. Control (water)
2. Liposam 1 l/ha in phase 3-5 leaves

Liposam 1 l/ha in phase 3-5 leaves



Pre-stress application

№	Variant	Yield, t/ha				Relation to control	
		Repetition				± to control, t/ha	± to control, %
		I	II	III	Average		
1	Control	8,96	8,37	7,88	8,4	—	—
2	Liposam 1 l/ha	9,97	8,88	8,83	9,22	0,82	10
LCD _{0,05}					1,09		



TRIAL 5.

Liposam effect on the drought tolerance of sunflower

Location: North-East Institute of Agriculture NAAS, Ukraine, 2021

Crop: sunflower

Soil: typical low-humus chernozem slightly alkaline

Scheme of trial:

1. Control (water)
2. Liposam 1 l/ha in phase 2-3 pair of leaves



Pre-stress application

№	Variant	Yield, t/ha				Relation to control	
		Repetition				± to control, t/ha	± to control, %
		I	II	III	Average		
1	Control	3,05	3,12	2,98	3,05	—	—
2	Liposam 1 l/ha	3,86	3,84	3,78	3,83	+0,78	25,5
LCD _{0,05}					0,28		



LABORATORY TRIAL 6.

Application to winter wheat during growing season

Location: **The Institute of Plants Physiology and Genetics of the National Academy of Sciences of Ukraine.**
Crop: **winter wheat**
Stage: **flowering**

Trial scheme:

Classical technology

Classical technology + 0,1% aquatic solution of Liposam®

Trial results 5 days after of Liposam® application

- 10% increased the photosynthetic rate of leaves
- 20% increased the respiration rate of leaves
- 12% increased the weight of kernels per ear increased.

LABORATORY TRIAL 7.

Liposam® effectiveness when used with soil herbicide

Location: **Skvyra trial station of organic production of agroecology and nature management Institute of the National Academy of Sciences of Ukraine, 2018**
Crop: **sunflower and corn**
Soil: **typical medium loam chernozem, pH (salt) –5,85**
Trial scheme: **Liposam + Prymextra TZ Gold (4 l/ha)**

Yield index under different Liposam application norms

Sunflower	Liposam 0,8 l/ha	3,64	+0,18
	Liposam 0,5 l/ha	3,61	+0,14
	Control (water)	3,46	-0,12
Corn	Liposam 0,8 l/ha	12,77	+1,16
	Liposam 0,5 l/ha	11,92	+0,31
	Control (water)	11,61	-0,16

EXAMPLES OF LIPOSAM EFFECTIVENESS ON DIFFERENT CROPS

EXAMPLES OF EFFECTIVENESS OF LIPOSAM® APPLICATION

Liposam +	Crop	Technology	Efficiency
Herbicide	Sugarbeet	-25% of herbicide, Liposam 0,25 l/ha	+ 4 %
Insecticide	Rapeseed	-25% of insecticide, Liposam 0,25 l/ha	+ 15 %
Fungicide	Vegetable	-50% pesticides 0,5 l/ha	At the control level
	Barley (seed)	-30% pesticides 0,3 l/t	+ 8,5 %
	Wheat (seed)	Farm technology + Liposam 0,3 l/ha	+ 15 %
Micronutrients	Sunflower	Farm technology + Liposam 0,3 l/t	+ 15 % (no rains for 90 days)
	Corn	-10% (micronutrients + humates) 0,3 l/ha	At the control level
	Barley	Farm technology + Liposam 0,2 l/ha	+ 13 %
Desiccant	Pea	Farm technology + Liposam 0,2 l/ha	+ 15 %
	Soybean	Farm technology + Liposam 0,2 l/ha	+ 15 %
Desiccant	Flax	-15% of desiccant + Liposam 0,25	At the control level



FEEDBACK FROM FARMERS

“ I have been working with BTU-CENTER for more than 10 years already. I constantly have Liposam®. I bring it starting from spring and I have it during the whole season, whatever I do or whatever I spray. Liposam® is not just an ordinary adhesive agent, but also the preparation that takes the hand and brings in through the leaf all the necessary preparations and elements to the plant. As having such an increased soil acidity and lack of humus on the fields, we are not able to treat many fertilizers into the soil. We treat it on the leaf but without Liposam® these preparations can drain down from the plant and be not absorbed in a proper way and with Liposam® they get to the point where they are needed.”

Ivan Pavlenko,
PE «Agrosystem plus»,
Ukraine



“ We grow crops by organic technology, in particular organic raspberry. We are very pleased with the result shown by adhesive agent by BTU-CENTER on different weather conditions. During the rainy weather, the adhesive agent stays longer, on sunny days the plant does not get sunburns; especially it is well seen during berries ripening. If to compare control field where we use preparation line of BTU-CENTER one can see the difference with a naked eye. We are extremely pleased with frequent delivery, quality of products, consultations by agronomists, fast solving of problems when we got any questions.”

Serhiy Savchyn,
LLC “Berry Organics”,
Ukraine





ADVANTAGES OF USING LIPOSAM®:

✓ **Liposam®** is an environmentally pure product, so its use instead of synthetic analogues will contribute to the production of healthy foods

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✓ **Liposam®** is a multifunctional biological that functions as an adhesive, adjuvant, antitranspirant, sorbent-carrier, antidote, antistressant, soil conditioner and net-forming agent

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✓ **Liposam®** is easy to use. It is compatible with all water-soluble fertilizers, plant protection products, growth regulators and biologicals and available with the most application methods

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✓ **Liposam®** operates in a wide range of temperatures from 5° to 50° C

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