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JOURNEY OF NATURALLY COLORED COTTONS: FROM FIELD TO FINAL PRODUCTS AND THEIR PRODUCT RANGES

(DOĞAL RENKLİ PAMUĞUN TARLADAN NİHAİ ÜRÜNLERE YOLCULUĞU VE ÜRÜN YELPAZESİ)

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ABSTRACT

Cotton varieties with white fibers have been using in textile industry after treating with many processes such as bleaching and dyeing. Synthetic chemical dyes are the most effective factors on the cost and also dangerous for the environment and the human health. For this reason, the researchers have started working on naturally pigmented cotton germplasm. This study aims to show the potential of both organically grown and naturally colored cotton fibers in relation to clothes, furniture and home decoration in the concept of "from field to final product" with contributions of plant biotechnology.

Keywords: Naturally colored cotton, Textile industry, Plant biotechnology, Synthetic chemical dyes

ÖZ

Beyaz lifli pamuk çeşitleri beyazlatma ve boyama gibi çok prosesli muamelelerden sonra tekstil endüstrisinde kullanılmaktadırlar. Sentetik kimyasal boyalar maliyet üzerine en etkili faktör olmalarının yanısıra, çevre ve insan sağlığı için de tehlikelidirler. Bu nedenle araştırmacılar doğal pigmentli pamuk germplazmı üzerinde çalışmaya başlamışlardır. Bu çalışmada, bitki biyoteknolojisinin de katkılarıyla "tarladan ürüne" konsepti içinde hem organik yetiştirilen, hem de doğal renklere sahip pamuk liflerinin, giysi, mobilya ve ev dekorasyonları alanlarındaki kullanım potansiyellerinin ortaya konması hedeflenmiştir.

Anahtar Kelimeler: *Doğal renkli pamuk, Tekstil endüstrisi, Bitki biyoteknolojisi, Sentetik kimyasal boyalar*

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1. INTRODUCTION

Cotton is a leading agricultural and industrial product of Turkey. Textile products made from cotton are both consumed in our country and exported to the other countries. Worldwide it is second among textile raw materials, coming after polyester fibers [1, 2]. Cotton fiber has a share for approximately 49 % of all fibers. It has many superior features compared to synthetic fibers, such as: natural production, good air permeability, hygroscopicity, good-washability, and hygienics [3-7]. After the development of the dye industry, productive and high quality cottons became the most important trade product of the last century because cotton can be dyed with popular colors. Unfortunately, ready-to-wear white cotton is processed with various chemicals, and synthetic dyes can be environmentally hazardous [3-5, 8].

In recent years, the factors such as the formation of disturbances in human ecology, pollution of environment by synthetic dyestuffs and dyeing cost have increased the awareness on environmental protection and consumer demand for environmentally friendly products. Along all the processes, those beginning from the harvesting of the naturally colored raw cotton until the production of the finished product, production techniques are not harmful to the environment and human health. Because naturally colored cottons do not required a dyeing process [4, 5, 9]. Therefore, researchers turned their attention to naturally colored cotton germplasm [5, 10-12]. Naturally colored cotton is of great importance for ecological textiles and in many countries, consumer demands began to turn towards "eco-textile" products [13]. These products have no risk to the environment or human health when produced, used, or disposed. Demand for environmentally friendly products has affected textile products, and interest in natural fiber has increased. Naturally colored cotton was not particularly noticed fifteen-twenty years ago, but it has since attracted the attention of researchers. Naturally colored cottons have mainly brown and green color pigments. Such cottons prevent problems of respiration, digestion, and caused by contact with skin in human ecology and also environmental pollution. In addition, natural-colored cotton creates new alternatives in the textile industry to obtain clothing, furnishing and household products. Naturally pigmented cottons which do not need a dyeing process and also grown organically are not detrimental to the ecology and they eliminate the costs of bleaching and dyeing and save on water and energy [8, 13-15] (Figure 1 and 2). In addition, these cottons present a relatively small niche for higher-priced specialty products in the international marketplace like USA, European and Japan [16].

Different sources indicate that colored cotton was cultivated in Central America and especially South America. The yields of naturally colored cotton were low and the fiber was too short to be machine spun. After 1982 has led to improvemets in yields and fiber quality, such as fineness, length, strength, color intensity and variations on kinds of genotypes. Commercially available naturally colored cotton with sufficent quality for spinning has appeard in the markets. Except traditional breeding methods such as crossing and mutation, the researchers on gene transferring systems to obtain new colour in cotton have been continued working [15].

From the years of 90's, the intensive researches have been done to determine adaptations of naturally colored cotton genotypes and their fiber quality characteristics in Aegean region of Turkey [5, 10, 11, 12]. "Nazilli Cotton Research Institute" developed a naturally light brown colored cotton variety called "Nazilli DT 15". As a result of our breeding studies

including field and laboratory experiments conducted since the 1990s, two naturally colored cotton varieties having fibers with light brown and brown pigments called “EMIREL” and “AKDEMIR” have been developed.

This study aims to show the potential of both organically grown and naturally colored cotton fibers in relation to clothes, furniture and home decoration in the concept of “from field to final product” with contributions of plant biotechnology by identifying the fiber color genes.

