

Natural aquatic Fiber: Exploiting algae as new raw material for textile

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Abstract: Cotton, the most commonly used terrestrial natural fiber, is under scrutiny due to various cultivation-related issues such as water consumption, monocultures, and pesticide use. Additionally, petroleum-based synthetic fibers are increasingly being critically discussed because they are derived from non-renewable resources and release microplastics during their use [1].

Algae belong to the aquatic biomass and are responsible for a significant portion of Earth's oxygen production. Despite their widespread distribution, they are relatively underutilized, even though they are considered beneficiaries of climate change and are globally available. Fibrillar freshwater algae, as aquatic natural fibers, have the potential to become a new ecological and economical alternative to terrestrial natural fibers.

The AlgaTex research project, funded by the German Federal Ministry of Education and Research (BMBF), aims to analyze filamentous freshwater algae, cultivate them on an economically viable scale, and subsequently process them into textile products (yarns, nonwovens, and textile structures). A key focus of the project lies in identifying and selecting filamentous freshwater algae, as these fibers must meet specific structural requirements to be used as textile raw materials.

Out of the currently known 175,029 species [2], the AlgaTex research team has successfully identified 60 genera within 6 algae classes where filamentous growth occurs. Analytical investigations reveal structural similarities between filamentous green algae and other cellulosic fibers such as cotton or Lyocell.

Keywords: Algae, Aquatic Fiber, textile raw Material

First preliminary products such as fiber slivers, rovings and first nonwovens have been made from 100 % algae

and various blends in several compositions with algae fiber (Figure 1).



Figure 1 Fiber slivers made from algae and Lyocell in varying blend ratios.

After a one-year exploratory phase, AlgaTex is currently in a three-year feasibility phase. During this phase, the use of various filamentous algae for textile products with different properties and applications, such as clothing (such as functional or protective textiles, medical textiles) and technical textiles (such as filter media), is being researched.

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REFERENCES

- [1] Cf. BSI Textile Mission. https://textilemission.bsi-sport.de/fileadmin/assets/Abschlussdokument-2021/TextileMission_Abschlussdokument_Textiles_Mikroplastik_reduzieren.pdf [22.03.2024]
- [2] Cf. AlgaeBase. <https://www.algaebase.org/> [22.03.2024]