

100% biodegradable

retentis[®]



Biological water reservoir
for optimizing the water
supply of plants.



Biological hydrogel made
from wood and 100% biodegradable.

THE BIOLOGICAL WATER STORAGE FOR FUTURE-PROOF SOIL OPTIMIZATION



Retentis® – 100% Biological Water Storage

With Retentis®, GEFA is ushering in a new era in soil improvement and water management in landscaping and all types of planting. Retentis® is a 100% biological and completely degradable hydrogel, FiBL-listed, and bio-certified. The essential function of this innovative absorber is to increase the water retention capacity of the soil, improve organic matter, and enhance soil fertility. The application of Retentis® not only provides effective drought protection but also enables the sustainable transformation of unproductive soils into fertile agricultural land. This allows for the protection of plants from drought stress where conventional synthetic hydrogels and water-storing mixed products could not be used.

Due to its biological composition, Retentis® is particularly environmentally friendly and represents a pioneering alternative for landscaping. The hydrogel, made entirely from lignin (wood), absorbs water during rainy periods or scheduled irrigation and releases it continuously during dry spells. This innovative approach not only leads to effective water storage in the soil but also supports moisture retention, ensuring stress-free plant development.

At the same time, Retentis® can transform infertile soils, including sandy substrates, into fertile agricultural land. Active in the soil for at least 3 - 5 years, the granules eventually decompose into humus, a crucial step in increasing the organic matter in the soil and creating the foundation for long-term healthy plant growth.

The manufacturing process

A key feature of Retentis® is its sustainable production from a byproduct of the pulp industry: lignin. In pulp mills, cellulose is extracted from wood waste for paper and fiber production. About 40% of the material is cellulose, while the remaining 60% consists of hemicellulose (30%) and lignin (30%). Hemicellulose is used in biorefineries, while lignin is typically considered a waste product.

In many pulp mills, excess lignin remains unused. Retentis® utilizes this surplus lignin as raw material, thereby returning dried carbon to the soil. The use of lignin as a water reservoir is not only resource-efficient but also contributes to closing the material cycle.



Advantages of Retentis®

The first durable and biological hydrogel made from 100% wood:

Retentis® relies on a fully natural composition that is both effective and environmentally friendly.

Active for at least 3-5 years, depending on soil type:

Retentis® provides long-lasting effects, ensuring sustainable soil improvement over multiple growing seasons.

Increases soil water retention capacity:

The hydrogel maximizes soil water storage, which is especially crucial during dry periods.

Protects trees and plants from drought stress:

Retentis® forms a water reservoir in the soil that protects plants from water shortages and drought.

Decomposes into humus, improving soil fertility:

The transition from Retentis® to humus not only promotes soil fertility but also supports the development of a sustainable ecosystem..

Transforms infertile soils, including sand, into fertile soil:

By converting sandy soils into productive agricultural land, Retentis® offers new possibilities for farming and horticulture.

Absorbs, stores, and slowly releases fertilizers/nutrients:

Retentis® acts as an efficient carrier of fertilizers and nutrients, releasing them gradually for sustained nutrient supply.

Prevents rapid leaching of fertilizers:

By controlling the release of fertilizers, Retentis® helps prevent over-fertilization and enables efficient nutrient use.

Reduces costs for water, fertilizer, irrigation, and labor:

Retentis® can be used alone or in combination with any irrigation method, reducing water consumption and lowering energy and labor costs. Retentis helps save up to 40% water by reducing irrigation frequency.

Approved for both conventional and organic farming:

Retentis® is a versatile solution applicable to all plantings, suitable for both conventional and organic farming.

Overall, Retentis® represents a groundbreaking solution for sustainable soil management, opening new perspectives for urban planting in landscaping while adhering to ecological standards.

Test Results

Both field and laboratory trials have confirmed the benefits of using Retentis®:

New planting of almond trees (Lauranne variety) under drought stress conditions in an open field in Granada, Spain (Planted February 2023)

Soil: Sand-clay mixture

Variants: Control group without Retentis®, four planting groups with different application rates of Retentis®.

Irrigation: 28 irrigation cycles until the evaluation on 14.09.2023, control group with 100% irrigation and 70% irrigation (40L and 28L per tree), Retentis® plantings with 70% (20L).

Climate: Extreme drought from may onward.



