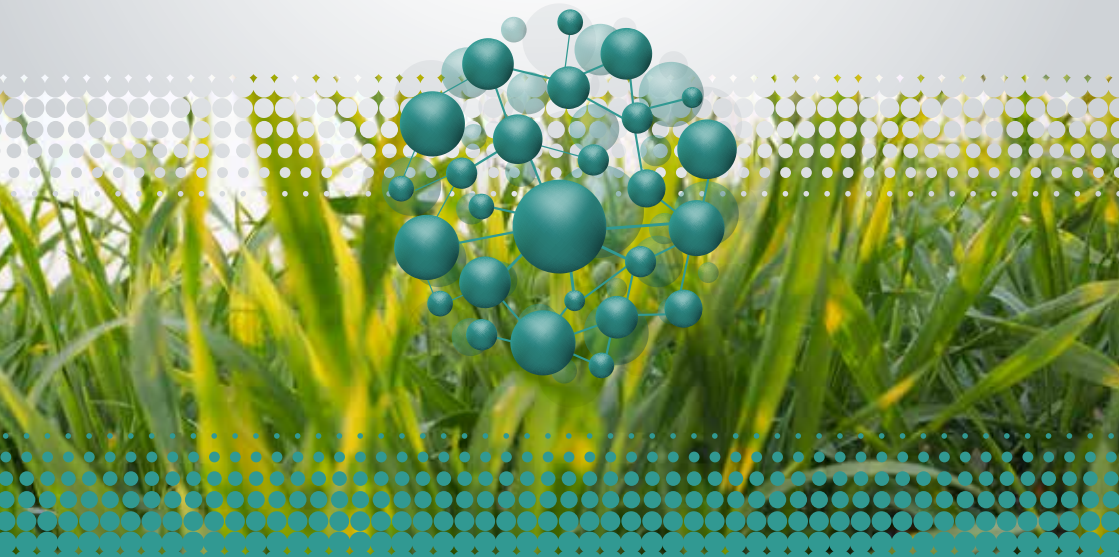




PROLIS[®]

**The Complete Stress Relief
Product for Agricultural Crops.**



Maximizing Potential Yield & Quality in Crops.

Protecting from severe winter and spring conditions for all crops.

The negative impact of different stress related issues on crops.



Crop stress is when the entire length of a plants growth are unavoidably exposed to various types of unfavorable (stress) conditions, which includes conditions such as shortage of moisture, waterlogging, heat, cold, the harmful effects of heavy metals (Cd, Pb, Hg), exposure to ultra violet rays (UV) and the impact of diseases and insects, saline / salt issues, insufficient competition with other plants, and particularly with weeds. Plus radioactive radiation, industrial waste, etc.

All these environmental factors in varying degrees will limit the crop growth and reduce yield. It will also reduce the quality of the crop at harvest losing the grower money due to a reduction in quality on top of loss of yield.

Crop Stress can severely reduce the potential yields by 50% and in extremely harsh conditions cause so much damage it can lead to complete crop failure.

Winter crops under Ukrainian climate conditions suffer from the severe low temperatures which are well below freezing and need protection then during the spring period of recovery the crops are suffering from exhaustion coping with the severe winter weather.

To overcome those unfavorable conditions the grower must use PROLIS[®] to restore the plants physiological processes and preserve the potential yield and quality.



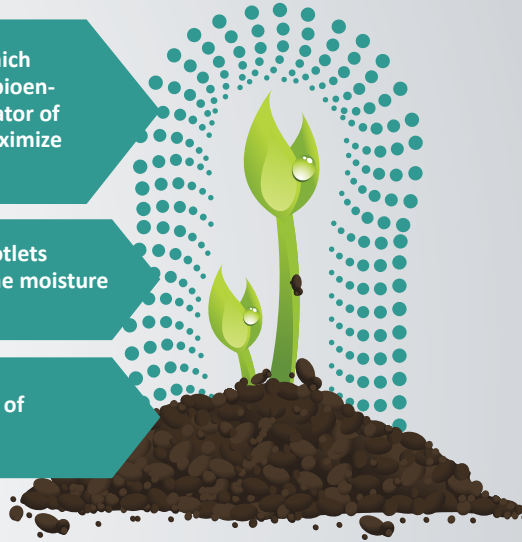
PROLIS®

PROLIS® is an essential amino acid for plants which takes a very important role in osmoregulation, bioenergy, cell growth and acts an antioxidant stimulator of enzymes which is necessary for the plant to maximize its quality and yield.

PROLIS® also stimulates growth of roots and rootlets providing the plants with the ability to access the moisture available.

PROLIS® effect on plant stress due to a shortage of moisture – Drought Conditions

Shortage of water (DROUGHT) is the biggest limiting factor for plant growth, leading to significant reductions of yield and complete loss, as well as the deterioration of the quality of the crop. PROLIS® protects the plant cell from loss of water by osmotic pressure support and to give signal to stomata to close to prevent further crop damage and thus to protect water balance.



