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11/25/08

### **Traditional vs. Organic Cotton and the Lifecycle of Cotton Apparel**

Cotton is undoubtedly an essential product used by the apparel industry. It would be an insurmountable task to eliminate cotton from the wardrobe of an average person across the globe. The use of cotton in the apparel industry stretches far beyond the comfortable clothing we are accustomed to. It represents 40% of the total fibers produced in the world, and is responsible for creating myriad of jobs.<sup>i</sup> Cotton is one of the largest crops harvested in the United States, generating huge revenue, internationally traded, and ultimately produced into numerous products. Its footprint starts with the cottonseeds and continues to have an environmental impact for countless years, ultimately resulting in a significant amount of pollution. With the increasing knowledge in regards to the destructive processes in the harvesting, production, and useful life of cotton, it has become imperative that alternative methods of farming, production and product care be examined. With the current push towards a green movement, it is evident that there needs to be a shift in mindset to become more accountable for the toxic byproducts the industry is responsible for. Cotton is one of the most used fibers worldwide; therefore it is both socially and environmentally responsible to critically analyze the benefits and drawbacks of producing cotton traditionally versus organically. The cotton apparel industry is so multifaceted and the entire lifecycle of a single garment has a significant global impact. This choice goes far beyond the farming practices; it also influences business models and encourages them to embrace sustainability and promote awareness for an informed consumer.

The United States is the third largest producer of cotton behind China and India, producing \$25 billion in products and services annually.<sup>ii</sup> It has a positive impact on the economy and in 2007 was responsible for creating 400,000 jobs in the US alone.<sup>iii</sup> However, cotton farming, like the majority of agriculture farming, has a negative impact on various natural resources. Traditional cotton farming uses large amounts of pesticides, insecticides, and fertilizers. Twenty four percent of the insecticide sales and 11% of pesticide sales worldwide are used on cotton farms, despite the fact that cotton farms

represent only 2.4% of global croplands.<sup>iv</sup> The use of these toxic chemicals expose the workers to hazardous materials, threaten nearby ecosystems, and put neighboring waterways to a high risk of contamination. Equally, if not more significant, is the immense amount of water necessary for cotton farming. It is estimated that in order to produce one t-shirt and one pair of jeans (approximately 1kg of cotton), over 20,000 liters of water is expended.<sup>v</sup> Furthermore, the majority of water used to grow this crop comes from irrigation systems. With the use of any toxic substance, there is a constant risk of pollution, especially if the farming is not done responsibly. A prime example is the contamination and drying of the Aral Sea. The Aral Sea was once the fourth largest lake in the world and is now over 65% smaller than its original size. The sea is a human ecological disaster directly resulting from more than 30 years of heavy irrigation for cotton plants in the former Soviet Union. Not only has this substantial size reduction caused the death of many ecosystems, the contaminated runoff from the cotton farms has resulted in irreversible pollution of the remaining water. Ultimately and unfortunately, it is now too polluted for human or livestock consumption. Although this is an extreme case, potential hazards from traditional cotton farming must be taken into account.

(Figure 1)

In comparison to traditional farming, organically grown cotton is becoming more accepted and practiced. Organic cotton has been grown without the use of synthetic fertilizers, synthetic pesticides and is defoliated by natural means.<sup>vi</sup> Organic cotton farming eliminates the risk of soil and waterway contamination. It alleviates exposing workers to hazardous toxins, and promotes environmental health. It is important to note that the use of less toxic dyes is also an integral part of reducing the toxicity of a garment. However, organic cotton is not without its drawbacks. Currently, organic cotton makes up less than 1% of all cotton production and is sold at a premium making it difficult for the average person to afford. It is on average twice as expensive as its counterpart. With the growing awareness and increasing demand, the price can be expected to lower over time.<sup>vii</sup> (Figure 2)

Both traditional and organic cotton farming has yet to reach a level of sustainability. Regardless of the methods of farming, both rely heavily on the copious amount of water necessary for producing a valuable crop. Traditional farming is also

allowed to use genetically modified (GMO) seeds that, although have higher market costs, produces a larger crop, result in more growth, and require less natural resources to thrive. In contrast, organically farmed cotton uses the same amount of water, yet does not yield the same quantities of the crop, consequently requiring more water usage to gain an equal amount of cotton that traditional farmers produce. Thus, it makes the decision on the best farming practice from a production and quantity standpoint very difficult to determine.<sup>viii</sup>