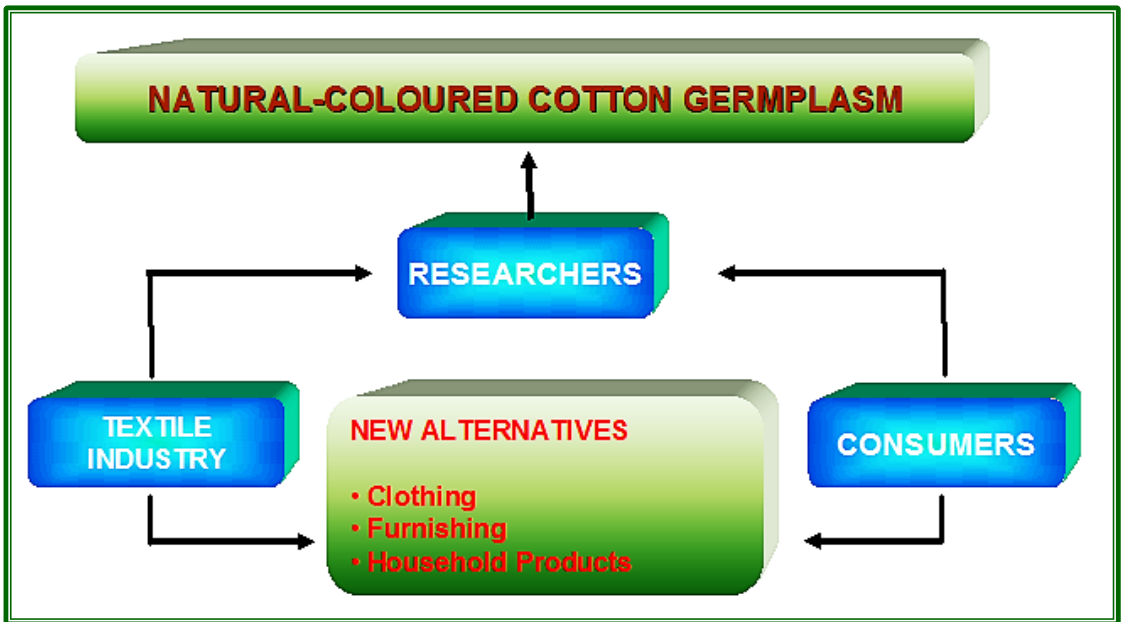

Figure 1. New alternatives for natural colored cottons

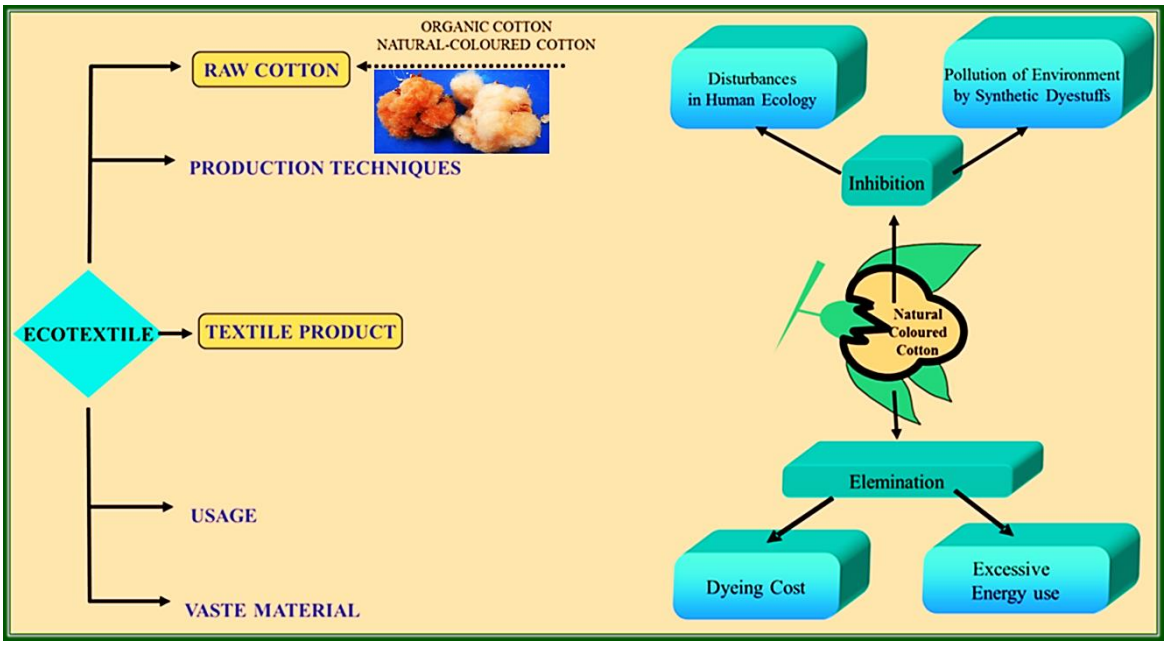

Figure 2. Flow diagram of ecotextile production from natural colored cottons and usage advantages of natural colored cottons

2. MATERIAL AND METHODS

Our breeding studies including field and laboratory experiments (agronomic traits, quality, textile and molecular genetics) were established since the 1990s and their color genes were determined by molecular genetic studies [14, 17].

3. RESULTS

This study aims to show potential of both organically grown and naturally colored cotton fibers related with clothes (e.g. handicrafts towards producing fabric and clothes, knitting, shirts, T-shirts, hosiery, towels, underwear, blankets and other types of clothes), furniture, and home decoration in the concept of "from field to final product" (Figure 3). Two naturally colored cotton varieties having fibers with light brown and brown pigments called "EMIREL" and "AKDEMIR" have been developed and registered by Variety Registration and Seed Certification Center in 2009. These varieties took placed in the National Variety List of Turkey.

Figure 3. Journey of naturally colored cottons: from field to final products and their product ranges

4. CONCLUSION

Extension of the product range will evolve with the growth of the niche market. They can be sold for a higher price. Naturally colored cottons have opportunities for improvement by using plant biotechnology including plant tissue culture techniques such as gene transferring and molecular genetic methods.

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