Techinical Textiles In Agriculture

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Abstract

Technical textiles is a keyword in this world of innovation, modernisation, infrastructure development, irrigation, agriculture, fishnets and may be many more. The application areas of technical textiles are vast. Among the diverse field of application of technical textiles, Agrotextiles is one of the sector which is gaining boom in the world technical textile market. Development of technical textiles has opened up the avenues for Agriculture, Horticulture, Aquaculture and Forestry. This paper discusses about the overall status of technical textiles and also highlights the Agrotextiles applications and its scope for growth in near future.

Keywords: Technical textiles, Agrotextiles, Agriculture, Horticulture.

1. Introduction

India and China constitute over 40% population of the globe and application of technical textiles in this region will increase with a very high rate. The developed countries are much ahead of India with respect to manufacture and consumption of technical textiles. They are now finding a great potential to exploit the Asian market and hence as per the industrial analysis the field of technical textiles is considered to be quite promising for the growth. Hence, those involved in textile business dealing with apparels, thinking of diversification should look at this segment of technical textiles with a great promise (Ref. No. 1). The application areas of technical textiles are in the below fig. 1 (Ref. No. 2).

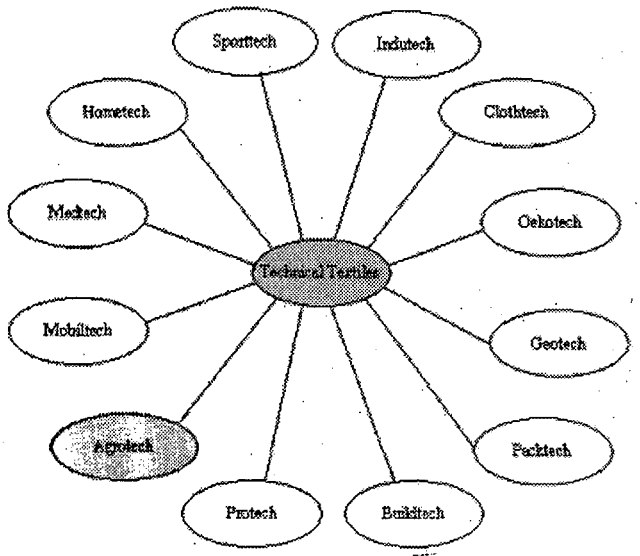

Fig. 1 : Application Areas of Technical Textiles

The market size of the technical textiles reported in the year 2003-04 was Rs. 201,286/- million which is expected to be increase almost by 100% making it to Rs. 420,060/- million. Among the various segments of technical textiles, the present paper is focusing on "Agrotech" (Ref. No. 1).

As far as US and Japan are concerned; more than 35% of the textile industrial production is in terms of technical textiles. For China it is over 19% and in India it is just 5% because of the fact that we have only a very few players in this field. Hence, those involved in textile business thinking of adding new line to their business should look at this technical textile and surely have a very high growth prospect in their business[1].

Application Area	2001-02	2003-04	2007-08
MOBILTECH	1016.00	1141.50	1279.25
MEDITECH	1213.42	1528.07	2222.29
SPORTTECH	1307.25	1528.50	2033.50
PROTECH	192.50	210.25	263.00
INDUTECH	1880.00	2174.00	2950.00
GEOTECH	100.50	300.00	1000.00
PACKTECH	3578.68	4602.00	7359.28
OEKOTECH	105.00	150.00	280.00
AGROTECH	292.00	340.50	552.70
CLOTHTECH	5320.00	6197.00	8398.00
BUILDTECH	1626.10	1821.58	2308.00
HOMETECH	9803.86	11425.00	16015.00
TOTAL	**26434.81**	**31418.40**	**44662.38**

Table 1: Indian Market Size and Potential of Technical Textiles (Rupees in Crores)

Table 1 shows the market survey of Tata Economical Consultancy Services and the study shows a significant growth of market size and potential of technical textiles. India having strong down stream activities like weaving and knitting, the thrust to produce indigenously synthetic technical yarns instead of importing the same opens the avenue for entrepreneurs to go for manufacturing of technical textiles. This is an opportunity for the country's contribution to the growing world market of technical textiles and also has a market share in the world trade[2].

Global market volume of technical textiles varies depending on the type of end-use applications. Higher value products exist at the upper end of price level at lower volumes and these are used in much specialised products where the performance, not the price, is the determining factor as shown in fig 2 [3].