After the cotton has left the farm, its lifecycle is still in the beginning phase. There is a current trend in the fashion industry to use organic and environmentally conscious fabrics. Some designers are taking sustainability and respect for the environment one step further by either creating their entire business around organic products, or incorporating them in their clothing lines. One company, Edun®, has constructed its entire organization around the cotton crop, ensuring that it has a positive environmental, human, and economic impact. The Mission of the company is “founded on the premise of trade as a means of building sustainable communities in developing countries to help foster economic growth rather than provide charity.” The company uses locally run factories and works with organic cotton farms. Although all their clothes are not 100% organic, they incorporate a large portion of organic fabrics into each collection. They look at the process from the ground up, making sure the cotton is grown organically, using fair trade and ethical business practices while ensuring a healthier working environment. This is combined with efforts to improve the economy in the countries its production is based, specifically Africa.<sup>ix</sup> Edun® serves as a model for other companies to follow and ideally creates a more sustainable industry. While contributing to the betterment of human rights practices and the conservation of natural resources, they are also capitalizing on the growing trend of ecofriendly clothing and are able to successfully charge a premium for their products. Edun® seems to be leading in the advancement of the industry by having a hand in every aspect of the products from initial cotton planting through the sale to the consumer. They are not alone in their efforts. Many existing companies are integrating sustainable garments as a portion of their existing collections. Others are building businesses that are entirely focused around

using organic and sustainable fabrics. The market for ecofriendly products is growing hand in hand with the awareness of their positive environmental impacts.

In contrast to the efforts of companies like Edun®, many are still entirely profit driven with little interest in the harmful environmental consequences. The term ‘fast fashion’ has been coined to address the increasing market of affordable and low quality merchandise. This constant need for consumption has resulted in wasteful behaviors once the product has reached the consumers. With ever changing trends, the shelf life of a t-shirt, for example, is often cut much shorter than its intended natural life. As a result, there has become constant need for new and increased apparel production. It is estimated that only 21% of clothes purchased in a year remains with the consumer<sup>x</sup>. Additionally, the average American discards 10 pounds of clothing annually adding to the 2.5 billion pounds of post consumer textile waste generated in a year<sup>xi</sup>. When clothing is no longer of value to the consumer it can either be disposed of or recycled. In the United States, textiles represented 4.7% of the municipal solid waste in 2007.<sup>xii</sup> The majority of the remaining clothing gets recycled by means of resale, exported in bulk to developing countries, or broken down into raw material for alternative purposes.<sup>xiii</sup>

Despite whether a t-shirt is constructed of 100% organic cotton in a toxin free and ethically sound process or if it is massed produced with toxic chemicals and pollutants, the post sale impacts can be equally detrimental to the environment. Every time a garment is washed, it uses an ample amount of energy. The majority of the energy is generated from tumble drying and washing on a hot water cycle. Throughout the entire lifecycle of a cotton t-shirt approximately 60% of the total energy used can be attributed to tumble drying. If tumble drying and ironing could be eliminated from a t-shirts lifecycle, together with a reduced washing temperature, it would lessen the t-shirts global climate change impact by roughly 50%. Attention also should be drawn to the types of detergents used in the washing process. Consequently, detergents high in phosphates, primarily powders and tablets, have a negative impact. Phosphates are known to support green algae growth, which can destroy some water-based organisms.<sup>xiv</sup> Using the Life Cycle Analysis, it has been calculated that:

“When a customer purchases a 250g cotton T-shirt they must also in effect purchase 1.7kg of fossil fuel to provide electricity for washing, drying and ironing. This will be released to air as 4kg of CO<sub>2</sub> emissions.

