



Soil restoration with organic rich  
freshwater sediments –  
**SAPROPEL**



## ABOUT

Soil is to a large extent a non-renewable resource, and is thus, in principle, not sustainable. But soil degradation is a permanent companion to agriculture and one of its most serious environmental problems. There is no universal fertilizer, because there are different soil quality, climatic conditions and types of cultivated plants. Since all plants impoverish the soil by taking away nutrients, they must be replenished. Latvia, especially in its southeastern part, is rich in lakes that contain the most valuable natural product - sapropel. To a greater extent, it is not a fertilizer, but a biologically active basis for the rapid restoration of the soil and the formation of humus in it.

The estimated amount of sapropel in Latvia's lakes is 700-800 million m<sup>3</sup>, but sapropel reserves in bogs reach 1.5 billion m<sup>3</sup>. The total sapropel resources in Latvia are about 2 billion m<sup>3</sup>. The amount of sapropel's resources and its wide range of uses make it a national strategic natural resource.

## BENEFITS & COMPOSITION

### The benefits of using sapropel for soil

- It is a biologically active basis.
- Heavy clay soils become looser.
- Forms a fertile soil layer on problem soils.
- Helps to clean the soil from pathogenic bacteria, microorganisms, fungi and nitrates.
- Enriches an exhausted soil that the fertile soil layer is formed.
- Increases soil moisture content by 4-5 times. (The soil requires less frequent watering.)
- Allows preserving the soil fertility for 3-5 years.
- Increases the amount of humus in the soil.

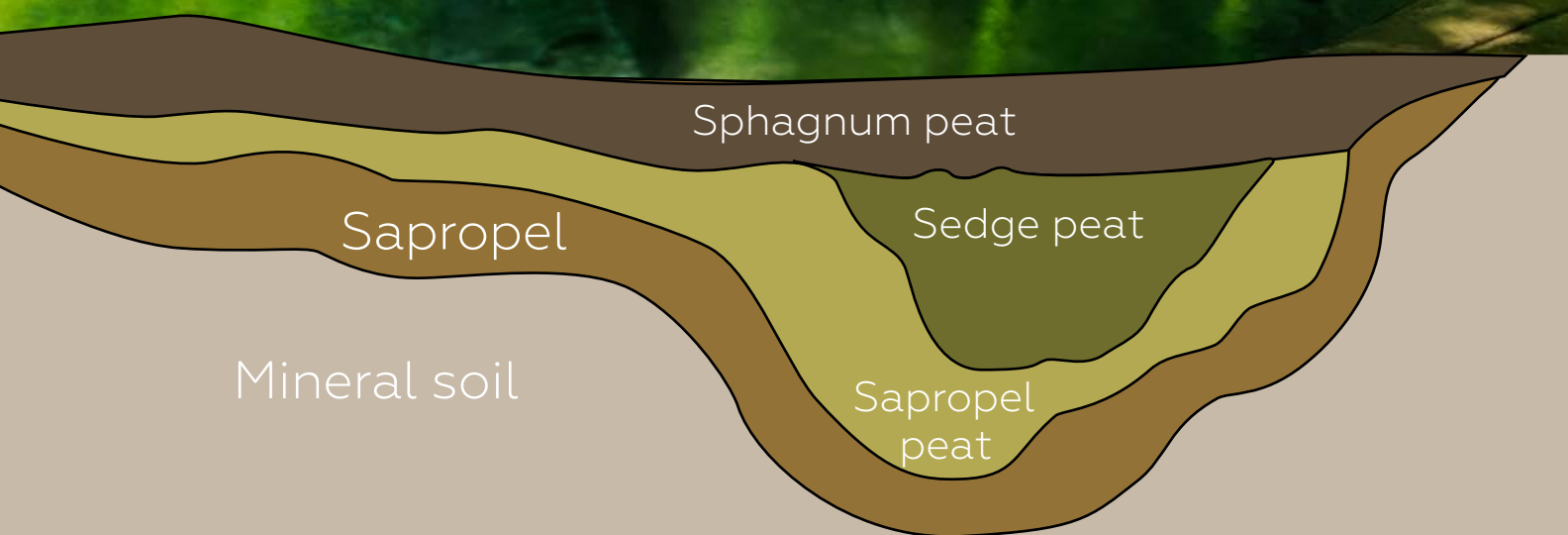
### The benefits of using sapropel for plants

