German trade mark

«HUMIN PLUS»

Organic mineral complex
humic micro fertilizer
based on a sapropel extract

Manufactured from a natural raw material –
eco-friendly lake sapropel

Manufactured by «The German-Ukrainian Center for Innovative Agri-industrial Technologies - FuTech»
by the technologies of
«The German-Russian Institute of Biomagnetic Cybernetics and Nanotechnologies»

On the basis of German patent DE 10 2009 043821 A1 2011-02.24
«Technological process for adjustable processing of biological objects by means of magnetic fields»
Micro fertilizers of the HUMIN PLUS series relate to fast-acting and cost-effective micro fertilizers with multifunctional actions. The raw material used for the production of HUMIN PLUS is an exceptionally pure sapropel - deposits of freshwater lakes in the North-West of Russia, the age of which spans thousands of years and consists of organic and mineral substances. These substances result from biological humification of remains of plants and animals (plankton, pollen, animals and plant organisms).

What makes HUMIN PLUS different from other humic products of various manufacturers which are made of peat, lignin and brown coal, is:

1. **Raw materials:** the main raw material used for the production of HUMIN PLUS is non-polluted pure lake sapropel. Only sapropel contains such a variety of organic and mineral components: water-soluble, easy- and hard to hydrolyze substances, hymatomelanic, humic and fulvic acids, a wide spectrum of amino acids, sugars, peptides, cellulose, lignin, lipids, carotenoids, xanthophylls, spirits, ketones, carbonic acids, chlorophyll derivatives, alkaloids, metalloporphyrins, phospholipids, vitamins, enzymes, antibiotics, steroid compounds, extended composition of trace elements in the form of organo-mineral complexes. Variety of components and their proportions in relic sapropel are balanced naturally and all of them are essential for plants and animals at all stages of development.

2. **Technology:** Modern nanotechnological extraction of sapropel by means of cavitation is employed in the production of HUMIN PLUS. A licensed technology allowed us partially or even completely abandon the conventional reagent (chemical) technology. The main drawback of the traditional technology is a huge variation in quality, low speed of the processes and low output of nutrients. The quantity of water-soluble humic acids in the best conventional humic-containing fertilizers and growth stimulants is no more than 20 g/liter. Only by using new physical principles in the processing of raw materials (cavitation combined with magnetic treatment) we get micro fertilizers with new quality characteristics: improved consistency and increased physiological and biological activity of the ingredients. For example, taking only one parameter, the water-soluble humic acids are more than 40 g/litre. Moreover, the cavitation method gives the optimal ratio of humic and fulvic acids.

A second innovative technology used in the production of HUMIN PLUS is the treatment of the finished product in a gradient magnetic field using the patented German technology - the German patent DE 10 2009 043 821 A1. The magnetic treatment elevates the product activity, thus allowing the using of its small concentrated amounts for achieving a good effect. Additionally, «The German-Ukrainian Centre for Innovative Agri-industrial Technologies FuTech» under a License Agreement with «The German-Russian Institute of Biomagnetic Cybernetics and Nanotechnologies», conducts pre-sowing magnetic treatment of seeds. Magnetic treatment made it possible to achieve a 10% increase in crop in Germany and Kazakhstan without the use of the microfertilizer HUMIN PLUS, and an increase of 30% and over with the use of it.

3. **Multiple influences:** a set of applied technologies allows for having multiple effects on plant and soil simultaneously. The presence of organic and mineral stimulating active substances in HUMIN PLUS provides the plant and soil with all the essential nutrients, creates various independent mechanisms of influence on plant and soil which gives the overall effect.
First, HUMIN PLUS contains the whole range of macro-nutrients and trace elements needed by the plant. This bouquet is formed naturally. Moreover, HUMIN PLUS, as a humate-containing material, acts as a chelating agent, making a lot of nutrients available that were previously not available for the plant. Thus, the plant gets more nutrients and gives a higher yield, not to mention the saved cost on fertilizers.

Second, HUMIN PLUS biologically stimulates the plant by inhibiting the growth of pathogenic bacteria and favoring the growth of beneficial bacteria which, thanks to their livelihoods and symbiosis with the plant and soil, make a further contribution to the development of the plant, increasing its immunity and productivity.

