



## NATURAL CARBON TYPE SOIL FERTILITY STIMULATOR WITH A HIGH CONTENT OF HUMIC ACIDS

Sustainably increases soil fertility | Improves soil structure | Retains water in the soil - water manager | Acts as an inhibitor of nitrification | Reduces need for minerals by up to 30%

**HUMAC® Agro** is a carbon type soil improver. By applying it on soil, the **soil fertility is sustainably increased** thanks to the **significantly improved soil structure, improved conditions for development of microorganisms, and increased sorptive and buffering soil capacity**. With its high organic carbon content it regulates the ration of C:N in soil and applied substrates.

Humic acids play a significant role at binding resp. releasing various ions and pH adjustment. Bounds soil nutrients, macro and micro elements into chelate complexes for their easier intake by plants. **HUMAC® Agro contains a number of biogenic substances and simultaneously accumulates additional minerals and vitamins** for plant nutrition.

The product **binds toxic metals and pesticides, retains water within the soil, revitalizes contaminated soil and adjusts soil pH**.

It **significantly reduces nutrient loss** by leaching (N, P, K, Ca, Mg and other trace elements), resulting in expanded volume of root mass of cultivated plants, which are then more resistant to stress factors. This affects the increase of both the quantity and quality of agricultural production.

**Acts as an inhibitor of nitrification**. It has a beneficial effect on the mineralization and immobilization of nitrogen in soil.

Provides a **more effective use of organic, mineral and organic-mineral fertilizers**. Its addition increases the C/N ratio in fertilizers and other incorporated substrates (digestate, fugue, separates, etc.), changing their classification to **fertilizers with slow nitrogen release** and thus extending possibilities of their application.

The product optimizes the utilization of nutrients by plants and **reduces the need for mineral fertilizers by up to 30%**.



### The scope and method of usage

#### 1. Arable land, land for growing fruits, vegetables and other plants

Humic acids present in HUMAC® Agro need a certain amount of time to form humic complexes ensuring efficient plant nutrition. Therefore their application to the soil is most suitable from autumn to early spring.

Basic product dosage set in the range of 200 - 500 kg/ha is based on the quality of soil. Repeated usage is recommended after 3- 4 years.

#### Dosage for selected crops

Cereals, canola, corn	200 – 500 kg/ha
Orchards, vineyards	10 – 40 kg/100 pc
Vegetables (leafy, brassica, fruiting), legumes	350 – 500 kg/ha
Fruits (raspberries, strawberries, currants)	350 – 500 kg/ha
Potatoes and root vegetables	300 – 400 kg/ha
Herbs	250 – 300 kg/ha
Ornamental plants and shrubs	2 – 3 kg/100 m <sup>2</sup>

#### 2. Land without topsoil and reactive land

A basic dosage of 1 - 3 t/ha repeatedly applied throughout 2 - 3 years in combination with artificial fertilizers and grass seeds is required for land recovery.

#### 3. Preparation of compost

3 - 5% of the formula is gradually added to the compost mass.

#### 4. Usage when fertilizing with digestate, adjustment of organic and organic-mineral fertilizer properties

Based on fertilizer analysis (digestate, separates, fugue, etc.) and the determination of carbon C and nitrogen N levels, we convert the dosage of **HUMAC® Agro** in accordance with the desired effect and desired final ration of C/N.

The appropriate amount (ratio) is applied either directly into the tank before it is filled with the substrate, or gradually into storage tanks based on the daily amount of supplemented substrate (not at once after filling the tank prior to export to the land).

The recommended amount of **HUMAC® Agro** can also be applied directly to arable land and following the application of digestate, is worked into the upper layers of the soil.

Packaging: **25, 500, 1000 kg**

Expiration date: **24 months** from the date of manufacture at observing storage conditions.