During the period of owning the T-shirt, 125g of detergent will be sent to waste water processing. In disposing of the T-shirt, if it is incinerated, it will be reduced to 3g ash and the fossil fuel will leave 10g ash but these are small components of a total of 450g of waste sent to landfill, which is made up of primarily mining waste generated during extraction of the fossil fuel.<sup>xv</sup>

It is impossible to ignore the impact consumers have on the environment. In order to alleviate the environmental stressors consumers are creating, it demands an overall shift in behaviors. It is obviously not a realistic short-term goal to completely eliminate ones carbon footprint, however awareness of the issues are the first step in resolving the crisis at hand. Various solutions have be proposed to lesson the environmental harm created by mass apparel consumption including; leasing clothing as opposed to purchasing, increased second hand shopping, and repairing damaged clothing instead of discarding and repurchasing. Ultimately, the goal should be to buy fewer, but more environmentally sustainable and well-made garments. Moreover, washing should be kept to a minimum on low temperatures using low phosphate to no phosphate biodegradable detergents, and air drying should replace machine drying when possible.<sup>xvi</sup> (Figure 3)

It is undeniable that there is no easy, clear-cut, answer between organic versus traditional cotton in the apparel industry. Cotton crop uses massive amounts of resources in just the beginning stages of its lifecycle regardless of the way it's grown. Its post farm life can be equally as wasteful and consequently very harmful to both people and the environment. Because apparel, specifically cotton, has an enormous global significance, it is imperative to examine the complete lifecycle. From an ethical standpoint, organic cotton is the best choice because it reduces the human exposure to toxins. From an environmental perspective it is difficult to conclude without a doubt what the best practice is, although in my opinion organic seems to slightly outweigh traditional farming. This conclusion is due to the potential risk to surrounding ecosystems that occurs with the use of toxic pesticides, insecticides, and fertilizers. With the clothing industry adjusting to the current state of the environment, it allows for these issues to be evaluated and considered by the public and the industry. However, it is evident that a change is necessary in the attitude of the consumer in order to make the largest impact. For it is in the post sale activities where most harm is done and on a very large scale.

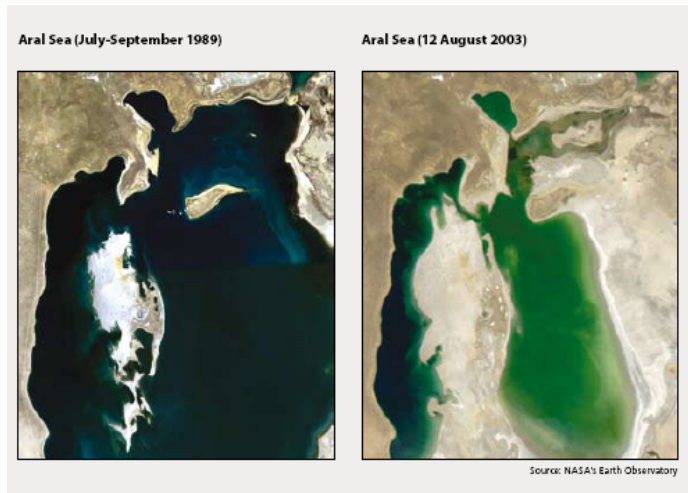


Figure 1.<sup>xvii</sup>

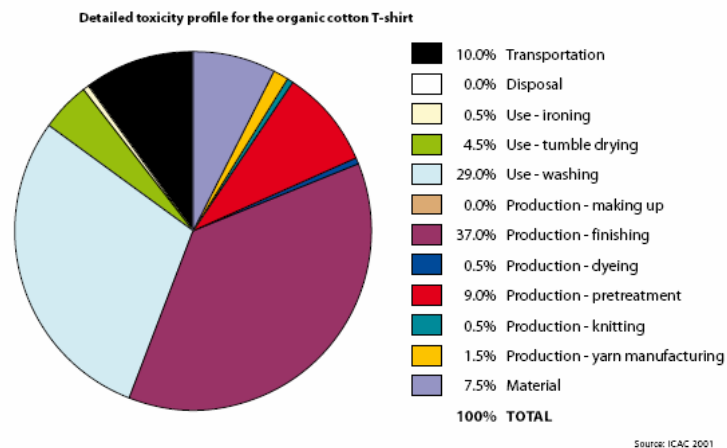


Figure 2.<sup>xviii</sup>

Primary energy profile T-shirt base case

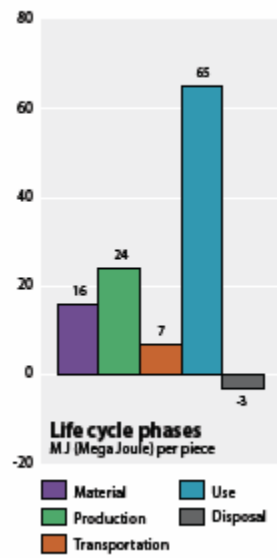


Figure 3.<sup>xix</sup>

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