Biosynthetic Textile Production: Sustainability

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The global climate crisis is happening now and fast. The fashion industry is a significant contributor to damage to humanity and the environment. The fashion industry makes up about 10% of global carbon emissions and almost 20% of wastewater (Ro, “Can fashion ever be sustainable?”, 2020). The wastewater spreads into freshwater streams and pollutes the rivers that people live and fish from. It also affects aquatic life. Textile dyeing plays a huge part in pollution of the water. The water leftover from the dyeing process is usually discarded into streams or rivers. Other problems in the industry include the transportation of the clothing and how it’s disposed when a consumer no longer wants it. This contributes to more air pollution and more waste. Up to 85% of textiles go into landfills each year (McFall-Johnsen, 2019). What makes the fashion industry particularly problematic is the fast pace of change it not only undergoes but encourages (2020). Every season, consumers are encouraged to buy the latest items because everyone wants to stay on trend. Many fast fashion brands like Zara, we see produce a lookalike of a garment seen on the runway, days after it was showcased. These are just some of the reasons why we need more sustainable fashion. Sustainable fashion will help reduce carbon footprints, save animal lives and natural resources, decrease water usage, support safer working conditions, and overall will provide a healthier planet and healthier people.

There are brands working to become more sustainable, two in particular are Reformation and Levi’s. Reformation “makes killer clothes that don’t kill the environment.” (FutureLearn) Reformation wants to be fast fashion but also wants to be sustainable. Fast like Zara but more eco friendly. Aflalo has stated “We are Zara but with a soul,” (Chitrakorn, 2019). Reformation's production process all takes place in Los Angeles. The products are all designed, made, photographed and shipped from their facility in downtown Los Angeles. Each garment is made from repurposed vintage clothing, restored deadstock fabric or new sustainable materials

(FutureLearn). This is great because recycling clothing is very important and helps the environment. Instead of contributing to the huge amount of landfill that is continuously increasing, the brand reuses and transforms the upcycled materials to wear. More brands should start using repurposed clothing. Remanufactured clothing can save more than 13,000 pounds of CO2 emissions per person, per year (TheReformation.com, 2020). Reformation's site states that they use fabrics like Tencel Lyocell which is almost identical to cotton and is made from renewable wood materials. The company also utilizes Recover yarns which are made from old clothes and fabric waste (TheReformation.com, 2020). In fact, Reformation released "Ref Shoes" last year. The collection has sandals, flats, and heels made from materials like chrome-free leather and jute. The manufacturing process of the shoes saves an average of 52% on CO2 emissions, 70% water and 65% waste compared to other U.S. shoe brands (Gonzalez, 2019). This was a really nice step towards sustainability given that footwear counts for about one-fifth of the apparel industry's negative impact on the environment. "Shoes are the most requested item from our customers so it really made sense as the next step in our mission to bring sustainable fashion to everyone," Alafo said (Gonzalez, 2019). The brand takes pride in providing what consumers want but also making sure it's also sustainable. The typical Reformation consumer would be a young contemporary female between her early 20s and 30s who loves chic outfits and cares about the environment. Reformation targets female millennial shoppers who don't mind spending between $60 and $550 on their skater skirts, flowy blouses and floral dresses made from eco-friendly fabrics (Paton, 2019). Reformation caters to many sizes like heights ranging between 5′6 and 5′10. The company also offers a petites

collection designed for ladies 5′2 and under, an extended sizes collection going up to size 22, as well as a collection specially designed to fit women with a full C-DD cup (TheReformation,

2020). The brand is inclusive and reaches more women than a lot of other brands that may only cater to smaller sizes.

Levis has always been a leader in sustainability. The brand set “terms of engagement” in 1991. It displayed the brand’s global code of conduct throughout its supply chain which meant setting standards for worker’s rights, a healthy environment for workers, and an ethical engagement with the world (Segran, 2017). Other brands quickly started following suit. Even now, Levi’s continues to figure out how it can become more green. Fast forward to this year, in March, the brand announced a new Wellthread collection which they stated that it's their most sustainably designed clothing thus far. Wellthread is made using less water, fewer chemicals, and fair labor, and is 100% recyclable (Charlton, 2020). Levi’s makes the Wellthread garments from cottonised hemp which helps in their commitment to reduce water and chemical usage. The cottonised hemp comes from hemp crops fed by rain. It is also grown using fewer pesticides than cotton (2020). Levi’s also claims that Wellthread is finished with a technique called “Water<Less”, which is professed to save more than 96 percent of water normally used in the finishing process of apparel manufacturing. The jeans that were featured in the Wellthread collection are made with organic cotton and Circulose, an innovative material made partly from worn out jeans.

