

Chapter 10

Cotton Textiles and Human Health Challenges

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ABSTRACT

Cotton is the most used natural fiber in the world for the production of textiles and apparel. Nowadays, there are three different possibilities for cotton growth in the world: production of conventional, organic, or genetically modified cotton. Their influence on human health, due to the application of pesticides, is discussed. The influence of the pesticides on the environment, which, in turns, affects the human health through the water, soil, and food chain, is also discussed. The preferable cotton sector is presented, giving a chance to the customers of cotton textiles and apparel, and to assess the positive influence of the existing initiatives in the cotton field on the human health and the environment.

INTRODUCTION

Cotton textiles are the most widely used textiles in the world. The production of cotton occupies the first place among the natural textile fibers and the second place among all textile fibers after the polyester fibers (Textile Exchange, 2017). It takes about half a year from planting the cotton seeds to harvesting the cotton. The cotton fibers have to be separated from the cotton seeds, so gins are applied after the harvest. During the process of separation, the thin wax coating of the cotton fibers that protects them from humidity is also removed. Finally, the raw cotton is pressed into bales, which are sent to the spinning mills to produce cotton yarns. Spinning is the first stage of the cotton textiles production chain, which will finish with garments (apparel, interior textiles, floor coverings, protective clothing, etc.)

The use of pesticides in cotton growth has attracted several studies, and both reports and research papers provide a lot of data for the effect of the cotton pesticide (over)use on the environment and human health. Depending on the year (weather and season) the pests and crop disease change, which require selection of the most effective pesticides. However, this is in most cases far beyond the abilities of the smallholders, and they frequently react with overuse of the known pesticides. Large-scale cotton farms are more

DOI: 10.4018/978-1-5225-7635-8.ch010

likely to adopt technologies and management that are environmentally friendly (Cameron, 2007). The observations in Northern Greece show that young farmers would care more about the pesticides related hazards and the use of personal protective equipment than the older farmers (Damalas and Hashemi, 2010). In any case, information, knowledge of new technologies is one of the ways to tackle the effects of pesticide use in cotton growing. The low level of knowledge is correlated with overuse of pesticides in small-scale farms. The use of the foliar application, for example, is more effective than the spraying (Kumar et al., 2012), but spraying continues to be the most widely used way for pesticide application in the cotton fields. The effect of GMO technologies on the use of cotton pesticides was remarkable at the beginning, but later the cotton pesticide use increased again and today in China is even higher than it was in 1997 (Jin et al., 2015).

The chapter aims to give the reader an overview on the relationship between the production of cotton crops for textiles and the use of pesticides in the cotton fields in the light of the human health and the effects on the environment, which, in turns, affect once again the human health. The differences in the three types of cotton, used in the textile and clothing industries nowadays: conventional, organic, and genetically modified cotton, are discussed. An overview of the cotton production in the world is presented regarding the production volume, leading cotton producers and leading exporting/importing countries, to underline the global problem of the environmental pollution due to cotton crop cultivation. The health problems, arising from the application of pesticides on the cotton fields are discussed for both occupational and non-occupational exposure. Special attention is given to the effect of cotton pesticides on children's health and production of cottonseeds oil. Environmental problems, related to wildlife and cattle poisoning, as well as water and soil poisoning due to the application of pesticides in cotton fields, are also considered. An analysis on the preferred cotton textile segment, namely Fair Trade Cotton, CmiA initiative, Better Cotton Initiative, Cleaner Cotton™, REEL Cotton and e³ Cotton is made. The last gives a chance to the reader, which is a customer of cotton textiles and apparel, to assess the possible influence of the nowadays initiatives in the cotton industry on the human health and the environment.

THE COTTON IN THE COTTON FIELDS

Three types of cotton are used nowadays for the production of cotton textiles and clothing:

- Non-Organic cotton: the conventional plant, grown since millenniums
- Organic cotton: cultivated nowadays without the application of pesticides
- Genetically modified cotton

Conventional (Non-Organic) Cotton

The man had grown cotton for about 5,000 years. Until the 1950s no hazardous chemicals were used, and soil treatment practices controlled the cotton pests. Agricultural management considered the pest cycles and used annual crop rotation. Cotton plants were grown at a sufficient distance to reduce the damage from the pest population. In fact, cotton growth was based on organic agriculture practices.

The development of the chemical industry after World War II has led to significant advances in the discovery of neurotoxic chemicals. DDT was the first chemical applied to limit the pests in the cotton fields. The growth of the pesticides caused cotton farmers to change their agricultural management

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