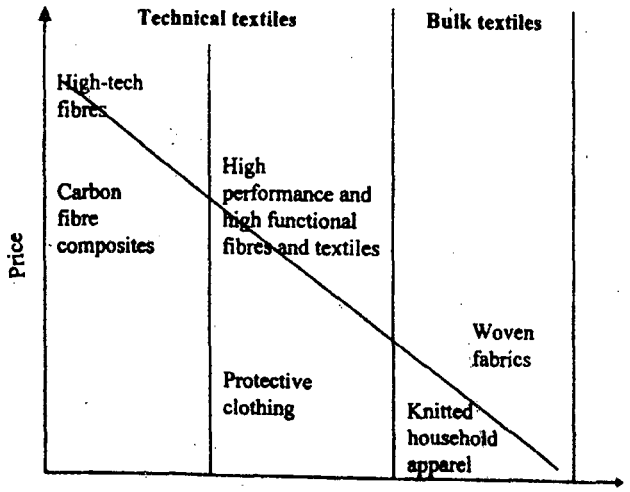

Fig. 2 : Global Market Volume vs. Price for Textile Products
Source: Ref. 3

2. Agrotech or Agrotextiles

Agrotextiles itself explains the meaning of the term, the use of textile materials in the field of agriculture. As we know that "Agriculture" is the backbone of our country, but even today farmers face a lot of problems, especially regarding yield and quality of the products. So, it is necessary to increase the yield and quality of agro-products, which will give optimum profit to the farmers. Today, agriculture and horticulture have realised the need of tomorrow and opting for various technologies to get higher overall yield, quality and tasty agro-products[4]. Agrotextiles are also playing a major role in protecting farmers from harmful pesticides used in farming[5]. Therefore, the use of textile materials in agriculture field can give multidimensional views and solutions to the problems being faced by agro industry[4].

3. Fibres Used in Maufacturing of Agrotextile Products

Agrotextile products are manufactured using natural as well as man-made fibres[5]. Natural fibres give the advantage of biodegradation but have low service life when compared to synthetic fibres[4]. Fibres used in agrotextile products are as follows[5]:

- Jute
- Wool
- Nylon
- Polyester
- Polyethylene
- Polyolefin
- Polypropylene, etc.

Among all the fibres mentioned above polyolefin is extensively used due to its good properties and wide applications. Among all natural fibres jute and wool are used because they serve the purpose and also after some years they degrade and act as natural fertilisers[5].

4. Properties Required for Agrotextile Products

The properties required for agrotextile products depend on their end-use or application. In general, the properties required for agrotextile products are:

- Resistance to weather
- Resistance to micro-organisms[4,5]
- Biodegradability[4]
- High potential to retain water[4].
- Protection Property[4]
- Long service life[4]
- Stable construction[5]
- Light weight[5]

5. Techniques Used for Producing Agrotextile Products

Different techniques of fabric production can be used to produce agrotextiles; each method offers specific advantages for particular product. The techniques are as follows:

- Weaving
- Knitting
- Non-woven[4]

6. Applications of Agrotextiles

Agrotextiles can be used in agriculture, horticulture and can even be used as protective textiles to protect the farmers from harmful pesticides[5]. Wide varieties of agrotextile products are available in the market and its selection depends on the end-use. Selection of agrotextiles was greatly influenced by the geographical location. At some places agrotextiles are used to protect the plants from extreme cold while at some places they are expected to protect plants from excessive sunlight. Therefore, the selection of agrotextiles is done as per the location and the desired protection required from the external agencies. With the use of high quality agrotextiles, yield and quality of agro products can be improved[4].

Some of the applications of agrotextiles are as follows[4,5]:

- Sunscreens
- Insect meshes
- Root ball nets
- Bird protection nets
- Plant nets
- Windshield
- Ground cover
- Animal husbandry
- Agro protective garments
- Packing materials for agricultural products, etc.

6.1 Sunscreens

The sunscreens are mainly used to protect fields from the intense solar radiation for healthy plant growth and good harvest (e.g. for the culture of mushrooms[5]). Sunscreens are available with mesh construction and are used to control sunshine and amount of shade required. Sunscreen nets allow the air to flow freely and therefore they don't build up excess heat under the screen[4]

6.2 Insect Meshes

Insect meshes are used to protect plants from insect attack without using any insecticides. Insect meshes are made by woven or knitting techniques. Polyethylene monofilaments are used for making these insect meshes[4]. These insect meshes wrap around the plants which are to be protected from insects as shown in the below fig 3.

Fig. 3 : Insect Meshes
Source: Ref. 6

These insect meshes should be light in weight otherwise they suppress the growth of the plants and even they can destroy the shape of the plant. Insect meshes can also be placed over the openings of green houses to prevent pollinating insects such as bumblebees from escaping[4].