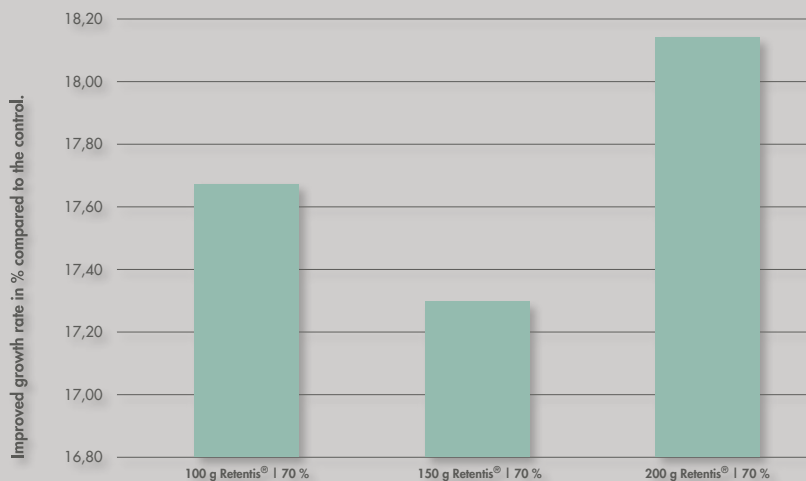
Results

1. Water savings

The use of Retentis® resulted in a 30% water savings while maintaining the same plant development as the fully irrigated control group.

2. Increased growth

Under reduced irrigation (70%), the addition of Retentis® increased plant growth by about 18% compared to the untreated control (also with 70% irrigation).



Enhanced Root Growth

The addition of Retentis® to soil mixtures significantly improved soil structure by creating a coarser texture, positively affecting plant root growth.

The porous soil structure enhances aeration, increasing oxygen availability to the roots. This improved oxygen exchange promotes root growth and allows plants to develop deep root systems.

Additionally, the coarse texture supports efficient water absorption and distribution, preventing waterlogging while ensuring adequate drainage during heavy rainfall or irrigation.



Frequently asked questions

Where can Retentis® be applied?

Retentis® is universally applicable for tree and shrub plantings, annual and perennial crops, various soil types, planters, beds, and even grave plantings. As a bio-product, it has no negative environmental impact and can be used under diverse climatic conditions and soil types.

How often should Retentis® be applied?

We recommend fresh application for each new planting. The product remains active in the soil for 3-5 years.

What is the best time to apply Retentis®?

Retentis® can be used year-round and remains stable even under extreme soil temperatures.

Can Retentis® be mixed with fertilizers?

Yes, mixing with fertilizers is recommended. Retentis® helps reduce fertilizer use without eliminating the need entirely.

What is Retentis®'s long-term impact on soil?

Retentis® improves soil structure, permeability, nutrient availability, and overall fertility, enhancing crop yields.

How long does Retentis® remain active in the soil?

It remains effective for up to 5 years before decomposing into organic matter.

How does Retentis® work?

Retentis® increases the soil's water-holding capacity and promotes fertility. Under dry conditions or with reduced irrigation, it ensures an even water supply, reduces plant stress, and supports healthy growth.

Does Retentis® affect irrigation frequency?

Yes, it can reduce watering frequency by up to 40% by enhancing soil water retention.

Does Retentis® cause root rot?

No, it is designed to release water gradually, preventing excessive moisture accumulation.

Does Retentis® alter the soil pH?

No, Retentis® has a neutral pH and does not affect the soil's pH level. It remains active across a wide soil pH range from 4 to 9.

How should Retentis® be stored?

Retentis® should be stored in a cool, dark, and dry place. When kept in sealed bags, it remains stable for at least 2 years. Keep out of reach of children and pets.

Can I apply Retentis® to existing plantings?

Retentis® was specifically developed for use during new plantings. However, a solution is currently being developed to enable its use on already established areas.

Does Retentis® alter the composition of water?

No, Retentis® does not change the composition of water. It simply stores water and slowly releases it to the plants as needed.

Can Retentis® be used as a root protection gel?

Yes, Retentis® can be used as a dipping solution for bare-root trees and shrubs for reforestation purposes.

Recommended Application Rates

Depending on the location and soil conditions, the following quantities should be applied:

Lawn seeding/sowing:	100 g/m ² , work into the soil to a depth of 10 cm
Plantings (ground cover, perennials):	200 g/m ² , work into the soil to a depth of 20 cm
Planting holes:	5–10 kg/m ³ , thoroughly mix with excavated soil
Root protection gel:	Mix 1 kg with 10 liters of water. Wait 10–15 minutes for the granules to absorb the liquid, stirring several times during this period. Then dip the roots into the mixture.

The innovative production of Retentis® from lignin not only contributes to soil improvement but also promotes the sustainable use of wood waste from the pulp industry. This represents a significant step toward closing the material loop and demonstrates how innovative solutions made from so-called waste products can have a positive environmental impact.

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