

Running Head: To Bio(synthetic) Or Not to Bio(synthetic)

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Biosynthetic textile production is destined to change the fashion industry favorably within the next few years. More companies are being exposed to how much textile waste and pollution through manufacturing diminishes our necessary natural resources. This has encouraged many companies within the industry to develop biosynthetic fibers. Biosynthetic fibers are made from polymers that are made with renewable resources (“What are Biosynthetics”, 2018). Biopolymers come from renewable sugars, starches and lipids and there are several technologies currently developing to produce biosynthetics from a wider variety of raw materials (2018). These methods of technology include, but are not limited to, new dyeing processes and creating textiles through waste or existing agriculture. Ananas Anam and Orange Fiber are two of the growing number of companies that have taken on the challenge to keep the environment safe while remaining fashionable. 

Ananas Anam Ltd. is a company that was developed by Dr. Carmen Hijosa in efforts to find a sustainable alternative for leather production nearly thirty years ago (“Piñatex”, 2020). As a then leather good expert, she was baffled to find out how negative chemical tanning and mass manufacturing of leather affected the environment (“Piñatex”, 2020). Hijosa’s goal was to configure a new textile that would not significantly affect the environment negatively and administer beneficial economic and social impact, all while still being able to be commercially produced (2020). To achieve this goal she created Piñatex (see Figure 1), an innovative, natural, sustainably-sourced, cruelty free textile made from the leaves of a pineapple plant (2020). To obtain Piñatex the fibres located in the leaves are removed through decortication (see Figure 3), which is a process where the outer layer of a structure is removed. This is done by farmers at a plantation (2020). To help with the decortication process Ananas Anam created the first

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automated decorticating machine which allows farmers to use larger amounts of leaves at once (2020). “Once the leaves have been stripped of fibre, the leftover biomass can be used as a nutrient-rich natural fertiliser or a biofuel so that nothing is wasted” (2020). Gum gets removed from the fibres (see Figure 3) and goes through another process to become a non-woven mesh (2020). This creates the base of Piñatex textile. The mesh is taken to Spain for finishing which gives it its imitation leather appearance. Ananas Anam personally delivers the Piñatex to companies who are interested in sustainable alternatives for leather in several areas beyond clothing and footwear such as, interior furnishings and automotive upholstery (2020).

Orange Fiber (see Figure 2), orchestrated much later in 2014 by Adriana Santanocito and Enrica Arena, is an innovative company based in Catania and Rovereto, Italy (“Orange Fiber”, 2020). Orange Fiber creates sustainable fabrics from citrus juice byproducts that would essentially be discarded with (“Orange Fiber”, 2020). Orange Fiber’s mission is to transform waste into refined, ethereal fabrics that correspond to Italian traditions of high quality fabrics and luxury fashion (“Orange Fiber”, 2020). There are more than 700,000 tons of citrus juice byproducts produced annually in just Italy alone (“Orange Fiber”, 2020). Orange Fiber is a textile made by extracting the cellulose from the fibers that are discarded from these citrus juices (Fiber, 2016). This results in a polymer apt to be spun and that yarn is used to make the orange fiber fabric (“Orange Fiber”, 2020). Nanotechnology technologies also enrich the fiber with citrus fruit essential oil which makes the textile vitaminic and helps to nourish the skin (Fiber, 2016). The first fashion collection made with Orange Fiber fabric was launched by Salvatore Ferragamo (see Figure 4) on Earth Day of 2017 (“H&M Group”, 2019). That collaboration

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represented the shared ethical values of using sustainable applications of Ferragamo and the Orange Fiber brand (“H&M Group”, 2019).

In terms of sustainability both Piñatex and Orange Fiber appear equally sustainable. Both of the textiles depend on the fruit industry which means there will be no shortage as long as pineapple plants and citrus trees are continually planted. The United States production of oranges totaled approximately 3.9 million tons in 2018 (Shahbandeh, 2020). Piñatex currently works with farmers in the Philippines (“Piñatex”, 2020). In 2018, the production volume of pineapples was about 2.7 million metric tons in the Philippines (Sanchez, 2020). So generally, both companies have around the same production opportunity. Enrica Arena did admit however that one of Orange Fiber’s biggest challenges involves the industrial scale up and the optimisation of the costs of production (“H&M Group”, 2019). She continued to say, quote, “Practically, on one hand we are working on the process and on the synergies with citrus squeezers and their processes, and on the other hand we are working with industrial players in the cellulosic industry for fabrics to adjust to their standard of productions, while keeping in mind the brand’s requests and preferences that we discovered with our first production and testing our samples on the market with different players” (“H&M Group”, 2019).

