

Soft Hemp - Sustainable hemp yarns and design applications

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Abstract: The research presented here, focuses on the development of alternative hemp yarns and their application in a sustainable, low-waste fashion collection. By employing "Design for Recycling", a comprehensive solution strategy is pursued to minimize the negative impacts of the linear clothing system. Hemp fibers are experiencing a resurgence in the textile industry due to their sustainability and versatile characteristics. The fiber can be locally cultivated and requires minimal amounts of water, fertilizer, and pesticides. Moreover, hemp cultivation enhances soil quality, contributes to soil regeneration, and sequesters three to five times more CO₂ per hectare of agricultural land than cotton. These advantages align with the concept of "Design for Recycling" and promote circularity in the textile industry [1, 2].

Keywords: circular economy, soft hemp, knitting

The overproduction of textiles, the use of environmentally harmful materials, and the disposal of non-recyclable products pose significant challenges for the textile industry of the future. The utilization of mixed or synthetic materials complicates fiber-to-fiber recycling and compromises the sustainability of the textile industry [3]. Our research addresses these challenges by considering the end of the product lifecycle during material selection, yarn development, and their application in a clothing collection.



Figure 1 Air Flow and Single yarns made from hemp and Lyohemp®

The Air Flow yarns, developed here (see Figure 1), consist of a blend of natural hemp and Lyohemp® (a regenerated fiber from hemp plants). The special spinning technique and yarn construction enables yarns that not only look soft, but also have an unusually soft feel that clearly sets them apart from conventional coarse hemp materials. They enable versatile knitting design applications, both individually and in combination with single smooth yarns made from hemp and Lyohemp®.

The research provides valuable insights into the development of sustainable hemp yarns and their application in clothing. The knitted fabrics developed from

the Air Flow and Single yarns (see Figure 2) offer aesthetic and functional advantages such as high breathability, washability, and durability. Due to these properties, the fabrics can be used in various ways and across seasons. Through their monomaterial composition the collection has the perfect basis for a fiber-to-fiber recycling and circularity.



Figure 2 Some knitting design applications of the Air Flow yarns, both individually and in combination with Single yarns made from hemp and Lyohemp®

These findings underscore the potential of hemp yarns as a sustainable alternative to conventional materials and represent a significant step towards a circular textile industry, emphasizing the importance of holistic sustainability approaches in the fashion sector.

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REFERENCES

- [1] cf. European Commission (2022). Hemp production in the EU. https://agriculture.ec.europa.eu/farming/crop-productions-and-plant-based-products/hemp_en [23.02.2024]
- [2] cf. Ellen MacArthur Foundation, A new textiles economy: Redesigning fashion's future (2017). <https://www.ellenmacarthurfoundation.org/a-new-textiles-economy> [04.03.2024]
- [3] cf. Europäische Kommission, Generaldirektion Binnenmarkt, Industrie, Unternehmertum und KMU, Duhoux, T., Maes, E., Hirschnitz-Garbers, M., et al. (2021). Study on the technical, regulatory, economic and environmental effectiveness of textile fibres recycling: final report. Publications Office. <https://data.europa.eu/doi/10.2873/82841>