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BAST FIBRES

What is the true sustainability of Bast Fibres?

Hemp

Traditionally used for textiles, rope and twine, hemp comes from Cannabis Sativa, a fast-growing and highly regenerative plant that requires minimal water and herbicides (Zimniewska, 2022). It is already widely used in clothing, particularly in shirts.

Flax

One of the most widely used bast fibres, commonly processed into linen. It has high tensile strength, low elasticity and good moisture absorption, while requiring relatively low water and fertiliser inputs (Santos et al., 2024; Chand and Fahim, 2020).

Nettle

A cellulosic fibre derived from stinging nettle plants, grown in temperate regions like Europe (Vogl and Hartl, 2003). Although less commercialised, it offers strong mechanical properties, low density and biodegradability compared to fibres such as cotton (Brindha et al., 2020).

Bast fibres are natural lignocellulosic fibres belonging to a group of plant-based fibres obtained from the outer cell layers of plant stems (Summerscales et al., 2010).

Challenges:

- Chemical waste
- Fibre blending
- Quality issues
- Retting pollution

Benefits:

- Low water usage
- Renewable
- Low agricultural inputs
- Biodegradeable
- Tensile strength
- Durable

Bast fibres align with SDG 6,12 & 15. Their lower water requirements support more efficient water use, while their durability and renewability promote responsible production, and reduced waste. Their reduced need for pesticides allow for improved soil health and sustainable land use.

Key SDG Goals

6 Clean Water and Sanitation

"Ensure availability and sustainable management of water and sanitation for all"

12 Responsible Consumption and Production

"Ensure sustainable consumption and production patterns"

15 Life on Land

"Protect, restore and promote sustainable use of ecosystems, sustainably manage forests, combat desertification, and degradation and biodiversity loss"

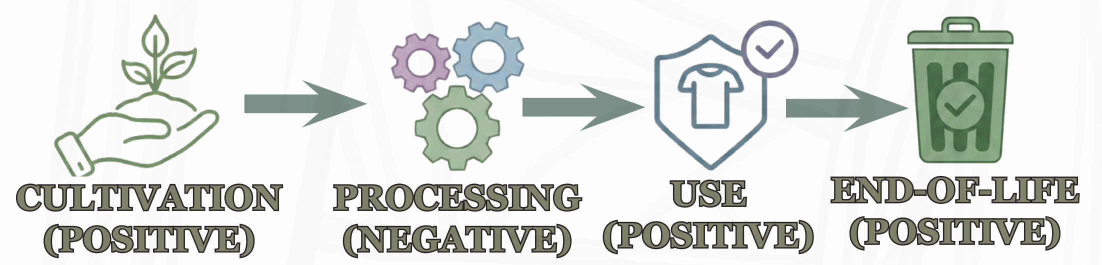
Extraction Processes Sustainability:

Traditional extraction methods include water and dew retting. These are relatively low-cost but present environmental concerns and can result in inconsistent fibre quality. Water retting, in particular, releases high levels of organic matter into wastewater, which can deplete oxygen levels in water ecosystems. Although dew retting is less water-intensive, it depends on the climate and can result in inconsistent fibre quality.

Alternative methods include enzymatic, biological, and mechanical extraction, which are more controlled and potentially sustainable solutions. However, these processes often require higher energy inputs and specialised equipment. These factors also increase production cost and have scalability limitations.

Overall, these environmental and economic impacts compromise the true sustainability of bast fibres. While the fibres themselves are renewable and biodegradable, the sustainability of their extraction processes remain a critical challenge that can undermine their environmental advantages.

Sustainability across their lifecyle:



Cultivation: Low pesticide and water use (positive)
Processing: Can be environmentally damaging i.e. retting waste (negative)
Use: Durable & long-lasting (positive)
End-of-life: Naturally biodegradable (positive)

ENZYMATIC	Uses specific enzymes to breakdown the pectin's that bind the fibres to the stem tissue. This method reduces risk of fibre damage and improves uniformity.
BIOLOGICAL	Uses microorganisms or isolated enzymes to sperate the fibres. This process reduces reliance on harsh chemicals and lower energy demand compared to mechanical processes.
MECHANICAL	Uses physical force (e.g. rollers or hammermills) to separate the fibres from the stem. This method is faster than traditional retting and allows for production control.

Conclusion:

In assessing the sustainability of bast fibres in woven textiles, their strength and durability are key, as fibres like hemp and flax have high tensile strength and abrasion resistance, enabling long-lasting fabrics. However, processing, particularly water retting, can release organic pollutants into wastewater, increasing their environmental impact and potentially harming aquatic ecosystems if untreated (Chaudhary, Bhardwaj and Juneja, 2025).
Although bast fibres present strong potential as sustainable alternatives to synthetic materials, their true sustainability relies heavily on improving extraction efficiency, waste management, and energy use. Developments in cleaner technologies and scalable enzymatic or biological methods are essential to fully realise their environmental benefits.

Are they truely sustainable?