Another mechanism of action of HUMIN PLUS is the principle of physiological stimulation. Due to its unique natural composition HUMIN PLUS creates a pseudo-stressful situation around the plant or on the plant itself which, in essence, does not harm the plant, but only causes a reaction within the plant, aimed at improving its immune system and type preservation that eventually leads to the strengthening of plants and higher yields. Thus, all the potential given by nature to the plant comes into force.

Consequently, if one of the above listed mechanisms will not work because of improper use or some other reasons; other mechanisms will work and will have their effect. That is, in any case the farmer will get a positive result. And if the farmer is to use HUMIN PLUS correctly, he can achieve such an increase in crop yield, that it will be a hundred times greater than the cost of acquiring the micro fertilizer.

About other advantages of humic substances derived from sapropel:

- The fundamental difference of peat- and lignin-derived humic substances from the ones derived from sapropel is that the nature of the firsts is determined primarily by cellulose and lignin. Because of this, their molecules (or fragments) contain significant quantities of components with aromatic (benzoic) nuclear structures, which are characterized by hydrophobic properties. In sapropel a special type of humic substances forms, originating from the plankton, vegetative and animal organisms. Their origin is determined by carbons and proteins. The share of amino acids in humic and fulvic acids, derived from sapropel, is two to three times higher than that in the corresponding acids formed on land. In this way they differ fundamentally from humic substances derived from peat, brown coal or lignin. The molecules of HUMIN PLUS humic substances contain very little aromatic (benzoic) nuclear structures.

It is aliphatic components that are mainly consumed by the agricultural use of soils as a result of plant life and flora, resulting in a decrease of the proportion of labile (easy-mobilized, active) organic parts of humus and in a relative increase in its inertial parts, which consequently decreases soil fertility. Therefore, the replenishment of the soil active organic substances should come from sources that contain relevant components. Sapropel-based humic substances can serve as such source because aliphatic part dominates in their molecules.
Hence, it is important to treat the soil with **HUMIN PLUS** before sowing for the replenishment of the active humus in the soil.

- Sapropel-based humic acids differ from peat-based ones in high hydrolyzable substances that can be easily mobilized and included in the carbohydrates cycle: soil - microorganisms - plant – soil. Humic substances with such a structure possess high physiological activity and high ability to form complexes with metal ions (chelating)
- Fertilizers based on peat, brown coal and lignin have less adhesion to seeds and plants and less affinity with their cellular membranes than sapropelic. For this reason and because of the high molecular weight, they are less able to penetrate into plant cells
- Fertilizers based on peat, brown coal, oxidized bituminous coal, and lignin are poorer than those based on sapropel and vermicompost in biologically active substances - amino acids, enzymes, vitamins, phytohormones, etc.
- Fertilizers based on peat, brown coal and lignin are highly resistant to biodegradation and therefore can accumulate in the soil as part of stable (inactive) humus. The time of their half-decay is hundreds of years.

**HUMIN PLUS operates on plants as follows:**

- Stimulates the creation of a strong and branching root system, especially the roots of third order, which in turn leads to an increase in green mass and increase in crop
- Stimulates the production of root exudates, thus enriching the soil microbiota
- Due to its chelating ability, releases phosphate molecules associated with iron, aluminum, magnesium and calcium, followed by chelation of these molecules, thereby making them available to the plant
- Increases permeability of plant’s cell membranes, thus, contributes to the perception of nutrients. Increase in permeability has a selective nature in favor of elements essential for the plant (hundred times for potassium) compared with other elements (ten times for sodium)
- Promotes assimilation of nitrogen, phosphorus and potassium, and prevents the formation of nitrates
- Helps reducing the shortage of iron and prevents the appearance of chlorosis in plants
- Increases the efficiency of enzymes that are responsible for respiration and synthesis of sugar, protein and chlorophyll
- Increases the plant’s resistance to diseases, pests and adverse weather conditions
- Increases the content of vitamins and minerals in plants
- Stimulates plant growth by accelerating cell division thanks to the components contained in them, such as humic acids, fulvic acids, hymatomelanic acids, amino acids, pectins, carboxylic acids and mono sugars etc.
- Raises nutritional value of the crop, improves their trade dress
- HUMIN PLUS and its main components can be absorbed by the leaves of the plants as well as by their roots
- Humic acids contained in HUMIN PLUS intensify the synthesis of nucleic acids. This is important for the strengthening of plants since all forms of nucleic acids are involved in protein synthesis
• Cation C14 contained in HUMIN PLUS regulates important physiological processes in plants being one of the elements boosting high plant immunity to adverse environmental factors
• Contains a wide range of essential micronutrients (about 50), as well as many useful microorganisms
• Once applied to the plant it reaches the chlorophyll grains in the leaves and intensifies the perception of ultraviolet rays and by doing so, accelerates the process of photosynthesis.
• As a result of aforementioned factors HUMIN PLUS raises crop yield from 20 to 60 %.