Effect of PROLIS® on plant stress from high and low temperatures.

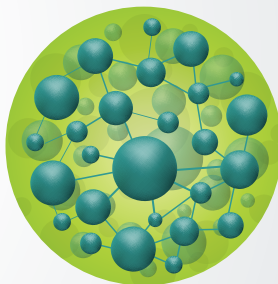
PROLIS® as an antioxidant.

During exposure to high and low temperature stress the water balance and metabolism nutrition is damaged. This deviation from the optimal growth temperature for the plant leads to serious damages to growth and development. This leads to excessive amounts of plant waste products and different types of Reactive Oxygen Species (ROS), such as alkali ($\text{OH} \cdot$), oxygen ($\text{O}_2 \cdot$), hydrogen peroxide (H_2O_2), and any others. In normal plant growth conditions, ROS are in the normal range and they play an important role in protecting from harmful disease pathogens. The plants are more susceptible to plant diseases when they are under stress conditions. Various kinds of reactive oxygen species (ROS) should remain in the normal range, but this is possible only under ideal conditions. However, excessive levels of ROS caused by stresses lead to excessive oxidative processes in plants, this results in damage to nucleic acids, the oxidation of proteins and lipids in the cell walls and degradation of chlorophyll pigments, reducing enzyme activity, electrolyte leakage. This damages many vital functions of development. Under normal conditions, excessive active oxygen species are scavenged by protective antioxidant compounds, but when the plants are under biotic and abiotic stresses their ROS level is increased resulting unfavorable growth conditions. Those excessive oxidative processes in plants damage nucleic acids, proteins and oxidation of lipids in the cell walls, degrades chlorophyll pigments, reduces the activity of enzymes, causes the leakage of electrolytes and thus damages important functions.





The active ingredient of PROLIS® facilitates creation of antioxidant enzymes, for example, catalase, ascorbate peroxidase and superoxide dismutase and neutralizes too high levels of ROS and helps the crop grow normally.



Resistance of plants to manage cold temperatures is determined by the minimum temperature at which the growth of the plants stops. For most crops, this temperature is below +4°C. When the plant is exposed to temperatures below zero PROLIS® helps the plant to activate its soluble sugars, thus increasing its internal nitrogen process by a margin of 20-40% in the plant cells, which significantly lowers their freezing at lower temperatures and leads to an increase to the winter hardiness of agricultural plants.

PROLIS® on seed treatment.

PROLIS® stimulates the enzyme alpha-amylase process, which is needed for seedling emergence and subsequent growth. It positively effects the increase in germination of the crop by allowing the crop to use its own sugars more efficiently and allowing it to establish itself quickly. Therefore, as all growers know, any crop which establishes its self quickly will always lead to a positive yield improvement and allow for good crop management by the grower.

PROLIS® for photosynthesis in plants.

Any stress will cause the photosynthesis process to be damaged thus causing damage to the chlorophyll of the plant. Adding PROLIS® to plants under stress conditions contributes to maintaining favorable ratio of NADP + (Nicotinamide adenine dinucleotide phosphate) which has the most important role for the efficiency of photosynthesis and is essential for plant growth and development.

PROLIS® for plant growth.

PROLIS® contains essential amino acid which is very important for formation of proteins in plant cell walls. Those proteins are very important for cell division and for the growth of plants in general. When the plant growth conditions are unfavorable proline levels decreases. This leads to reduced cell division, which is expressed by reduced plant growth and lack of formation of the germinating seeds. Prolis® application helps to increase levels of this essential material saving potential yields.

PROLIS® to treat the Stress wounds of crops.

When plants are injured by mechanical damage, damage by insects or diseases they have to fight back and need all their proteins to work quickly and efficiently. By adding PROLIS® it will assist by allowing the crop to utilize its sugar content to its maximum and allowing the crop to heal itself as quickly as possible.

PROLIS® in saline soils – osmoregulator.

High saline soils stress, plants, and especially their roots, suffer strong disorder in the metabolism/uptake of nutrients which causes slow of the growth of roots. This significantly reduces the ability of the root to absorb moisture and grow to its maximum ability.

The roots of plants in saline soil accumulate too high amounts of hydrogen peroxide (H₂O₂) and this leads reduction of enzymes for the production of antioxidants. An application of PROLIS® provides an osmotic protection in root cells by increasing the amount osmolites, making root cell solute osmotic pressure positive to absorb water and nutrients and increasing amount of antioxidants, thus resulting in normal plant growth of plants.

PROLIS® enhances absorption of nutrition's.