- Improve acclimatization of nursery plants.
- Activate the root system development.
- Stimulate continuous blooming.
- Nourish plants throughout their life.
- Increase the guaranteed crop yield.
- Promote the quality of the final product.
- Accelerate the growth & development.
- Works as an antidote to pesticide treatment.

Sapropel contains a rich complex of natural vitamins, minerals and bacteria that promote rapid formation of humus in the soil, activating metabolic processes in soil and restoring its fertility. Thus, sapropel is a biologically active basis for rapid restoration of soil fertility and formation of humus in it.

Important consumer properties of the product is that sapropel is 100% organic product, which does not contain weed seeds, neutralizes the activity of nitrates, nitrites, salts of detected metals contained in soils, easy to use, because has good friability and is easily recognizable with common terrain types, retain nutritional properties for 3-4 years after the contribution to the soil, has no smell, non-toxic, does not require special storage conditions.

Sapropel relates to renewable natural resources and as it contains organic matter is able to bind metal ions and change their speciation forms in soils forming stable complexes. The ability to form complexes with metal ions depends on the type of soil, type of metal, as well as quantity of sapropel as soil amendment.



## COMPOSITION

Bacteria	Nitrogen fixing abd nitrifying bacteria
Natural water soluble vitamins	Carotene (pro vitamin A), B1, B2, B3, B5, B12, E, C, D, P and folic acid
Amino Acids	Alanine, Serine, Leucine, Isoleucine, Phenylalanine, Tyrosine, Lysine, Methionine, Threonine, Cysteine
Natural enzymes	Catalase, Peroxidase, Reductase, Protease
Humic complex	Humic Acid, Fulvic Acid
pH	5.5 - 6.5
Moisture	67% (+/- 3%)

Nitrogen (N)	not less that 12000 mg/kg
Phosphorus (P2O5)	not less that 1000 mg/kg
Potassium (K2O)	not less that 600 mg/kg
Organic Carbon (C)	not less that 40%
Microelements	Mn, Cu, B, Zn, Mg, Cr, Ag, Sn, Ba, Ti, Br, Mo, V, Be
Organic matter (in dry matter)	not less that 86% (+/- 5%)
Essential ements	Si, Ca, Ai, Fe

## APPLICATION POSSIBILITIES: FROM RAW MATERIAL TO PRODUCTION OF PROCESSED PRODUCTS



The sapropel could be used in a sustainable way – some as fertilizers in agriculture and some part as remediation agent helping to immobilize heavy metals in contaminated areas.

The objective of the possible assessment would be to develop effective and ecologically safe amendment based on natural raw material - sapropel and to develop methods and models for forecasting effectiveness of countermeasures as part of remediation of soils contaminated by heavy metals.

The reasons for low exploitation level of sapropel are lack of information about the application ways, insufficient data on research, low demand of sapropel as a natural resource in the world and local markets. It has been proven that sapropel can be valuably used in agriculture, horticulture and forestry as a fertilizing and soil-improving agent, but in cattle breeding, it serves as an additive 36 for animal feed. Besides, sapropel is also

a suitable raw material for the chemical and construction industries, as well as can be applied in medicine and veterinary medicine, e.g., as therapeutic mud in balneotherapy.

The main environmental problems are related to very different issues, such as loss of biodiversity, pollution, loss of amenities. Proposing a project of recultivation of soil with organic rich freshwater sediments – Sapropel, would bring a potential soil amendment for recultivation of areas contaminated with heavy metals, and moreover it would bring an important resource of intensive activity in terms of employment and income in the sphere of agriculture. It must be added that the recultivation of the techno-genic areas should be considered as the regeneration of the ecological system constituting a basic functional unit of the biosphere.



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