HUMIN PLUS operates on soil as follows:
• Participates in the formation of soil structure, enhances microflora activation
• Decreases the loss of water and nutrients in light sandy soils. Helps enriching such soils with humus
• Loosens heavy clay soils, thereby improves the oxygen supply of the soil and improves the workability of the soil
• Protects soil biota, preserves a vegetative cover in case of any occurrence of extreme weather situations
• Counteracts soil crust covering and erosion due to increased ability to bind to colloids.
• Improves soil ability to conserve water, ergo its resistance to drought, optimizes the balance of water
• Acts as PH balancer in both acidic and alkali soils
• Acts as a chelator for metal ions under alkaline conditions and thus creates the possibility of their perception by the roots
• Bonds soluble non-organic fertilizers in the root zones and reduces nutrient loss
• Has an extremely high capacity for cation exchange. Helps to transform NPK nutrients and other trace elements into a form in which they are available for the plants
• Binds heavy metals and radionuclides, preventing their penetration into the plant
• Promotes the decomposition of the remains of the pesticides and other harmful metabolites, which leads to a reduction of chemical load on the soil.

Miscibility and compatibility

Field-testing and practical application of microfertilizer HUMIN PLUS show its good compatibility with all fertilizers and chemical pesticides, insecticides, fungicides and herbicides.
Cucumber – seeds treatment

Lettuce – seeds treatment

Spinach – seeds treatment
Main chemical and physical characteristics of HUMIN PLUS:

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Colloidal liquid, may precipitate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>Brown, black</td>
</tr>
<tr>
<td>Smell</td>
<td>Weak or moderate smell of ammonia</td>
</tr>
<tr>
<td>Humidity, %</td>
<td>From 50 to 85 %</td>
</tr>
<tr>
<td>Density, g/cm²</td>
<td>Not less than 1,1</td>
</tr>
<tr>
<td>pH</td>
<td>From 6,0 to 8,5</td>
</tr>
<tr>
<td>Mass fraction of organic substance, %</td>
<td>Not less than 35</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total soluble salts, g/l:</th>
<th>Total soluble salts, mg/l:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen (N)</td>
<td>Phosphorus (P₂O₅)</td>
</tr>
<tr>
<td>≥8</td>
<td>≥9</td>
</tr>
</tbody>
</table>

**Storage:**
Store in warehouse in tightly closed, undamaged original package at temperature from -5 to +35 °C.

**Guaranteed shelf life:**
3 years from the date of manufacture, in the original, unopened, undamaged package, if stored in accordance with proper storage conditions. Upon expiry date the product must be analyzed for compliance with specifications. If the compliance is confirmed, the product may be used for its intended purpose. Agrochemical Period of validity - not limited.

**Security measures:**
Danger Class IV, not explosive, fire-safe, in case of contact with hands, nose, mouth or eyes - rinse with water; while working use rubber gloves. Dispose spilled quantities by using rubber gloves and absorbent tissue. Empty recyclable package to be disposed in waste collection sites.

**INSTRUCTIONS FOR USE:**

**General instructions:**
- **HUMIN PLUS** can be applied at any stage of plant development, especially in those phases of development when plants are in great need of nutrients
- The treatment must be performed no more than once every 2 weeks
- Applying undiluted micro fertilizer and overdosing are **forbidden**!
- To prepare the working solution dissolve the micro fertilizer in the right quantity of water and stir it well
- The working solution should be prepared immediately before treating the plants
- If necessary, spraying can be carried out in combination with insecticides, fungicides, biological, macro- and micro fertilizers
- During prolonged dry and hot weather we recommend that leaf treatment is replaced by root treatment
- In irrigated fields it is recommended to apply both root and leaf treatment

![Cucumber in greenhouse-Ukraine](image)
Ways of application

**HUMIN PLUS** can be applied in one or more of the ways listed below:

1. **Soaking plant seeds:**
   - Dilute HUMIN PLUS in water at a ratio of 1:50 to make a solution
   - Seeds to be soaked in the solution for 1 hour before sowing or 10 minutes before drying

