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# Some Considerations on Agrotextiles Use in Future Scenery

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## Introduction

The issue of sustainability is central to any company that works to ensure a future for its shareholders, customers, employees and their children and this is even more true for those operating in the agri-food sector.

Having healthy foodstuffs sufficient to meet the needs of an enormously growing world population cannot ignore the search for harmony between a complex system such as that of contemporary society and the need for conservation of acceptable environmental conditions.

The analysis of development trends in the agricultural sector highlights some main issues and problems to be addressed in the immediate future:

- a) the constant demographic increase requires
  - i. the yields of agricultural land to be multiplied by a significant factor
  - ii. the crops for subsequent distribution to be guaranteed
  - iii. the possible spread of epidemics of new viruses and bacteria to be controlled
- b) the great demand for food brings with it that of an equally important quantity of water especially in places where water resources are scarce
- c) the globalization of markets and the ease of transport of goods over long and very long distances greatly increases the probability of a contamination of viruses, bacteria, insects and animal species between distant territories
- d) the trend towards climate change exposes crops to increasingly real risks and requires protection from atmospheric agents
- e) the increasing sensitivity to environmental aspects in developed countries and to people's health favors organic crops, and for this reason an almost zero use of pesticides is required
- f) new trends in hi-tech agriculture integrated with innovative approaches to the control of crops and the means to ensure them require knowledge of the interactions between plants, systems and components of agricultural activity [1-5].

## Choices to Make

Those who implement policies fully aware of the trends described above by setting up and carrying out their business to develop products, systems and methodologies that are friendly to plants and the environment in which they are grown, will be able to play an important role in the future of agricultural supplies.

For example, agro-textiles will have to protect crops, adapting to the needs of each of them and the characteristics of the environment in which they are located, whether it is made up of greenhouses and artificially confined areas, or open fields. The aim must be to provide crops with the most favorable microclimate for growth with minimal use of chemical treatments, resulting in healthy and safe foods with almost no impact on the environment. At the same time it will be necessary to guarantee high durability and resistance to agro-textiles together with their complete recyclability to reach a full sustainability [6-8].

To this purpose, research and development constitute a fundamental element to improve the knowledge, characteristics and performance of the agro-textiles. The market winner will be the one who

- a) will have its own research laboratory, equipped with advanced instruments purposely designed to carry out tests there and in the open field, tailored to the needs of its production
- b) will make a group of researchers grow internally by developing knowledge and expertise in the reference sectors
- c) will collaborate with universities and research institutes to develop (from the concept to the practical application in the field) innovative ideas that solve the problems related to the production and use of agro-textiles
- d) organize and carry out complex research projects on topics that broaden the uses of products and specialize optimal solutions
- e) will propose particular experimental campaigns among operators in the sector to detect the actual operating conditions and measure the effectiveness of the adopted solutions.

## The Predictable Main Lines of R&D

The characterization of agro-textiles will pass through a performance analysis on several aspects:

- a) air permeability of nets
- b) behavior of nets when exposed to rain
- c) measurement of the shading coefficient of the nets
- d) evaluation of the stress / elongation curve for nets even after controlled exposure to atmospheric agents (aging test)
- e) influence of nets on the microclimate of protected crops (temperature control, quality and quantity of sunlight, control of



water requirements)

f) single crop based requirements for agro-textiles

Research activities aimed at developing innovative and performing products are linked to:

a) the definition of properties with a strong link to product performance

b) measurement with full traceability to the conditions with well-designed instruments made for the needs of agro-textiles

c) demonstration of the efficiency and engineering of the new approaches

d) multi-purpose performance definition

e) collaborations with well-known players (universities, research institutes, partner companies)

### Three Hot Topics

#### Interaction of networks with light

The nets exposed outdoor to protect crops from interact with it. The light that filters through the net is modified by it in its characteristics linked to its direction, diffusion and spectral content.

Understanding how to make diffused light prevail, of a particular wavelengths or some wavelengths (colors), will allow to influence in one way or another the growth of plants and, sometimes, the action of the insects that guarantees their reproduction.

#### Microclimatic effects induced by the presence of mesh roofs

Under the protective nets, temperature and humidity become different from those of the surrounding environment and this affects the health of the plants, the productivity of the crops, the water consumption of the irrigation systems.

Knowing the characteristics of nets, will make it possible to guarantee the optimal values recognized by agronomists and different for each application because they relate to different crops and places of production.

#### Water savings resulting from the use of protective nets

The reduced amount of radiant energy that reaches the shaded crops produces below them conditions of temperature and humidity able to reduce the levels of evapotranspiration and, therefore, the overall water requirement. The measure of savings linked to individual crops and types of networks is fundamental for the conservation of the water resource and for a correct design of protection and irrigation systems.

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