Agrotextiles
A growing landscape with huge potential

Geoff Fisher
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Introduction

In their simplest form, textiles have been used in agriculture for thousands of years to protect plants – as well as animals – against extreme climatic conditions. For instance, they offer shade, help to maintain soil humidity and increase soil temperature, and can also protect crops from insects and weeds.

“Agrotextiles” is a relatively recent term, generally having been used since the 1980s. It encompasses woven, knitted and nonwoven fabrics and other textiles used in agriculture, forestry, horticulture, floriculture (flower farming) and landscape gardening, as well as in fishing and aquaculture (fish farming). These include fabrics for livestock protection, shading, weed and insect control, and for extending the growing season of plants and crops. The most common agricultural applications are covers for greenhouses and crop protection products.

In principle, the use of agrotextiles generally leads to agricultural products with enhanced quality, higher yields and less damage. They can also help farmers decrease their use of herbicides and pesticides, thereby reducing environmental pollution, as well as input costs.

For most end-use agrotextiles require suitable tensile strength and good permeability characteristics with no significant deterioration under the influence of climatic extremes. The properties of agrotextiles are dependent on the fibres from which they are produced and on the type and conditions of their manufacture.

However, advanced technical agrotextile products have become commonplace only in the past two or three decades, with fibrous materials, particularly synthetics, beginning to replace plastics in certain applications. In particular, the use of nonwovens, especially spunbond fabrics, is increasing.

Growth drivers

The main growth driver for the agrotextile sector is the rise in global population, which is increasing the demand for more and better quality food grown in soil that is often compromised.

Population growth

The United Nation’s Food and Agricultural Organization (FAO) predicts that global food production will have to increase by 70% from its current level to feed a population of 9.1bn by 2050 (Figure 1), of which Asia will account for 5.3bn and Africa 1.8bn – even though by this time, global population growth rates will have fallen to less than 0.5% from a peak of around 2.2% in the mid-1960s (Figure 2).

This means an additional 1bn tonnes of cereals and 200m tonnes of meat will need to be produced annually by 2050, when it is estimated that 80% of the world’s population will reside in urban areas. “In order to intensify production by that
Agrotech: A growing landscape with huge potential

Figure 1: World population: 1950-2050

Source: US Census Bureau, International Data Base, December 2009 Update

Much of our finite earth, immense effort will have to go into new, better and more intensive ways of producing our food,” stated FAO director-general Jacques Brouillet.

Moreover, feeding in excess of 9bn people will require the expansion of irrigated areas as well as the wider use of management practices to improve the efficiency of water use, such as water “harvesting” techniques and conservation of soil moisture.

This also means an estimated 109m ha of new land (about 20% more land than is represented by Brazil) will be needed to grow enough food to feed the global population of 2050, assuming traditional farming practices continue as they are carried out today. At present, more than 80% of the land that is suitable for raising crops worldwide is already in use. Historically, some 15% of that area has been laid waste by poor management practices.

Based purely on these estimates for population growth and food demand, the long-term outlook for agrotech: appears healthy. However, their utilisation thus far has been modest considering the size of the current and potential area dedicated to crop growing and the substantial economic advantages that can be gained from using such materials in agriculture.

In many industrialised countries, the total land area dedicated to agriculture and horticulture is declining, which is placing huge pressures on governments and economies to feed the ever-expanding global population. Fortunately, better use
Agrotecstiles market

Agrotecstiles is one of the smaller categories of technical textiles, with consumption accounting for around 8.2% by volume and 6.4% by value of the 23.8m-tonnes global technical textiles market valued at US$126bn in 2010. However, this sector is among those with the strongest growth predictions based on the projected increase in global population and the demand for higher quality food.

According to a 1997 report prepared for trade fair organisers Messe Frankfurt by David Rigby Associates (DRA) entitled “The World Technical Textiles Industry and its Markets: Prospects to 2005”, global consumption of fibres and yarns for agrotectiles was forecast at 2.04m tonnes worth US$4.94bn in 2005, a compound annual average growth rate (CAGR) of 3.3% in volume terms and 3.6% in value (Table 1, Table 2).

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<td>Fabrics¹</td>
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¹ woven, knitted, braided
Types of agrotextiles

The two main functions of agrotextiles are to:

- protect;
- increase productivity.

Agrotextiles are widely used to protect plants, such as vegetables, fruit, crops, flowers and trees, as well as animals, from insects, other animals and birds, other plants, i.e. weeds, and extreme climate, e.g. sun, heat, cold, wind, hail, etc.

Agrotextiles can have a maintenance function: they help to conserve moisture and increase soil temperature, which is especially important in early spring in temperate climates. Large-scale applications include string, ropes and packaging bags and nets for harvesting certain crops.

There are many different types of agrotextiles, including:

- nets and meshes;
- sheets;
- woven fabrics;
- nonwoven fabrics;
- coated fabrics.