PROLIS® by maintaining uptake and enhancing settling of nutrients such as nitrogen (N), phosphorus (P), potassium (K⁺), calcium (Ca⁺), magnesium (Mg⁺), and particularly when exposed to drought, regardless of growth stage PROLIS® activates the plant use more of its available nitrogen, the most important nutrient under normal growth conditions and of course becomes absolutely vital under stress conditions.

PROLIS® helping Plant stress from heavy metals.

Heavy metals, which exceeds a normal range, such as cadmium (Cd), lead (Pb), nickel (Ni) and are threats to the growth and development for the plants. Uptake by plants by excessive concentrations of heavy metals causes stress, leading to serious physiological and structural damages. In such cases, PROLIS® acts as neutralizer of heavy metals by helping to chelate them in the plant and eliminating their toxicity.

Effect of PROLIS® to other enzymes and metabolites

PROLIS® enhances the activity of other enzymes, especially such as the activity of nitrogenase (an enzyme which facilitates the assimilation of nitrogen from the air in leguminous plants) in nitrogen which in turn helps in fixing nodules of leguminous bacteria in when under drought conditions.

PROLIS® Stress relief ultra-violet (UV) SUNLIGHT

It is well known fact plants need sunlight to ensure that process of photosynthesis is active, but too much sunlight (UV can damage the plant leaving it vulnerable to stress. UV rays produces ozone – O₃ in plants which had heavy oxidative properties and damaging vital processes in plants.

With an Application PROLIS® the plants under the influence of UV rays, will help the plant with its natural process of defense by activating its natural source of proline Acid / antioxidants in the plant.

PROLIS® Stress of plant protection products.

When stress is caused by spraying plant protection products, especially herbicides, plants can be effected by yellowing or chlorotic symptoms by using PROLIS for stress reduction, it will help the plant recover from these symptoms during its natural process of defense by producing natural antioxidants of the plant.

PROLIS® for flowering.

The act of flowing in any plant as with emergence the most important factor of the life cycle of the plant. At flowering the plant is using and needs as much soluble sugar/proline acid in zone of flowering to ensure the pollination is as successful as possible. The act of flowing is nearly always at a time of least water and therefore it is nearly always a time of stress for the plant. By applying PROLIS® at flowing, this will help the plant maximize its own usage of Proline acids from which pollination will be at its most effective. It will also help attract pollinators which also allows for greater pollination.

Here is a list of how PROLIS® acts as defense mechanism for the plant in times of various stress conditions as below!

- Stimulation of alpha-amylase enzyme which is transforming hydro carbonates (starch) into sugar and to the other amino acid ornithine, which is necessary for germination.
- It has an important role during flowering to pollination processes.
- Stimulates root growth under drought, cold and saline soils stress.
- Determines the division of cells, which means growth and a variety of morphogenetic processes such as embryogenesis and organogenesis.
- Restores processes osmotic pressure to stop stress intolerance, maintaining cell turgor and osmotic balance.
- Stabilizes proteins and membrane lipids of cells and subcellular structures thereby preventing electrolyte leakage.
- Absorbs heavy metals.
- Antioxidant Facilitates removal of free radicals ROS in cells under stress conditions, bringing the concentration of reactive oxygen species (ROS) in the normal range, which prevents excessive oxidation process in plants.
- Concentrates the reactive oxygen species (ROS) to give plants disease resistant resistance
- Activates antioxidant enzymes (catalase, peroxidase, superoxide dismutase).
- Enhances the activity of other enzymes, especially activates enzyme nitrogenase in leguminous plants in drought conditions.
- Protects an abundance of other enzymes during abiotic stress.
- Increases the ability of the plant maximize its use of soluble sugars, hydrolyzed sugars and soluble proteins.
- Increases assimilation of nutrients such as nitrogen (N), phosphorus (P), potassium (K⁺), Calcium (Ca⁺).
- Speeds helps in the process photosynthesis.
- Proline acid is helps in the recovery from mechanical damage.
- Increases the plants ability to resist the effects of too much ultra violet (UV) Sunlight.



Composition of PROLIS®

**net 99.5 percent. L- α proline acid,
an essential amino acid.**

One package can handle as many as 5 to 10 hectares of crops!

Application: Water rate is 200 to 300 l / ha. It can be mixed with fertilizers and plant protection products, if any restrictions are not listed on their labels.

Water rate on seed treatment is 10 l/mt of seeds



Guidelines for the Use PROLIS®

PROLIS® can be applied at any time of the vegetation time of the crop for the reduction of crop stress.

For convenience PROLIS® can be used with pesticides by foliar application and for seed treatment together with other seed treatment products. The more stress the crop is suffering or about to suffer the more successful PROLIS® will be!

The recommended rate for foliar treatment is from 2 to 5 g/ha

The lower application rate should be used when used in conjunction with seed dressing or another lower rate application at another time in the life cycle of the crop.