6.3 Root Ball Nets

Root ball nets are used to protect the root system, which is extremely important for safe and speedy growing of young plants. Generally, during dug up, transplantation or replantation, the root system gets damaged[4]. In order to avoid this damage the root system is wrapped with root ball nets. This facilitates transplantation and accelerates the resumption of growth[5]. When the plants are transplanted, there is no need to remove the nets, since the roots can protrude through the nets[4].

6.4 Bird Protection Nets

In olden days farmers used to fire shots extensively in order to keep the birds away from the crops and fruits etc, but that required continuous monitoring[5]. But now-a-days bird protection nets are available, which offer effective passive protection of feeds, crops and fruits against damage caused by birds and a variety of pests[4]. These are of open knitted nets and are available in a wide range[4,5]. These nets will not damage the plants because of their light weight. The nets are economical and easy to install[5]. The special open structure repel birds, provides minimal shading and excellent air circulation to the plants[4].

6.5 Plant Nets

Plant nets are used to keep the fruits, which grow close to the damp soil by allowing them to grow through vertical or tiered nets in order to keep the amount of decayed fruit to a minimum. These nets are made from polyolefin and are available in 30-40 gsm. These nets are mainly used for the tomato plants[4,5].

6.6 Windshield

Windshields are used in farming to protect fruit plantations from wind and to prevent damage to plants. It also prevents plants being cooled by the wind[4].

6.7 Ground Cover

Ground cover is an extremely versatile landscaping and horticultural fabric for long-term weed control, moisture conservation and separation. It is mainly used in planted areas. It provides weed suppression and ground moisture conservation but at the same time it allows the roots to breathe water and air and also allows the nutrients to permeate through it. This maintains higher soil temperatures and promotes more rapid and even plant growth. It has a high degree of UV stabiliser added to protect it from the harmful effects of exposure to sunlight. Ground covers can reduce the costs and minimise undesirable herbicide use[4]. Needle punched non-woven fabric is mainly used for the purpose of weed control applications

6.8 Animal Husbandry

The animal husbandry is another important application where textiles can be used for animal related applications, which is indirectly related with this field. Different colour belts, which are made up of PET and nylon are used for animal's identification. Textiles are also used for filtering milk from animals like cows etc, is called an automatic milking system. Even textile materials are used to reduce the mud on cattle paths and trails[5].

6.9 Agro Protective Garments

During farming, there are chances that harmful pesticides will penetrate through clothing and come in contact with the skin of farmers and this leads to severe health problems. In order to overcome this problem the farmers must use agro protective garments during farming as shown in below fig 4. The agro protective garments must be light in weight, cheaper, protect from harmful pesticides and have good breathability and washability. The new technology agro protective garments not only protect the farmer from harmful pesticides but also keep him comfortable[5].

6.10 Packing Materials for Agricultural Products

Nets can be used for packing of farm products for many end-uses. It includes:

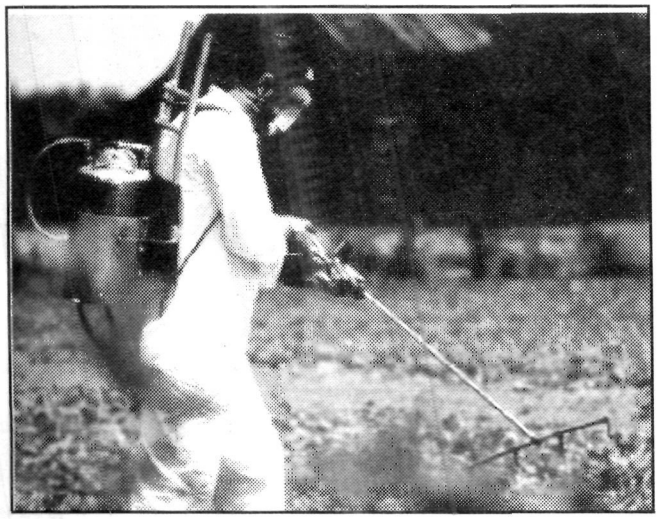

Fig. 4 : Protective Garment
Source: Ref. 7

- Packing sacks for vegetables
- Tubular packing
- Wrappers for Christmas trees

Net structures are preferred because of their high strength, low weight, air permeability, ease of handling and cheapness etc[4].

7. Conclusion

It is clear that all textile scientists and technologists must keep abreast of the latest developments that take place in the field of agrotextiles. The frontiers of the art of the possible are continually expanding and imaginative research and development will be needed to convert ideas into reality. In this way, the undoubted aesthetic and functional performance of textiles can be enhanced to excite the imagination of the consumer and extend the markets and end-uses for textile materials.

8. References

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