Agrotextile fabrics can be laid directly on the crop or installed in the form of mini-tunnels or on greenhouse structures of various heights, depending on the crop being cultivated.

Fabrics, either woven or nonwoven, are widely used where tensile strength and dimensional stability are a prerequisite.

Warp knitting

Warp knitting technology offers a range of possibilities for producing nets, in particular. Warp knitted fabrics can:

- be elastic or dimensionally stable;
- have open or dense constructions;
- have fine or coarse structures.

They can be produced as flat, tubular or three-dimensional textiles in widths of 6 metres and more. Besides the exceptional width of these nets, their design can be varied immensely, with the knitting process and construction used to make individual products that are adapted to specific needs. Further, warp knitting machines can produce single or multiple webs, which reduces costly making-up processes.
Applications

Ground cover/landscaping covers

Ground covers are used to insulate against cold and prevent weed growth. They also help to maintain optimal soil temperatures for rapid plant growth. Examples include spunbond nonwovens, biodegradable needlepunched nonwovens and coated fabrics.

In horticultural applications, ground or crop covers offer a protective climate barrier, temperature and moisture management, and excellent water permeability. They allow water vapour to pass through the material, thereby avoiding water droplets on the crops. When used as a lawn covering, they provide a unique microclimate, regulated air supply and humidity, high water and light permeability, and protection of freshly sown seeds.

Ground or crop covers are spread out on cultivated fields usually immediately after sowing or planting. This can be done either manually or semi-mechanically using an unwinding (roller) device on a tractor.

The covers are spread out broadly to allow room for the plants to grow to their full height, but without causing any crease in the material. The edges of the covers can be weighed down with soil or small bags filled with soil or pebbles.

Alternatively, the covers can be installed in the form of mini-tunnels on hoops or on greenhouse structures of varying heights, depending on the type of crop being cultivated.

Where plants, such as strawberries, require pollination, the covers are removed for a certain period while the flowers are in bloom. Following pollination, the plants are covered up again. Ideally, crop covers should be removed when the weather is dry and calm.

Spraying of polypropylene-based covering materials with pesticides should generally be avoided, as the chemicals can have a detrimental effect on the Ultra-violet (UV) stabiliser incorporated in such materials.

According to Fiberweb (page 57), market growth for crop covers is strongest in Europe, where frost protection is necessary during the cold season and transport costs are high. This contrasts with the US, for example, where the most important growing areas generally have better climatic conditions.

Meanwhile, Freudenberg (page 74) reports a trend toward heavier products for specialised applications, such as coverings for strawberries and early potato production. The company notes that when the horticulture market started using coverings made from nonwovens, it was focused on lightweight materials to enhance crops and give frost protection in the spring. However, over recent years, require-
Bonar

*Bonar Technical Fabrics NV, Industriestraat 39, B-9240 Zele, Belgium. Tel: +32 52 457411. Fax: +32 52 445604. Email: info@bonartf.com Web: www.bonartf.com*

Part of the Low & Bonar group of high performance technical textile producers, Bonar (formerly Bonar Technical Fabrics) is a producer and supplier of fibre and technical fabrics (woven and nonwoven) to a wide range of end-markets, including civil engineering (geotextiles), agriculture (agrotextiles), industrial applications (industrial fabrics) and the construction industry (construction fibres).

The company offers a wide range of agrotextiles with different applications in the fields of horticulture, agriculture and landscaping, including screens, ground covers, fruit fabrics, mushroom fabrics and crop covers. It offers solutions in the field of climate control in the greenhouse, for water distribution, weed control, fruit protection, moving of compost, energy saving, etc.

In April 2012, Bonar Technical Fabrics and Colbond were merged as part of organisational changes introduced by Low & Bonar, which are aimed at “accelerating growth and putting the group on a clear path to globalisation”. The portfolios of Bonar Technical Fabrics and Colbond are complementary. The company name was changed to Bonar with effect from 1 January 2012.

**Vegetables**

For vegetables grown under glass, such as tomatoes and peppers, light is of crucial importance. A high light transmission and energy saving properties are combined in energy saving screens.

PhormiTex Clear, PhormiTex Bright and PhormiTex Super screens are flame retardant, energy saving and highly translucent. PhormiTex Clear also enhances air humidity and is therefore conducive to a good start of cultivation. PhormiTex Bright is moisture regulating owing to a refined acrylic thread mesh. PhormiTex Super is also moisture regulating; owing to its diffuse tapes, this product spreads direct incoming light into different directions.

With their open weave, open sun shading screens provide optimum ventilation to give a cooler greenhouse climate, especially on hot summer days. Phormium open shading fabrics allow shading and energy saving simultaneously to different degrees (however, the emphasis is on shading). These fabrics are particularly used in double screen systems, especially in the floriculture and pot plant cultivation sectors.