The higher rate should be used at times of high physical stress during drought for instance or when the crop is in need of its best performance.

Slurry rate is 100 - 300 l / ha. In gardens standard slurry rate us 500- 1000 l/ha

	Time of Application	Norm	Purpose
Corn, soybeans	1. Seed treatment.	5.0 g/t	To improve germination.
	2. Foliar application with herbicides in 6 to 8 leaves.	5.0 g/ha	To relieve stress from the herbicides, the accumulation of sugar and increase resistance to drought.
	3. Foliar application before flowering.	2.0-5.0 g/ha	To improve pollination.
	4. Foliar application after flowering.	5.0 g/ha	To improve seed quality indicators.
Sunflower	1. Seed treatment.	5.0 g/t	To improve germination.
	2. Foliar application with herbicides in 6 to 8 leaves.	2.0-5.0 g/ha	To relieve stress from the herbicides, the accumulation of sugar and increase resistance to drought.
	3. Foliar application before flowering.	5.0 g/ha	To improve pollination.
	4. Foliar application after flowering.	5.0 g/ha	To improve seed quality indicators.
Winter wheat	1. Seed treatment	5.0 g/t	Improving germination and germination energy.
	2. Foliar application in the autumn	2.0 g/ha	The accumulation of sugar and Superior One overwintering.
	3. Foliar application in the spring BBCH 30-32	2.0 g/ha	plant regeneration, activates the physiological processes, protects against stress caused by the herbicide or leaf fertilizers.
	4. Foliar application BBCH 51-59	2.0-5.0 g/ha	Increases the resistance of plants to adverse environmental factors, especially drought, improved flowering and fertility.
	5. Foliar application BBCH 71-75	2.0-5.0 g/ha	It improves the quality of grain and seed characteristics.
winter rape	1. Seed treatment.	5.0 g/t	To improve germination.
	2. Foliar application in the autumn.	2.0 g/ha	To accumulate sugar and improve overwintering.
	3. Foliar application in the spring.	2.0 g/ha	For plant regeneration and accumulation of sugar and improve resistance to drought.
	4. Foliar application with fungicides.	2.0-5.0 g/ha	To improve pollination and increase resistance to drought.

	Time of Application	Norm	Purpose
Stone Fruits	1. Spraying in early spring.	5.0-10.0 g/ha	For plant regeneration and accumulation of sugar and improve resistance drought or frosts.
	2. Foliar application before flowering.	5.0-10.0 g/ha	To improve pollination and increase resistance to drought.
	3. Foliar application with fungicides or insecticides.	5.0-10.0 g/ha	For accumulation of sugar and prevents cracking of the fruit and increase resistance to drought.
	4. Foliar application after harvest.	5.0-10.0 g/ha	To improve overwintering.
Vineyards	1. Foliar application in the spring.	5.0 g/ha	For plant regeneration and accumulation of sugar and improve resistance to drought or frosts.
	2. Foliar application before flowering.	5.0 g/ha	To improve pollination and increase resistance to drought.
	3. Foliar application with fungicides or insecticides.	5.0 g/ha	For accumulation of sugar and increase resistance to drought.
	4. Foliar application after harvest.	5.0 g / ha	To improve overwintering and increase resistance to drought.
sugar beets	1. Seed treatment.	5.0 g/t	To improve germination.
	2. Foliar application with herbicides.	2.0 g/ha	For removal stress of herbicides and increased resistance to drought.
	3. Foliar application at 6-8 leaves.	2.0 g/ha	For accumulation of sugar and increase resistance to drought.
	4. Foliar application with fungicides.	2.0-5.0 g/ha	For accumulation of sugar and increase resistance to drought.
	5. Foliar application when beet leaves were covered interrows.	5.0 g/ha	For accumulation of sugar and increase resistance to drought.
Vegetables	1. Foliar application before flowering.	5.0 g/ha	To improve pollination and increase resistance to drought.
	2. Foliar application with fungicides or insecticides.	5.0 g/ha	For removal of stress of CPP and resistance to drought.

Estimated payback of applying PROLIS® P1 to 5

RESPONSIBILITY OF THE USER

Recommendations for the use based on field tests in normal conditions. The manufacturer is not responsible for emergencies related to weather conditions, soil type, resistance, use, interaction with other products or other factors that may affect the performance of the product. Such factors may lead to undesirable signs of crop or reduce the effect on weeds. Reducing the level of herbicides always affects the efficiency of unprotected weeds and requires optimum conditions in order to prevent undesirable effects. The manufacturer is not liable for damage caused by negligence or misuse of the product. product quality can only be guaranteed if the product is received and stored in sealed original packaging manufacturer.



www.prolis-stressbuster.com

Tel: +44 (0) 1480 810137
office@prolis-stressbuster.com