Water absorbing geocomposites

- Innovative technologies supporting the vegetation of plants.

Concept

The idea to develop a water absorbing geocomposite originated at the Institute of Environmental Engineering of the Wroclaw University of Environmental and Life Sciences, whose researchers had been interested in the issues of regulating water relations that determine plant growth for many years.

Objective of the project

Creating technical possibilities to permanently retain rainwater in soil and to make it available for plants for a long, predictable time.

Description of the project

The GEOSAP - "Water-sorbing geocomposites – innovative technologies supporting plant vegetation" project refers to one of the aspects of rational and economic water management, i.e. providing plants with a sufficient amount of water regardless of environmental and climate conditions. Water originating from precipitation or irrigation systems is partly retained in soil, but, due to low retention capacity, most of it penetrates deep into the ground or evaporates and is no longer available for plants. This retention may be significantly improved by water-absorbing geocomposites. They capture rainwater and retain it in form of gel. Water-absorbing superabsorbents are polymers of excellent absorption properties. 1 g of this substance may retain even up to 300 g of water. Thanks to hydrotropism plant roots are able to quickly find locations with higher concentration of water. They grow through the textile to the inside of the geocomposite and use suction power to absorb up to 95% of the collected water. The internal structure provides the space necessary for the proper functioning of the superabsorbent. Without such additional space, the superabsorbent mixed with soil is unable to retain water efficiently. During rainfall, or in situations when we turn on the sprinkler system or water our plants, the supply of water inside the geocomposite is replenished so that the plants can start using it again. The retained water is constantly available for plants, so that they can absorb it when it's needed, in such amounts as are necessary for development. This allows properly maintained plants to develop more quickly and to maintain a better condition. The root systems of plants supported by geocomposite, growing in optimal water conditions, are better developed, which, in turn, reinforces the soil. This is vital for protecting slopes against erosion. The overground parts of plants grow bigger, they are more resistant to water deficits in the soil and they root better after replanting.

In ornamental plants, better growth is observed, while in berries the crops are also higher. The application of water sorbing geocomposites also allows to reduce the losses and the usage of water for cultivation purposes.

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Realisation

During the research project planned for a period of more than five years, a new type of geocomposite was invented. Their effectiveness was tested in laboratory, semi-technical and field conditions. Various forms of geocomposites were developed, depending on the conditions of application and installation. Their application allows for the optimisation of plant vegetation conditions with a positive influence on the crops of farming plants and, at the same time, in the reduction of overall water consumption. 90 researchers, doctoral and graduate students were involved in the research conducted as part of the project.
The project was carried out by a consortium composed of the Wroclaw University of Environmental and Life Sciences – the leader and co-ordinator of the project and the Wroclaw University of Technology and the Institute for Ecology in Industrial Areas in Katowice.

Application of project results

Water sorbing geocomposites will be applied:

- on road slopes and embankments, where they will have a positive influence on the condition of vegetation, constituting an element of biotechnical reinforcement of road and railway slopes and embankments,
- in transport and storage of ornamental plants, seedlings of trees, bushes and flowers,
- in urban agglomerations, where they help solve the problems related to the maintenance of urban green areas,
- in planting forests and bushes, particularly in difficult habitats,
- in degraded post-industrial areas.
- in selected areas of agriculture, such as the cultivation of berries or ornamental plants.

Financing

The project is carried out under the Operational Programme Innovative Economy, Priority Axis 1 "Research and development of modern technologies", Measure 1.3 "Support for R&D projects for entrepreneurs carried out by scientific entities", Sub-measure 1.3.1. "Development projects", co-financed by the European Union from the European Regional Development Fund.

Commercialization

In 2012 the company Geotabo sp. z o.o. (Limited Liability Company) bought from the Wroclaw University of Environmental and Life Sciences an exclusive licence to use the invention "Geocomposite element, particularly for enhancing plant growth", protected under national patent No. PL 211198.
The product manufactured pursuant to the purchased licence is marketed under the brand name HYDROBox.
Currently, patent proceedings pursuant to the international PCT procedure are in progress.

Schedule of realisation:

01.10.2009. – 30.06.2015

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