

## Agro-Textiles: A New Venture of Textiles in Agriculture

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### Introduction

Agriculture in India is primary source of livelihood, which is employed 58 per cent of the Indian work force and can never be underestimated. With the increasing population effects in India will increase demand for a good quality, quantity and nutritious food. So, it is necessary to increase the yield and quality of agro-products. But it is not possible to meet fully with the traditionally adopted ways of using pesticides and herbicides. Today, agriculture and horticulture has realized the need of tomorrow and opting for various technologies to get higher overall yield and quality agro-products. For that purpose, controlled environment practices play key role in maintaining production pace and quality, which is possible with use of agro-textiles materials in various agricultural activities. Agro-textiles or Agro-tex are the textile materials which are either woven, knitted or nonwoven technical textiles which are primarily employed to protect the plant and animals from environmental factors and to enhance the yield of the crops. Agro-textiles are nothing but different textile material used in agriculture and allied sectors like floriculture, forestry, landscape gardening, horticulture, fishing, animal husbandry and aquaculture.



## Market demand

Globally, the agro-tech market is estimated to grow at a Compound Annual Growth Rate (CAGR) of 4.3 per cent from 2022 to 2027. The force for this market includes the expanding efforts to improve crop quality, growing product applications such as bird protection net, plant cover, sunscreen, ground cover, root ball net, insect mesh and also due to the expansion of the agricultural and textile industry. Additionally, the rising use of latest textile products in the fabrication of agro-textiles is expected to be a major trend for the growth in this sector. The key geographical areas in agro-tex sector include North America, Latin America, the Middle East and Africa, Europe, and the Asia Pacific. Some of the leading companies in the sector include Beaulieu Technical Textiles, Belton Industries, Inc., B&V Agro Irrigation Co., Hy-Tex (U.K.) Ltd., and Diatex.

## Properties required for Agro-textile products

- **Resistant to solar radiation:** Usually agro-textiles are spread over the agricultural field as after planting or sowing. In such kind of situation the textile material should withstand the solar radiation with changing environmental temperature without degrading or losing its property.
- **Resistance to ultraviolet radiation:** Textile materials which are used in outdoors to protect crop or animals from UV radiation should have excellent resistance to it. Polyester is resistant to solar radiation but under UV radiation conditions, its molecules tend to degrade. So, UV stabilizers should be added or treated to the textile material to be used as a UV radiation protector for plant and animals.
- **Bio-degradability:** Presently, it is super most important to protect soil from desertification and pollution, so the textile material which is used in agricultural activities should be able to degrade after its service or after certain duration of its application. Natural fibres like cotton, wool, jute, hemp, sun hemp, sisal, dhaincha, etc. are degradable under specified environmental conditions, which make them less serviceable than the synthetic fibres.
- **High potential to retain water:** The textile material used above the soil should hold or retain the water from evaporating, thus keeping the plant hydrated for a longer duration. Usually, nonwoven textile materials are preferred in these kinds of applications.

- **Resistance to micro-organisms and insects:** Agro-textiles are always open to attack by insects and microorganisms when employed in the agricultural field. So, such agro-textile should not provide a base for microbial growth and not be attacked by insects.
- **Protection from environment:** Agro-textiles should have sufficient potential to resist wind, rain and other environmental conditions, mainly to protect plants or crops under such situations.
- **Resistance to chemicals:** Agro-textiles may be prone to chemical attacks when used in agricultural fields. Pesticides, herbicides or other fertilizers may harm the textile material hence, it should possess good resistance to chemicals.

### Different forms of agro-textiles

Agro-textiles can be of different forms which are used in agricultural activities like woven fabric, knitted fabric, nonwoven fabric, coated composites, sheets, nets, and many. These are mainly fabricated by weaving, knitting, nonwoven and braiding techniques of textile manufacturing.



### Applications of agro-textiles

There are numerous forms and products of agro-text are available in the market and the selection of suitable one depends on the application or use of that textile in agriculture or other fields is given in Table 1.