With the environment suffering from many of the techniques used to make products throughout the fashion industry, there’s many sustainable techniques being introduced to help the future of the environment. One of them being synthetic biology, used by Colorifix where color is created from living things, leaving them unharmed and unbothered. The process removes the need for harsh chemical usage in the creation or disposal of dyes. It starts with finding a color that is created by an animal, plant or microbe. Through DNA sequencing, the company figures

out what encodes the instructions to create a pigment which is then translated into their engineered microorganisms, which is used both to grow and transfer the color. Colorifix places the genetic information into a bacterial cell, which copies itself every 25 minutes. The bacteria is fed with sugar molasses and nitrogen in a fermenting machine, where the cells accumulate which creates more pigment (Chan 2020). This is great because the process uses byproducts of the agricultural industry which makes for a more sustainable way to make dye. The process can also cut down on transport pollution because Colorifix can send color packed bacteria to a dye house which will end up multiplying, where the factory will be able to produce huge amounts of dye solution a day (see Figure 2)

Besides living things, brands are using food, specifically fruit, to make textiles. Ferragamo launched a capsule collection made with patented orange fiber. The fabric was the first in the world made with citrus fruits. Salvatore Ferragamo famously created procedures to make leather substitutes, or soles in goliath or glass to improvise around the time of wartime restrictions and shortage of materials (Zargani, 2017). The Orange fiber is a twill that gives the look and feel of silk. The idea of Orange Fiber is the use of what remains after squeezing oranges for juice, which totals more than 700,000 tons of byproduct in Italy alone (2017). Ferragamo's collection consisted of shirts, dresses, trousers, and foulards and was the first brand to use the Orange Fiber (see Figure 3)

Piñatex, by Ananas Anam is the name the company came up with for pineapple leather. It is an innovative natural material made from waste pineapple leaves after the fruit is harvested resembling leather (see Figure 1) (Martinko, 2020). The leaves are often thrown away but Pinatex has made a sustainable use out of it. It was developed by Dr. Carmen Hijosa who decided it was time for change and innovation after having worked in the leather industry for

years. The extracted fibers are washed and dried in the sun, then goes through a purification process turning it into a fluffy fiber. The fluff is blended with corn based polylactic acid, which then turns into a non-woven mesh, Piñafelt, the base for Piñatex products. When the mesh arrives in Italy or Spain for finishing, it is then colored using pigments certified by the Global Organic Textile Standard and given a coating that adds durability, strength, and water resistance (Martinko, 2020). It's great that it is animal free leather and doesn't harm the environment. Piñatex has already been adopted by brands such as Hugo Boss, and H&M. It will only grow as more designers and consumers discover its benefits.

It's great how companies and brands are coming together to make the textile industry more sustainable. The more eco friendly techniques are put out into our planet, the more we get back from the environment because sources are being reused and not wasted. I don't feel we will run out of raw materials if the majority or all brands or companies become sustainable and follow the lead of the brands mentioned or even branching out and bringing a new way of sustainability. It is unlikely that running out of raw materials will be a limiting factor. It is waste products and consequences of the misuse of resources that may prove to be limiting factors. Everyone must come together in providing greener solutions. Who would've thought that the planet would get to a point where people consider fruits as a way to make dye for clothing. Sustainability needs to become a global goal.

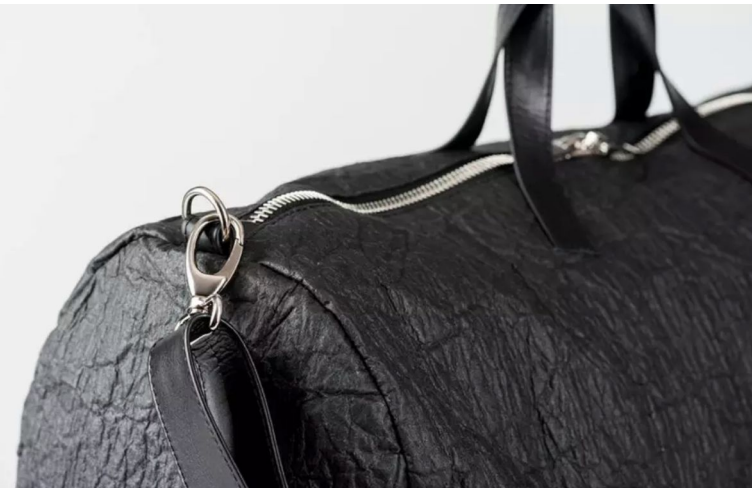

Figure 1. (2019) Inventor Carmen Hijosa worked with local factories to set up production. DESIGNED AND MADE BY INA KOELLN.

