‘Clothing industry: opt for new raw materials!’

Interview

Polyester from fossil raw materials has had its day, according to WUR researcher Paulien Harmsen. She calls on the clothing industry to radically innovate with circular textiles. In her book Textiles for Circular Fashion Part 2 she looks at all the options.

“Sustainable energy and food are hot topics in society these days. There is a growing awareness that we must stop using fossil fuels because they are finite and polluting. But you hear much too little about the problems with fossil-based textiles,” says Paulien Harmsen, researcher at Wageningen Food and Biobased Research. “There is no sense of urgency yet, even though there are major concerns around the sustainability of the garment industry. Nevertheless, we have too few alternatives for when fossil fuels are phased out.”

Many clothing brands are attempting to boost their image with items made of organic cotton or recycled plastic (rPET). Clothing made from rPET originates from drinking bottles that are converted to textiles. “This type of recycling is gaining a lot of attention, but there is a problem with this route. You can only do this once; after that you can’t turn the material back into clothes or make new bottles from it,” Harmsen explains. She is therefore calling on the clothing sector to focus on real innovation by opting for textiles made from renewable raw materials that are truly recyclable. And the first step is to recognise the problem.

Origin of materials

The problem still lies at the beginning of the supply chain, in the origin of PET, known in the textile industry as ‘polyester’. This is derived from a fossil raw material: oil. Oil is used to make various fabrics for clothing, such as polyester, elastane and nylon. Other fabrics for clothing are based on natural fibres, of which cotton is the best-known natural plant fibre. An exception is viscose or lyocell, a semi-synthetic material made from cellulose, which is primarily obtained from wood. No fossil raw materials are used in the production of this fabric.

Polyester and cotton

The vast majority of clothes are made of polyester or cotton. Both have advantages, such as strength and wearing comfort, but also disadvantages. Polyester’s fossil origin is its biggest problem, along with a possible issue with microplastics entering the water when clothes are washed. According to Harmsen, the focus on recycling PET from drinking bottles into textiles is therefore too limited.

Although cotton is not of fossil origin, the textile industry is dependent on a limited number of countries for its cultivation. Moreover, cotton production is often highly polluting. Simply replacing polyester with cotton therefore does nothing to solve environmental problems. On top of that, cotton would not be able to meet the worldwide demand for clothing due to its limited production area.

Properties

Harmsen is therefore researching other solutions, such as the use of a wider range of raw materials for natural, semi-synthetic and synthetic clothing fabrics. She began by systematically classifying as many known and potential raw materials for clothing as possible. She also documented their properties and production methods.

The results of Harmsen’s search were recently published in a booklet entitled Textiles for Circular Fashion Part 2: From Renewable Carbon to Fibres. This is the 25th publication in the *Green Resources* series. In the category to which viscose belongs, she describes modal, cupro and lyocell. The category of natural plant fibres is much larger; it includes flax, hemp, jute, ramie, sisal, raffia, coconut fibre and bamboo.

Applications

“The plant fibre category includes fabrics that were widely used in the past but have become less popular since the introduction of polyester, which is more comfortable to wear,” Harmsen says. Nevertheless, other plants besides cotton are also suitable for textile applications, she believes. She therefore calls on manufacturers to take a closer look at which fibre is best for each garment. “Underwear, for example, is best made from soft fabrics such as cotton, but flax or hemp can be used for other garments such as jackets or blouses, and ramie for T-shirts. And a strong, sturdy fabric like denim could easily be made from hemp.”

Blends

It is also possible to blend fibres to improve the properties of the fabric. Harmsen: “You can do that with different plant fibres. A downside is that they become more difficult to recycle, although you can always use the cellulose the fibres are made of. Cotton and linen can be recycled mechanically. This makes the fibres shorter, but if you mix them with a proportion of new, long fibres, recycling is an option. If the fibres have become too short, they can still be turned into viscose. This method of recycling clothing is hardly ever done at the moment.”

Fossil-free polyester

Harmsen hopes that in future a type of polyester will be designed without the use of fossil raw materials and with the right properties for textiles. Some plant fibres are unsuitable for direct processing in the same way as cotton because they are too short or not strong enough. However, sugars originating from cellulose can be isolated and processed into completely new fibres. These are the raw materials for polyesters and other synthetic materials. Harmsen: “Polyester has useful properties. We don’t have to stop using it altogether, but we do have to look at other raw materials, reduce volumes and extend fabric lifespans.”

Researching plant fibres

Harmsen plans to further analyse the properties of new plant fibres in the Innovation Lab Biobased Products and the Circular Fashion Lab. “We want to show that there is more out there than cotton. It is important not to get lost in what we are familiar with and simply make some small adjustments to make textiles more sustainable. We also really need to look for new materials with good properties that can be produced on a large scale. At Wageningen we can help make that happen with our knowledge of plants.”

Harmsen has been making her own clothes from fossil-free fabrics for several years now. So she acts as her own test subject to get an idea of which ones are comfortable to wear. It is difficult to get her wardrobe completely fossil-free. “For example, many sewing threads are made of polyester because it is strong and affordable,” she says. If it were up to Harmsen, even the stitches would soon be made of fossil-free polyester.