

Reducing the waste and creating the best – sustainable clothes

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■ **ABSTRACT** : In today's time there is advancement in everything including the types of clothing materials being made. There has been an overall growth in the world fashion and clothing industry. Due to huge rise in human population there has been an increased demand of clothing which has further lead to an increased amount of waste production. And by human intelligence we are able to create amazing products from even the waste. This paper describes about some of marvels of man which has helped reduce the amount of waste production on this planet.

■ **KEY WORDS**: Sustainable Fabric, Eco-Friendly, Fashionable Fabric, Recycled Fabric

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The fashion industry is said to be the second most polluting industry on Earth after oil and gas. It requires enormous quantities of resources, including water, land, and fossil fuels, to make fabric. The process of production is a process that causes waste in enormous amounts and also pollutes the environment in many ways. This industry creates a tremendous amount of waste in the form of the parts of the plants that are not consumed: fruit peels, leaves, stalks, etc. all these waste materials are usually just left to decay and rot but if this waste is used to make some useful products it will be bliss. Fortunately, more people are becoming aware of these problems there are many companies and departments that are working in this field for the reduction of waste production. Sustainable apparel fabric suppliers are taking advantage of a remarkable new source of material: agricultural waste, the discarded byproducts

from the cultivation of orange, banana, sugarcane, and other crops. Technologies like Agralooop are changing the sustainable fabric industry in ways that seem surreal until one understands the logic.

Plant parts contain fibres, and agricultural residue represents a tremendous source of fibres which would otherwise go to waste. Cotton, silk, leather and wool are undeniably great materials for making clothes but the surge in clothing production in recent decades has put enormous strain on these limited resources. The number of garments produced each year has doubled since 2000 according to McKinsey calling the sustainability of fabric production into question.

Food crop agriculture creates a tremendous amount of waste in the form of the parts of the plants that are not consumed: fruit peels, leaves, stalks, etc. (Fig. 1). All this material has been going to waste, either burned



Fig. 1 : Fruit peels, leaves, stalks

or left to rot, to the detriment of the environment.

Advantages of food waste fibre :

The idea is brilliant and dead-simple. There is a ton of food crop that is wasted globally: banana peels and stalks, pineapple leaves flax and hemp stalks and crushed sugarcane account for the main products for causing waste. Using Circular Systems' new technology, this waste can be turned into fabric, which means:

- Farmers don't have to burn the waste and contribute to air pollution
- Less waste will be sent to landfill to rot and emit methane
- Arable land is freed upto grow food, rather than fabric crops
- There is less demand for fossil fuels to make synthetic fabrics
- Fewer chemicals would be needed to grow cotton, a high-input crop

All this means that environmental pollution will be decreased by several folds which will definitely be helpful for the environment

We've called the technology 'new,' but in reality it's a throwback to the past. There was a time when the vast majority of clothes were made from natural fibres (97 % of clothing in 1960), but that number has shrunk to only 35 per cent today. By harnessing the bounty of food waste fibres, Circular Systems' founder Isaac Nichelsen says 2.5 times the current global demand for fibre could be met.

Types of food waste fibre:

Orange fibre:

Orange fibre (Fig. 2) aims to rescue some of the



Fig. 2 : Orange fibre

700,000 tons of orange peel that are discarded to create juice in Italy every year and transform it into a soft and silky fabric, ideal for clothes. This amazing startup idea came to the minds of two Sicilian girls. The Italian textile is perfect for creating dresses and tops since it is similar to viscose in that it is made from cellulose. This amazing fabric can also be blended with cotton and silk. Orange Fibre is a textile made by extracting the cellulose from the fibres that are discarded from the industrial pressing and processing of the oranges. Using nanotechnology techniques, the fibre is enriched with essential oil from citrus fruits. This results in nourishing the skin by a method which is natural as well as non greasy like body lotion. This innovative idea has the capability to bring sustainability inside the textile industry, tackling the environmental issue of the citrus waste production and bring job opportunities in a disadvantaged land. Recently, the fabric was used in H&M's Conscious collection too. Made from citrus juice by-product (hence its name), the silk-like cellulose fabric is similar to viscose and can be blended with silk and cotton to create a wider range of materials.

Taiwanese actress, model, and sustainability influencer Chiling Lin sported an Orang Fibre gown at the Global Change Award 2018.

Piñatex:

Piñatex is one of the most popular sustainable fabric made from pineapple leaf fibre. The fabric was founded and developed by Dr. Carmen Hijosa, a leather-goods expert in the Philippines back in the '90s when she realized the environmental impact of mass leather

production and chemical tanning. By turning the part of the fruit that cannot be eaten, and is usually discarded, it provides an additional income for farmers and is a cruelty-free option for shoes, bags and clothes.

Piñatex (Fig. 3) is created by felting the long fibres from pineapple leaves together to create a non-woven substrate. The pineapple industry globally produces 40,000 tones of waste pineapple leaves each year, which are usually left to rot or are burned. Approximately 480 leaves (the waste from 16 pineapple plants) are needed to create 1 square meter of material. The material uses the long leaf fibers which are separated by the pineapple farmers for additional income, the leftover biomass from the process can be used as a fertilizer.