2. **Foliar treatment:**
   - Suitable for all cultures and trees.
   - Dilute HUMIN PLUS in water at a ratio of 1:1000 to make a solution
   - Spray the solution on plants to full wetting
   - At hot times treatment must be performed in the morning or evening for best results
   - The recommended time interval between the spraying of crops or trees and the subsequent rainfall is not less than 6 hours

3. **Root treatment:**
   - Dilute HUMIN PLUS in water at a ratio of 1:500 to make a solution
   - Apply the solution to the soil in any convenient way.
   - Treatment can be combined with irrigation. In this case, the concentration will become less than recommended, which is permissible, subject to keeping the application rate of HUMIN PLUS per hectare
   - It is advisable to combine with macro fertilizers, if any.

4. **Making composts**
   - Dilute HUMIN PLUS in water at a ratio of 1:500 to make a solution
   - Spray the solution on each new layer of compost

5. **Pre-sowing treatment of soil** for the purpose of enriching it with active humus and useful micro organisms, giving the plant a strong start and favorable environment
   - Treatment must be conducted 1-7 days before sowing or planting
   - Dilute HUMIN PLUS in water at a ratio of 1:500 to make a solution
   - Apply the solution to the soil in a convenient way, possibly with irrigation and with macro fertilizers or plant protection chemicals

**Important:** soil treatment gives strong multifunctional long lasting effect

### Application rates of HUMIN PLUS

<table>
<thead>
<tr>
<th>Treatment kind</th>
<th>HUMIN PLUS rate</th>
<th>Concentration of the solution</th>
<th>Consumption of the solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foliar treatment (By spraying)</td>
<td>Fruit and berry cultures, grapes</td>
<td>not standardized</td>
<td>1:1000 (10 ml /10 l)</td>
</tr>
<tr>
<td></td>
<td>Other cultures</td>
<td>0,3-0,5 l/ha</td>
<td>300-500 l/ha</td>
</tr>
<tr>
<td>Root treatment (By watering)</td>
<td>Fruit and berry cultures and grapes</td>
<td>10-30 ml/bush or tree</td>
<td>1:500 (20 ml/10 l)</td>
</tr>
<tr>
<td></td>
<td>Other cultures</td>
<td>0,6-1 l/ha</td>
<td>300-500 l/ha</td>
</tr>
<tr>
<td>Making compost - irrigation of compostable mixture during the laying of each new layer</td>
<td>1-2 ml/m²</td>
<td>1:500 (20 ml/10 l)</td>
<td>0,5-1 l/m²</td>
</tr>
<tr>
<td>Soil treatment - 1-7 days before sowing or planting</td>
<td>1 l/ha</td>
<td>1:500 (20 ml/10 l)</td>
<td></td>
</tr>
</tbody>
</table>
### Phases of plant development at which it is desirable to apply HUMIN PLUS