**Floriculture**

Different types of screens are used in floriculture. Chrysanthemums, for example, are grown under darkening screens to control the timing of flowering. Ground
Other suppliers

ACE Geosynthetics

ACE Geosynthetics Enterprise Co Ltd, No. 33, Jing 3 Road, Chungkang Economic Processing Zone, Wu Chi, Taichung 435, Taiwan. Tel: +886 4 2659 5926. Fax: +886 4 2659 5935. Email: sales@geoace.com Web: www.geoace.com

Geotextile/geogrid producer ACE Geosynthetics produces a range of agricultural nets made of durable, UV resistant PE or PP, which are generally used in greenhouses or protection of crops.

The company also produces aquaculture nets made from high-strength PET fibres with different mesh sizes and coated with an anti-algae polymer to prevent the attachment of submerged organisms, which reduces the frequency of net cleaning and replacement. These products can also be UV resistant.

Affy

Affy Weaver India Pvt Ltd, Plot No - 212, Sector - 11, Rajnagar, Ghaziabad, Uttar Pradesh 201002, India. Tel: +91 120 412 1907. Fax: +91 120 412 4092. Email: info@geotextile.co.in Web: www.geotextile.co.in

Affy Weaver India manufactures a wide range of PP woven fabric and geotextiles, principally for the geofabric and filtration markets. The product range also includes UV-stabilised PP woven ground covers to control weed growth.

AgriFabrics

AgriFabrics LLC, PO Box 29, Suite 7, 6320 Atlanta Hwy, Alpharetta, GA 30004, USA. Tel: +1 770 663 7600. Fax: +1 770 663 7690. Email: info@agrifabric.com Web: www.agrifabric.com

AgriFabrics supplies the AgroFabric system that provides frost and cold protection for vegetables, foliage, nursery stock, citrus, strawberries, containerised ornamentals and turf. The nonwoven fabric is made from continuous filament PP.

AgroFabric is said to create a stable, favourable microclimate by capturing extra heat during the day and slowing the loss of stored heat at night from the soil. As a result, AgroFabric raises minimum temperatures, without suffocating, crushing or breaking plants the way plastic could. It is porous to allow air and water, plus the sunlight required for plants to flourish. In some cases, AgroFabric can be combined with irrigation for an extra measure of insulation during seasonal climate changes.

The fabrics come in several weights, from lightweight (17-25 g/m²) for high-value
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Russian apparel retailer considers global expansion

Gloria jeans, one of Russia’s largest apparel retailers, is considering international expansion plans through the establishment of its business in China, Brazil, Brazil, and Vietnam. According to the company, the expansion could be funded through the sale of up to 80% of its shares. Four well-known international banks, including Sberbank, VTB, and Sberbank, have already started recruitment of personnel in those countries and plans to open stores in 2013.

The company is currently planning to open design and merchandising centers in Istanbul, Turkey; Shanghai, China; Rio, Brazil; and Hong Kong, before expanding to Latin America, Europe, South Korea, Russia, the UK, and other cities. According to Mikhaylov, the company plans to open 1,000 stores internationally over the next five years, with an initial investment of $20 million.

New production bases for South Korean apparel firms

South East Asia’s developing countries, including Myanmar and Cambodia, are emerging as new manufacturing bases for South Korea’s textile companies. The US and South Korea increased their trade in textile products between 2000 and 2010. During the 1990s and 2000s, China and Vietnam gained the country’s attention with their low-cost manufactured goods. Now, Myanmar and Cambodia have become the most important country of South Korea’s textile industry.

For example, in April 2013, South Korean apparel manufacturer S.L. & Company acquired a spinning factory located in the southern area of Yangon, Myanmar, and another in the north of Yangon in February this year. The company also has a total of 24 production lines and 3,500 employees in Myanmar. This acquisition is part of D.L.’s successful manufacturing base in production costs,” said S.L. & Company’s official.

Another South Korean apparel company, Sam-young, is looking to start manufacturing textile products in the second half of this year by acquiring a production plant in Phnom Penh, Cambodia, which can be used as the production base. After searching for a long time, Sam-young selected Cambodia as a place to secure the additional production plant because the country is not labor-intensive and the company can reduce production costs. Sam-young already has operations in other countries, including Malaysia, Cambodia, and China. The company currently focuses on exporting its products to the US, and leads to a significant increase in the company’s foreign exchange revenue.

Capitalise on the market potential of these developing regions

Textiles Eastern Europe and Textiles South East Asia are invaluable sources of information on the textile and clothing markets of Eastern Europe and South East Asia, respectively. Published monthly, Textiles Eastern Europe and Textiles South East Asia provide the latest news, hard-to-find commercial information and business opportunities in an easy-to-read newsletter format.

These two publications are read by companies with an interest in capitalising on the market potential of these emerging and rapidly developing regions.