Piñatex, although soft and flexible, is very durable (“Piñatex, 2020). Pineapple leather can do practically anything normal leather can do and is also very sturdy. It is more likely to survive the wear-and-tear required of apparel better than Orange Fiber, which looks and feels like silk (Zargani, 2017). A little over three feet (475 gsm) of Piñatex® ORIGINAL fabric is fifty euros or \$56.73 USD (Piñatex, 2020). Piñatex® METALLIC collection is a little bit more pricey at fifty eight euros or \$65.77 USD (Piñatex, 2020). Shipping to the United States is a

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whopping fifty six euros (\$63.50 USD) which is equivalent to a price of fabric in the company's Mineral collection. This would virtually bring your total to almost \$115 USD if you were buying one meter of fabric to be shipped to the United States. Orange Fiber prices are not readily available online without addressing a representative. Orange Fiber has a better opportunity to dovetail with other sustainability issues like natural dye processes. This is because its textile has more versatile fibres for dyeing than Piñatex. However Piñatex has a great range of color available which means they could also use natural dye processes to become even more sustainable. Piñatex is more capable of handling large outputs in the event of an upscale because of its use of an automated decorticating machine which cuts down work time in comparison to Orange Fiber's use of citrus squeezers.

Piñatex appears to be for the general consumer, while Orange Fiber is definitely for a specialized group. Anyone can buy Piñatex textile online, but to obtain Orange Fiber one is expected to contact the company directly. Orange Fiber also seems to be a technical textile meaning it was produced unaesthetically with function as the primary end use. Piñatex is not a technical textile. Ready-to-Wear is sold directly off the rack to the general public. Sizes are general. Haute Couture, which was established by couturier Charles Frederick Worth, describes expensive, more highly fashionable clothes produced by leading fashion houses. Unlike ready-to-wear haute couture contains exclusive custom fitted pieces usually meant to be worn by someone in particular. Orange Fiber is intended for Haute Couture and Piñatex seems to be geared towards ready-to-wear.

In conclusion, both Ananas Anam and Orange Fiber are respectable sustainable businesses in their own right. Other companies can, and should, be inspired by their steps toward

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positive change in the fashion industry. These companies thrive to make the environment safer with their products which is an ultimate win-win for everyone, including you. To bio(synthetic) or not to bio(synthetic)? I definitely say biosynthetic all the way. 

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**Figure 1: Piñatex® ORIGINAL Old Rose**

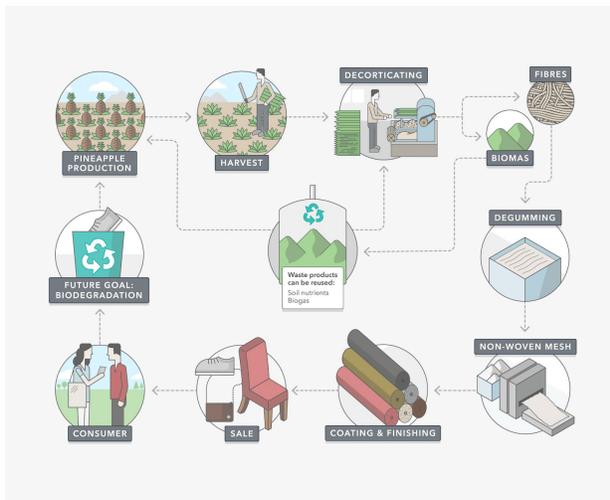
<https://store.ananas-anam.com/collections/original/products/pinatex-original-old-rose-475-gsm>



**Figure 2: Orange Fiber**

(94% cellulose acetylated fiber from oranges, 6% elastane)

<http://orangefiber.it/en/fabrics/>



**Figure 3: Piñatex Manufacturing Process**

<https://www.ananas-anam.com/about-us/>



**Figure 4: Orange Fiber's Collection w/ Ferragamo**

<http://orangefiber.it/en/collections/>

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