https://www.fastcompany.com/3059190/this-gorgeous-sustainable-leather-is-made-from-pineapple-waste

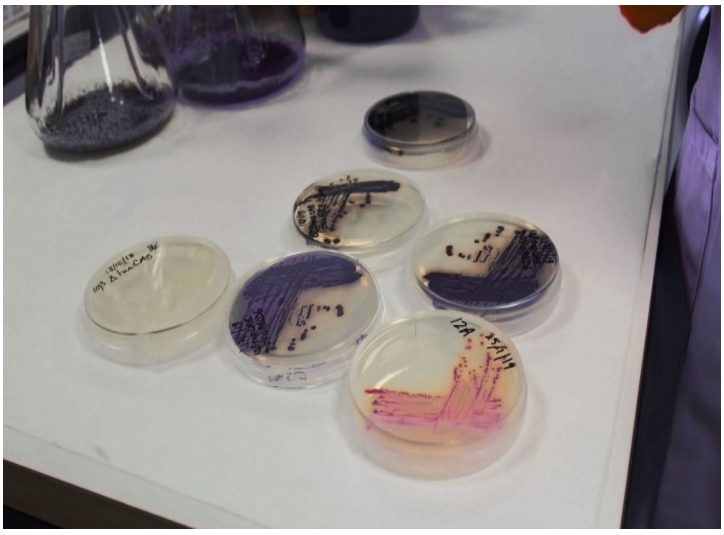

Figure 2. Colorifix replicates organisms carrying specific colour DNA. Overall the whole process uses less water, produces less waste, and needs far less chemicals.

https://www.bbcearth.com/blog/?article=breathing-life-into-a-dyeing-art

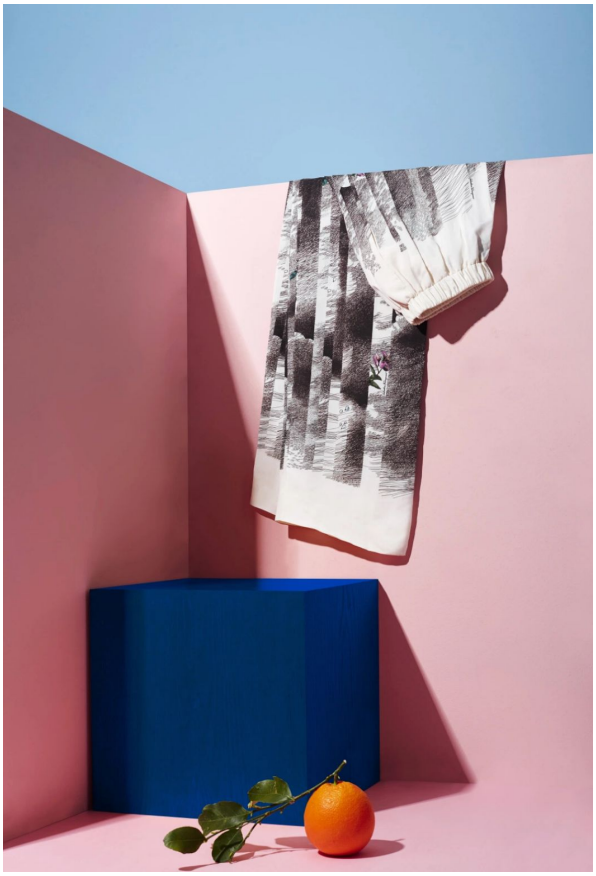

Figure 3. A look from the Orange Fiber capsule collection by Salvatore Ferragamo. Courtesy Image.

https://wwd.com/fashion-news/designer-luxury/exclusive-salvatore-ferragamo-launches-capsule-collection-made-orange-fiber-10868843/

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