Fig. 3 : Piñatex

Piñatex is produced partially from a waste product that requires no additional land, water, pesticides or fertilizers. It also avoids the use of toxic chemicals and heavy metals used in animal leather production and has none of the wastage of leather caused by the shape of the animal's skin.

Q Milk Fiber:

Q MILK is a protein fibre (Fig. 4) and feels velvety soft as silk. Qmilk is therefore an ideal combination for mixing a wide variety of material from natural or synthetic fibers. QMILK improves the Product properties from a share of 20%. The fiber is ideal for clothing because of its soft grip. The fiber has excellent moisture absorption and climate regulation properties. The antibacterial efficacy protects in direct contact with the skin. The fibre has been tested dermatologically with “excellent”. The trending wool made today is often related to mixing of viscose and synthetic fibers QMILK significantly

improves the unique properties of wool. It gives you an increased silk feel and strength.



Fig. 4 : Q Milk fiber

Parblex:

A bioplastic called Parblex (Fig. 5), is steadily gaining momentum in the fashion industry and is being prototyped as buttons and eyeglass frames. Parblex has a beautiful textured finish and is available in three colors: smoke, tortoiseshell and snow. Chip[s] Board make a range of materials from potato waste suitable for the interiors and fashion markets. Parblex is their bioplastic recommended for fastenings, buttons and accessories in the apparel world. With a beautiful textured finish Parblex comes in three colors, ‘smoke’, ‘tortoiseshell’ and



Fig. 5 : Parblex

'snow'. Their waste is currently sourced from McCain and one of the chip brand's retired regional CEOs acts as an advisor to the company in manufacturing and operations. Chip[s] Board has a zero-waste production system where even the offcuts from material production are reincorporated back into the process.

Agroloop Bio Fibre:

The Agroloop Bio-Refinery (Fig. 6), a new technology developed by materials science company Circular Systems S.P.C., this company is capable of turning food waste such as banana peels, pineapple leaves and hemp stalks into natural fiber that can be woven into clothing. The CEO and cofounder says that "We want to enable food crops to become our primary fibres". If cane sugar and flax stalks are processed through Agroloop, it could generate 250 million tons of fibre each year and definitely reduce the amount of waste production. This means, that the global demand for clothes will be met more rapidly. The waste otherwise left or used for making compost can help farmers create some extra income if they start their own Agroloop setups. Thus farmers should be encouraged to follow this practice.



Fig. 6 : Agroloop bio fibre

Vegea fabric:

The name VEGEA (Fig. 7) comes from the combination of VEG (Vegan) and GEA (Mother Earth).

It was chosen to identify next generation of alternative materials to totally oil-based and animal-derived ones.

One of the main applications of vegea are fashion, furniture, packaging automotive and transportation. This fabric is characterized by high content vegetal/recycled raw materials.

All of the products are compliant with the most stringent European regulations (REACH), they are solvent free, animal friendly and Made in Italy.

VEGEA is produced in several versions which differ by technical and aesthetic properties such as thickness, elasticity, weight, finishing, texture, backing textile and bio-based content.

On specific customers' request, we can make any colour.



Fig. 7 : Vegea fabric

"Sustainability is one of the pillars of our social responsibility policies and is based on production processes that use vegetable raw materials, recycled materials and bio-based polymers."

Seacell fabric :

Featuring breathable, durable and moisture-wicking properties, Sea Cell is a fabric that is derived from *Ascophyllum nodosum*, a seaweed sourced from the fjords of Iceland. By only harvesting the regenerative upper part once every four years, the sustainability and health of the seaweed is insured. Cutting the upper part is also said to spur growth. The name SeaCell (Fig. 8) comes from the combination of the word cellulose and



Fig. 8 : Seacell fabric

seaweed. To create SeaCell, a Lyocell process is used. With a solvent-spinning procedure, the beneficial health properties and the active ingredients of seaweed are locked in by utilizing natural cellulose derived from wood pulp as a host.

Conclusion:

In the manufacturing process of fabric from the fiber some amount of fibre is lost to scrap and waste, scientists say, in opening and cleaning, for example, 4 to 8 per cent of the fibre is lost; up to 1 per cent is lost during drawing and roving; and up to 20 per cent during combing and yarn production. And this waste scrap is left in the landfills or dumps or; left to rot. But by the intellectual thinking of man we have found a way to use these scraps as well. Even the fruit and vegetable peels left can be used for something productive. If we take the case of Italy where 700,000 tons of orange peels waste is produced per year, this amount if wasted can really be harmful. But using it in some scientific and productive manner like the orange fiber we can really save our planet from becoming a waste hub. There are many fibres like orange fibre from orange peels, piñatex from pineapple leaves parblex from potato leaves etc.

that provide a hue benefit to the textile industry. From my above research I would like to motivate the use of the fabrics made from waste materials. These fabrics are eco friendly as well as safe and healthy for our own selves'. They also safe for our mother earth too!

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