

**TCCV/Biodegradable Polymers
Textile Competence Center
Vorarlberg**

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BIODEGRADABLE POLYMER FOR GEOTEXTILE APPLICATIONS

USING BIODEGRADABLE POLYESTERS TO REPLACE POLYPROPYLENE IN EROSION CONTROL AND REVEGETATION MATS

Geotextiles are applied on exposed surfaces, such as slopes or areas, where wind and heavy rain fall can wash away the fertile floor or remove the protective plant cover. Usually these geotextiles are made of synthetic polymers, such as polypropylene or polyester, which are produced from crude oil and are not environmental friendly. Furthermore, fragmentation of these materials leads to the production of micro plastics, which accumulate in the environment. Additionally, full revegetation can be hampered by the geotextile, because the plants entangle in the meshes of the mat and further plant growth is restricted at a certain level.

For this reason, the aim of this project is the development of biodegradable geotextiles, which are stable for the first planting phase, where the seeding

and rooting takes place. Afterward, the material slowly degrades into environmentally safe components and the newly established plant blanket can take over the erosion protection. Also the recollection of the geotextile becomes redundant. The geotextile must be stable for at least two years, in order to guarantee the formation of a homogenous plant cover.

In the project, polypropylene fibers, which are used in the existing erosion control mat Greenax®, are replaced by biopolymer fibers, made from commercially available materials, such as PLA, PBS and PBAT. A Melt-spinning process was developed for producing the biopolymer fibers and the fibers were tested in detail, in order to fulfill the requirements regarding stability and mechanical properties. Mechanical testing was conducted by tensile testing

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and the results were compared to the synthetic materials currently in use. Also short-term stability was tested by artificial weathering. Very promising results were obtained by different melt-spun blend fibers and demonstrators were pressed into 3-dimensional test shapes, which are currently exposed to outdoor weathering.



Application of Greenax® erosion control mat. (copyright Geobrugg)

Impact and effects

The achieved project results show the good progress and the development is ready for upscaling tests. There is a high demand for biodegradable geotextiles

on the market and it is an important issue for Geobrugg to offer more sustainable and environmentally friendly products to their customers. The positive results obtained by material testing and the successfully produced prototypes will be the base for the final product development, where an adaption of the production method is a further challenge.

By using biodegradable polymers for geotextiles, the field of application for such materials is greatly extended. This contributes to a more sustainable future, on the one hand, by avoiding the use of petro-based polymers and on the other hand, by preventing the formation of dangerous micro plastics in the environment.

After the successful material tests, the product idea was protected by an European patent and several publications were written about the topic, which increase the impact of the development in the scientific and industrial area. For this purpose, a scientific review paper about biodegradable geotextiles in general was written in the course of the literature research. Additionally, conference papers and talks are in progress to further spread the results of the development.

Project coordination (Story)

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