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Sustainable Water Storage Technology Based On Biodegradable Waste Materials

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A growing number of the world's population is struggling with severe environmental pollution. Plastics are among the main sources of environmental pollution, however, their global demand and production continues to increase. Geosynthetic materials are commonplace sources of soil pollution. The primary recipients of geotextiles are environmental engineering, agriculture, and horticulture, where they are used for drainage, filtration, erosion protection, separation, reinforcement, retention, and mulching. Unfortunately, although they have numerous advantages, they pose a significant burden for the environment , particularly because a vast majority of them is produced from synthetic fibres. As a result, it is desirable to seek and apply alternative solutions that take into account the current environmental challenges.

One of the methods of managing a sustainable economy is to develop technologies are based on biodegradable materials, including waste. The paper describes a sustainable technology of water storage in soil, which was tested in the actual field conditions. Water absorbing geocomposites (WAG) are an innovative technology that supports sustainable water management and plant vegetation. WAG are used successfully, among others, in agriculture and environmental engineering. The basic version of the WAG consists of a nonwoven geotextile, internal skeleton structure, and superabsorbent polymer (SAP). The permeable nonwoven fabric absorbs water from the environment and transports it to the interior of the WAG, where it is stored in the SAP. The skeleton structure is a spatial grid that captures the loads and creates a free space for the swelling of SAP. This study investigated a new biodegradable version of a water-absorbing geocomposite (BioWAG). BioWAG installed in soil ensure protection against water deficits and their gradual biodegradation fosters vegetation. BioWAGs had a positive influence on the biometric parameters of grass, increasing the growth of overground biomass by over 400%. BioWAG is one of the few solutions which improves water retention and provides a source of nutrients for plants.

This study exemplifies the need to adopt a rational approach to soil additives and lists the methods of sustainable management of textile waste in the environment. Research carried out demonstrate that the technology has high potential and create a real chance to introduce a sustainable water management and responsible soil use technology to the global market, while, at the same time, achieving the goals of sustainable development.