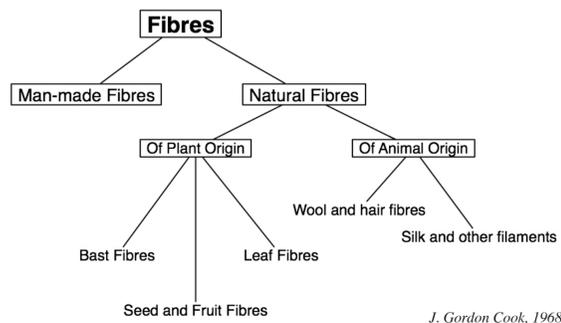


Fibre from stinging nettles

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Where do nettle fibres fit in?



J. Gordon Cook, 1968

The above diagram shows one way of classifying fibres. At the top level, fibres can be extracted from natural sources, or they can be synthesised. Natural fibres tend to have an ecological advantage as they are renewable and biodegradable. Synthetic fibres often have a petrochemical origin, and can require significant energy to manufacture (pellets of Nylon 6 take just over 80 MJ/kg to produce). Nevertheless it is possible to have sustainable synthetic fabrics (and unsustainable natural fabrics), especially if fibre products are synthesised with end of life in mind, such as BASF's Savant¹ carpet - 99% of which can be recycled.

¹http://www.mcdonough.com/writings/promise_nylon.htm

How can nettles be sustainable?

1. Nettles could be used in integrated farming

The integrated farming system developed by George Chan² is a system designed to have zero waste. Elements include livestock, crops and fish. One of its principle components is the biodigester, which takes livestock waste and produces biogas and fertilizer.

One of the "paradoxes" of the Integrated Farming System is that it produces an excess of fertilizer. Excess fertilizer can be potentially damaging to an ecosystem through eutrophication (excessive plant growth in water supplies leading to depletion of dissolved oxygen).

Nettles would be ideal crops to absorb this fertilizer as they thrive in over-fertilized areas.

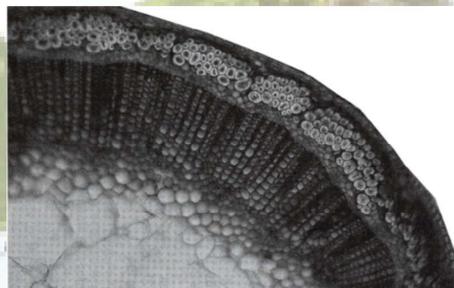
² <http://www.scizerinm.org/chanarticle.html>

2. Nettles have potential to save water

Nettle fibres can be as fine as cotton, and they are far finer than flax. However, 7000 - 29,000 litres of water are used per kg of cotton produced (Soth, 1999). This immense water usage can have severe knock on environmental effects. Substitution of nettle fibre for cotton could save large amounts of water.

Bast Fibres

Bast fibres are found in the stems of plants. These two microscope photos below show cross sections of flax and nettle. The fibres are found in bundles just inside the outer bark of the plant. Other bast fibres include ramie, kenaf and jute.



Cross section of a flax stem, Institut Technique de Lin, Paris



Cross section of a nettle stem. The fibre bundles are just visible in the dark patches. The stem is hollow, unlike flax and many other bast fibres



Nettle, flax and wool fibres (from left to right)

Aims of the project

1. Research into traditional methods of nettle use & processing.

Although there has been a recent resurgence of research into nettles (for example the STING project at De Montfort University), nettles have been used for thousands of years. They have many other uses besides fibre, and are known for their medicinal properties. Ideally, it will be possible to find uses for the whole plant, in keeping with zero-waste objectives of sustainability. Investigation into traditional uses should reveal some interesting possibilities.

2. Lifecycle Analysis

Are nettles really a sustainable crop? A lifecycle analysis of all the stages, from growing to final disposal, done with respect to water and energy use, should show how fibres from nettle compare to other fibre sources.

3. Identification of barriers to nettle fibre production.

Production of fibre from nettles is still insignificant compared to other natural fibres. There are few places that process it commercially, and there is no specially designed equipment. Why is this, and what can be done to increase its use?

4. Profiling/ Mechanical Testing

A series of tests to profile the fibre from nettle should identify how nettle fibre is best used. Mechanical properties are perhaps the most important - and can have unexpected effects: a higher Young's Modulus creates a fabric that is stiffer and can feel "prickly" on the skin. Other properties are important too: Camira Fabrics² have discovered that a blend of nettle and wool has very good fire resistance.

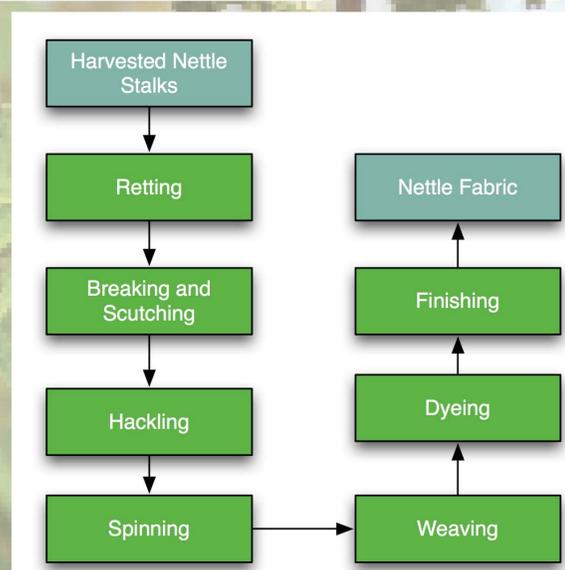
² <http://www.camirafabrics.com/content/pages/news.asp?newspage=1&Index=640>

5. Investigation into alternative plants (and alternative uses).

Nettles are just one of a large number of alternative sources of fibre. Are there other suitable sources of fibre that remain untapped?

In addition, natural fibres have a range of potential uses besides fabric. Building materials (see papercrete project) can be enhanced with natural fibres, and there are exciting possibilities for reinforcing plastics with natural fibres.

Processing Route



Processing bast fibres follows a route similar to the one shown above. There are some terms here that need defining:

Retting

This is a controlled rotting to remove gummy (pectinous) substances which glue fibres together, which can be carried out in a number of ways:

water retting - stalks are left in water, and are acted upon by bacteria

dew retting - stalks are left out in the field for 6 weeks, and are acted upon by fungi

chemical retting - stalks are placed in chemical solutions

Currently dew retting is the dominant method; chemical methods tend to damage the fibres.

Breaking, Scutching and Hackling

Following retting, a sequence of processes to remove the fibres from the woody stalks is carried out (first breaking them, then scraping - or scutching - them off). Hackling is a combing process to separate long from short fibres and to remove the remaining woody material.



Learning to spin