<table>
<thead>
<tr>
<th>Culture</th>
<th>The optimal timing of treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potato</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; time - upon the appearance of complete germination (3-4 leaves), 2&lt;sup&gt;nd&lt;/sup&gt; time - in the budding stage, 3&lt;sup&gt;rd&lt;/sup&gt; time - after flowering.</td>
</tr>
<tr>
<td>Root crops (Carrots, garden radish, beet, turnip, radish, etc.)</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; time - upon the appearance of 3-5 leaves, 2&lt;sup&gt;nd&lt;/sup&gt; time - 15-20 days after the 1&lt;sup&gt;st&lt;/sup&gt; time, 3&lt;sup&gt;rd&lt;/sup&gt; time - 20-25 days after the 2&lt;sup&gt;nd&lt;/sup&gt; time.</td>
</tr>
<tr>
<td>Cabbage</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; time - upon the appearance of 4-6 leaves, 2&lt;sup&gt;nd&lt;/sup&gt; time - in the beginning of cabbage -head forming period 3&lt;sup&gt;rd&lt;/sup&gt; time - 20-25 days after the 2&lt;sup&gt;nd&lt;/sup&gt; time.</td>
</tr>
<tr>
<td>Pumpkin (cucumber, zucchini, pumpkin, squash, cantaloupe, melon, watermelon, etc.)</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; time - at the stage of 3-5 leaves and for seedling cultivation method – a week after transplanting seedlings into soil. 2&lt;sup&gt;nd&lt;/sup&gt; time - 15-20 days after the 1&lt;sup&gt;st&lt;/sup&gt; time.</td>
</tr>
<tr>
<td>Solanaceous (tomatoes, peppers, eggplant, etc.)</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; time – at the stage of 3-5 leaves and for seedling cultivation method – 3-7 days after transplanting seedlings into soil. 2&lt;sup&gt;nd&lt;/sup&gt; time - in the budding stage.</td>
</tr>
<tr>
<td>Wild strawberry, strawberry</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; time - in the budding stage 2&lt;sup&gt;nd&lt;/sup&gt; time - on green ovary.</td>
</tr>
<tr>
<td>Legumes (beans, peas, soybeans, lupins, etc.)</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; time – at the stage of 3-5 leaves 2&lt;sup&gt;nd&lt;/sup&gt; time - in the budding stage</td>
</tr>
<tr>
<td>Corn</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; time - at the stage of 3-5 leaves 2&lt;sup&gt;nd&lt;/sup&gt; time - before tasseling.</td>
</tr>
<tr>
<td>The greens (lettuce, onion, garlic, dill, parsley, celery, etc.)</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; time – upon the appearance of 3-4 leaves 2&lt;sup&gt;nd&lt;/sup&gt; time - 15-20 days after the 1&lt;sup&gt;st&lt;/sup&gt; time</td>
</tr>
<tr>
<td>Fruit-trees and berry bushes</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; time - before bud burst (not later than a stage of a green cone) 2&lt;sup&gt;nd&lt;/sup&gt; time - before flowering</td>
</tr>
<tr>
<td>All roses (rose hips)</td>
<td>Use once a month, in addition - before flowering - on the buds</td>
</tr>
<tr>
<td>Grapes</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; time - before the flowering, 2&lt;sup&gt;nd&lt;/sup&gt; time - during the formation of ovaries</td>
</tr>
</tbody>
</table>
| Grain crops, annual and perennial cereal grasses | **For grains:** 1<sup>st</sup> time – in the stage of tillering (3-4 leaves), 2<sup>nd</sup> time – in the stage of stem elongation, 3<sup>rd</sup> time - at the stage of earing  
**For cereal grasses:** 1<sup>st</sup> time - at the beginning of regrowth (perennial) or in the tillering stage (annual), 2<sup>nd</sup> time - in the stage of stem elongation |
| Oil and spinning plants (sunflower, rapeseed, flax, cotton, etc.) | 1<sup>st</sup> time – at the stage of 2-4 leaves 2<sup>nd</sup> time - in the budding stage. For sunflower - in the beginning of baskets formation |
| Cereals (buckwheat, rice, millet, sorghum, etc.) | For buckwheat: 1<sup>st</sup> time - at the stage of 3-4 leaves; 2<sup>nd</sup> time – in the budding stage - flowering beginning.  
For other cultures: 1<sup>st</sup> time - in the stage of tillering , 2<sup>nd</sup> time - in stem elongation stage |
| Room and landscape gardening ornamental plants | 1<sup>st</sup> time – upon the appearance of 2-3 leaves (for tulips, narcissuses, etc. bulbous – upon the appearance of sprouts), and for seedling cultivation method - in 10-15 days after planting out. Further treatments - with an interval of 20-30 days, in addition - before flowering on buds |
Example:
Growing grain under the FuTech technology
(non-organic farming, non-irrigated areas)

1. Pre-sowing treatment of soil using 1 liter of **HUMIN PLUS** per hectare. The treatment can be combined with applying other fertilizers, stabilizers or plant protection products to the soil.

2. Pre-sowing seed treatment:
   - Magnetic treatment of seeds not earlier than 7 days before sowing
   - OR pre-sowing treatment of seeds by **HUMIN PLUS**.

3. For spring cultures: Sprinkling of shoots at the stage of the first 3-4 leaves by **HUMIN PLUS** at the rate 300÷400 ml/hectare. Treatment can be combined with other fertilizers or chemicals.

4. Sprinkling of plants at the stage of stem elongation by **HUMIN PLUS** at the rate 300÷400 ml/hectare. Treatment can be combined with other fertilizers or protection chemicals.

5. Sprinkling of plants at the stage of formation of heads by **HUMIN PLUS** at the rate 300÷400 ml/hectare. Treatment can be combined with other fertilizers or protection chemicals.

![The electronic and spectral image of roots of corn](image-url)