**Suitable for use in organic farming** (dependent on local registrations)

Technical parameters	
Humic acids in the dry	min. 62 %
Free humic acids in the dry	min. 50 %
Carbon content in humic acids in the dry	62 %
Minerals in the dry	
Sodium (Na)	15 705 mg / kg
Potassium (K)	1 186 mg / kg
Calcium (Ca)	15 100 mg / kg
Zinc (Zn)	64 mg / kg
Boron (B)	77 mg / kg
Iron (Fe)	16 805 mg / kg
Copper (Cu)	19 mg / kg
Selenium (Se)	1.67 mg / kg
Other minerals and almost all naturally occurring trace elements	In µg/kg
Properties	
pH reaction	6,5
Humidity	max. 15%





## SIGNIFICANCE AND IMPORTANCE OF HUMIC ACIDS CONTAINED IN HUMAC<sup>®</sup> AGRO AS THE ACTIVE INGREDIENT OF HUMUS FOR THE SOIL AND CROP PRODUCTION

- Improving soil structure.
- Adjusting soil pH to an optimal level in terms of receiving nutrients and biological processes in soil (buffer).
- Containing chelate bound biogenic elements.
- Improving conditions for development of soil organisms and microorganisms.
- Belonging among ion exchangers of reductive nature.
- Reducing nitrogen emissions and natural smell of organic and organic-mineral fertilizers in the air.
- Adjusting the C/N ratio in organic and organic-mineral fertilizers and other processed substrates in the soil.
- Adjusting the C/N ratio in soil.
- Increasing the activity of important microflora and microfauna, especially in growing monocultures.
- Improving the sorptive capacity of soil and thus increasing nutrient accessibility for plants (humic substances - humic acids have the best sorptive capacity).
- Optimizing use of soil nutrients by plants and significantly limiting leaching of nutrients into lower levels of the soil complex and into groundwaters.
- Increasing the availability of nitrogen for plants and avoiding its loss in the atmosphere in form of ammonia.
- Their composition and structure hamper nitrification processes in the soil, thus preventing loss and leaching of nitrogen by inhibiting nitrification.
- By substantially impacting the C/N ratio, they positively affect the processes of mineralization and of biological immobilization of nitrogen.
- Reducing the leaching of nitrates from soil to groundwaters and significantly reducing accumulation of nitrates in plants and in other agricultural crops.
- Binding heavy metals, pesticides and other toxins into complexes unaccessible for plants. Remediating contaminated soil.
- Preventing soil erosion.
- By adjusting soil structure and preventing erosion they allow a more efficient fertilization even on terrain slopes.
- Withholding water in soil (creating tubes) - a significant impact on water management. By improving soil structure they prevent its supersaturation with water in upper layers, and thus reduce the period of soil flooded with water and lowers the risk of time-limited application of organic, organic-mineral and mineral fertilizers (with digestate and fugee).
- Affecting the decomposition speed of organic compounds, substrates and substances found in soil.
- By systematic addition to stocks (landfills) of organic and organic-mineral fertilizers we prevent the passing of toxic substances from soil to plants and into groundwaters by binding these toxic elements into unaccessible complexes.
- Lowering the risk of soil erosion (soil less threatened by erosion) enables the use of slopes for growing wide-lined crops (corn, potatoes, beet, beans, soy, sunflower) even.
- **Increasing agricultural production yields, thus impacting production economy and nitrogen fertilizer dosage calculations.**
- **Lowering the need for mineral fertilizers.**
- **Increasing rentability and yields of agricultural outputs.**

Based on the above mentioned reasons, the usage of humic acids is rapidly increasing year by year worldwide. **Humic acids are substances with an exceptional biological efficiency**, whereas their dosage needs to be individually assessed primarily from these aspects:

- Bonita and nature of soil.
- Used cultures in the following 3 - 4 years.
- Amount of soil fertilizing with artificial and natural fertilizers (when using the product, doses of used technical fertilizers can be reduced to ensure the planned harvest in the following 3 to 4 consecutive years).
- Composition and structures of adjusted substrates (organic and organic-mineral fertilizers).
- Soil, ecological and environmental aspects.
- Valid legislative standards regarding fertilization and various restrictions when applying individual soil nutrients components.
- Economical aspect (desired amount of production).