Table 1. Different agro-textile products and their application in agriculture and allied fields

Product	Crop produce	Floriculture	Horticulture	Post harvesting	Animal husbandry	Fishing
<b>Knitted nets</b>						
Shading	✓	✓	✓			
Bird protection	✓	✓	✓			
Wind shields		✓	✓			
Anti-hail		✓	✓			
Harvesting			✓			
Fishing						✓
Mulching					✓	
Packaging				✓		✓
Support nets	✓	✓	✓			
<b>Nonwoven fabrics</b>						
Mulch mat	✓	✓	✓			
Cattle shed underlay					✓	
Protective clothing	✓	✓	✓	✓	✓	
<b>Woven fabrics</b>						
Packing sacks				✓		
Sunscreens	✓	✓	✓			
Protective clothing	✓	✓	✓	✓	✓	
<b>Plastic sheets</b>						
Ground covers	✓	✓	✓	✓	✓	
Greenhouse films		✓	✓			



Some of the applications of agro textiles are detailed below:

- **Sunscreen nets**-it is to protect crops in greenhouses and fields from intense solar and UV radiations to yield good quality of crop. These nets will allow air to pass easy and does not build up heat under the screen.
- **Bird protection nets**- these are knitted monofilament nets offers protection to fruits, seeds and crops damage from birds. These are mainly used in horticulture plantations.
- **Plant net**-Fruits that are close to the ground can be protected from the moist soil by growing using vertical or tier-set netting, which will reduce the number of rotting fruit.
- **Ground cover**-Ground cover is a highly adaptable horticultural and landscaping fabric used for long-term weed management, moisture retention, and separation. It is primarily utilized in landscaped settings. It suppresses weeds and conserves ground moisture while permitting roots to breathe and water, air, and nutrients to pass through. This promotes more rapid and uniform plant growth while maintaining higher soil temperatures.
- **Windshield**-Windshields are utilized in agriculture to give protection to fruit crops from the wind and stop plant damage. Additionally, it prevents the wind from cooling the plants.
- **Root ball net**-these are used for safe and speedy growth of young plants without damaging the young roots when they are dug up, transported and replanted. Usually, the root ball are wrapped in a cloth. When the plants are transplanted, the net do no have to be removed as roots can easily protrude of the net.
- **Mulch mat**- Mulch mats are laid in horticulture fields to prevent the growth of weeds. It covers the ground, obstructing light and halting weed competition around main crops. Additionally, it reduces the demand for the herbicides for weed control. For this application, needle-punched non-woven and black plastic sheet are employed. Mulch mats come in both biodegradable and non-biodegradable forms.
- **Tape nets**-These are flat, knitted, which are available in different range of densities for diminishing the sunlight intensity, fruit support, shade, and animal protection.

- **Cherry covers-** these offers protection all through the season from rain, hail, frost and wind. The fabric is highly durable with a high level of UV stabilizers, hence it will last for many years, and its softness makes it very comfortable to handle.
- **Fishing nets-** these are used for fish farming and commercial fishing. They are mainly made of nylon or High Density Polyethylene (HDPE).



## Conclusion

Agro-textiles products are commonly used in agriculture, horticulture, and animal husbandry to assist in post-harvest processing and quality maintenance. It is going to be best adaptation strategy tool to reduce the adverse effects of environmental and extreme climatic conditions on the healthy farming culture. Agro-textiles technology has achieved success all over the world by protecting crops from environmental factors while boosting agricultural production. Unique properties of the blend of Agro-textiles sector products whose cost is cheaper than that of weedicides, pesticides, and chemical herbicides, which will cut off additional expenditure in management and reduce harmful effect on soil. Agro-textiles offers multiple ideas and solutions to the challenges faced by agriculture sector. Therefore, awareness and entrepreneurialism in agro-textiles are need of the hour to promote our country's economy. Future agriculture needs to focus on this new venture of textiles interference to advance agro-tech sector's production.