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## A sustainable future of textile: Orange (fruit) fiber

**Neetu Singh, Dr. Rashmi Srivastava and Manju Yadav**

**Abstract**

Orange trees are the most commonly cultivated fruit trees in the world. Oranges are a popular because oranges have list of numerous edible products, pharmaceutical values, cosmetic uses, and now an innovative idea of producing a high quality textile fiber from the orange scraps also gaining popularity across the world. Orange Fiber transforms industrial waste of citrus into a sustainable and biodegradable textile.

**Keywords:** Orange, pharmaceutical values, cosmetic use, scrape, industrial waste, sustainable and biodegradable

**Introduction**

Oranges probably originated from south East Asia, and were cultivated in China by 2500 BC (Nicolosi *et al*, 2008) [2]. Today, it is grown almost all over the world as a source of food for humans because of its high nutritional values, source of vitamins and other uses. Propagation through seed is associated with problems like poor pollen production, self-incompatibility and muscular embryo (Mortton, 1987) [4]. In terms of volume in production, citrus ranks after banana as the world second fruit crop with more than 108 million tons (FAO Statistics 2006).

**History related to production of orange (Fruit) textile fiber**

Everything started in 2011. Adriana Santanocito specialized in design and innovative textile and Enrica Arena, expert in communication and marketing, were students in Milan when they invented Orange Fiber. Adriana, for her thesis, was conducting a research on a sustainable and vitamin-enriched textile from citrus waste. Enrica, her flatmate at that time, embraced the idea adding to it her communication and marketing expertise. The thesis became a project at the Polytechnic of Milan, after the feasibility study the team patented Orange Fiber. With the financial support of Trentino Sviluppo and the help of two business angels and a lawyer, Orange Fiber officially became an innovative startup based in Catania and Rovereto in February 2014. In September 2014 was presented the Orange Fiber prototype in the occasion of the Expo Gate of Milan (Caterina Daniela Impastato, 22 January 2016)

**Production process of orange (fruit) textile fiber**

Orange Fiber is a textile made by extracting the cellulose from the fibers that are discarded from the industrial pressing and processing of the oranges. The fiber, through nanotechnology techniques, is also enriched with citrus fruit essential oil. The result is a vitaminic textile that nourishes the skin like a not greasy body lotion. This innovative idea has the potential to bring sustainability inside the textile industry, tackling the environmental issue of the citrus waste production and bring job opportunities in a disadvantaged land (Caterina Daniela Impastato, 22 January 2016).

The productive process patented by Orange Fiber gives new life to the pastazzo, technical term to define what remains of the citrus fruits after squeezing. The wet citrus residual, pastazzo, is processed to be able to extract the cellulose that will form the final yarn. Cellulose is extracted from the leftovers that would normally be discarded after pressing an orange and then treated with a special process. A biodegradable material like silk is produced: soft to the touch and shiny appearance, suitable to be woven with any type of existing yarn. Inside are also positioned, with the aid of nanotechnologies, essential oils in the form of capsules that dissolve in contact with the skin, smoothening. Wearing products made out of Orange Fiber is like wearing a vitamin cream; it's nourishing for the skin, and the effects are guaranteed for twenty washes, for now.

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Three prototypes are obtained from the fray with citrus fruits yarn: a lace silk black and white, a duchesse, colour neutral between white and cream, similar to that which can be used for the summer jackets or cocktail dresses, and a fabric like viscose, very slight is indicated for the daily use, to be assembled with shirts and summer clothes.

#### **Benefits of produced orange (Fruit) textile fiber**

Thanks to nanotechnology, the material still contains essential oils and vitamin C that are present in the citrus fruit peel. The skin absorbs these oils and is nourished by them, making the fabric a wearable body cream. According to Orange Fiber, despite the oils, the fabric does not feel greasy. The oils are guaranteed to last at least twenty washing cycles, but the company is experimenting with recharging methods with special fabric softeners washing cycles, but the company is experimenting with recharging methods with special fabric softeners.

A major problem with man-made fibers is the fact that they do not biodegrade. If a pure cotton shirt is left outside, it will eventually decompose to nothing. A polyester shirt will remain in the same state for hundreds of years. As these fibers are petroleum-based, if left outside the chemicals in them can seep into the soil and damage local ecosystems. Some other plastics, such as polyethylene Fiber produced from natural resources have no bad impact on environment. So orange fiber is good option for textile, as Man-made fabric has an even longer-lasting environmental impact than just not biodegrading. The extraction of the crude oil to manufacture them is environmentally damaging and the chemicals used also create toxic byproducts which are damaging to the local environment (Imon Green, 28, 2017).

#### **Conclusion**

The role of natural produced fiber has been well documented in various studies and now fiber produced from waste orange scrapes gaining its popularity day by day. It was ranking among the top 5 start-ups in Creative industries at the world level at Copenhagen Creative Business Cup 2013 and was nominated Change maker within the international competition for innovative start-ups for EXPO Milano 2015, in which Orange Fiber is entered in the top 10 selected projects, for being the company with the highest economic potential and less environmental impact. thus it is expected to do more and more research in this field to enhanced its knowledge among more and more people and to utilize its uniqueness and benefits.

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