

# Agrotextiles

A growing landscape with huge potential



SAMPLE ONLY

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-uses, 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

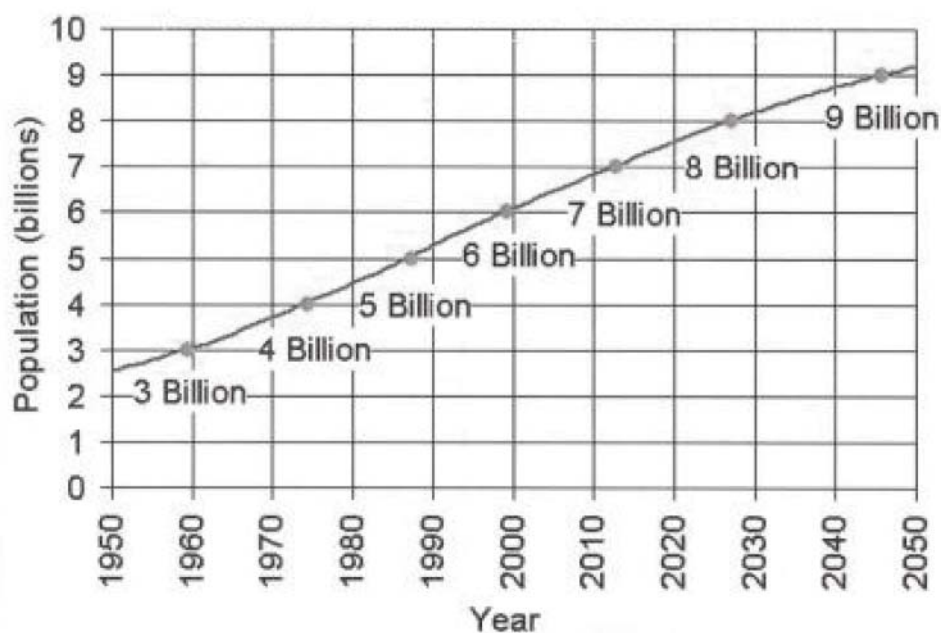
The main growth driver for the agrotextile sector is the rise in global population, which is increasing the demand for more and better quality food grown in soil that is often compromised.

### *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

**Figure 1: World population: 1950-2050**



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

much on 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 Diouf.

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 agrotextiles 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



## Agrotextile market

Agrotextiles 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 agrotextiles 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).

**Table 1: Global consumption of agrotextiles by volume, 1995-2005**

('000 tonnes)	1995	2000	2005	CAGR 95-05 (%)
Fibres and yarns	741	895	1,021	3.3
Wovens	222	306	373	5.3
Nonwovens	19	26	40	7.7
Other textiles	499	563	608	2.0
<b>Total</b>	<b>1,481</b>	<b>1,790</b>	<b>2,042</b>	<b>3.3</b>

Source: DRA

**Table 2: Global consumption of agrotextiles by value, 1995-2005**

(US\$m)	1995	2000	2005	CAGR 95-05 (%)
Wovens	1,815	2,355	2,841	4.6
Nonwovens	89	123	181	7.4
Other textiles	1,562	1,776	1,922	2.1
<b>Total</b>	<b>3,466</b>	<b>4,254</b>	<b>4,944</b>	<b>3.6</b>

Source: DRA

**Table 3: Global consumption of yarn-based agrotextile fabrics by volume, 1995-2005**

('000 tonnes)	1995	2000	2005	CAGR 95-05 (%)
Fabrics <sup>1</sup>	222	306	373	5.3

<sup>1</sup> woven, knitted, braided

Source: DRA

## 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 loosely 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 weighted 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

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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 2013.

### 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 green-houses 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 201 002, India. Tel: +91 120 410 1207. Fax: +91 120 437 4057. 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@agrofabric.com Web: www.agrofabric.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/m<sup>2</sup>) for high-value

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CENTRAL AND EASTERN EUROPE AND THE FORMER SOVIET UNION

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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, Iran and Vietnam.

According to *Kommeriant*, the expansion could be funded through the sale of up to 30% of the company to a portfolio investor, among which are some well-known international banks.

According to Vladimir Melnikov, founder of Gloria Jeans and its largest shareholder, the company is currently designing a strategy for the development of its business abroad, having consultations with KSA, McKinsey and JDA.

Gloria Jeans has already started recruitment of personnel in these countries and plans to open its first stores in 2014.

The company already operates its own design and merchandising centres in Istanbul, Turkey; Shanghai, China; São Paulo, Brazil; Chicago and Los Angeles, USA; Seoul, South Korea; Tokyo, Japan; and other cities.

According to Melnikov, the company's plans for foreign expansion could be associated with the current stagnation of the Russian apparel market, whose annual growth is around 10-15%.

Mikhail Burmistrov, head of InfoLine, one of Russia's largest agencies in the clothing market, said growth of the Russian apparel retail market is gradually slowing. In 2011 it grew by 28.7% to US\$50bn, while this year growth will be up to 16.5% to US\$59bn. In addition, the rate of growth will continue to decline during 2013-15.

Burmistrov added that so far no Russian apparel or footwear retailer has announced plans for global expansion, except Centrobuv, the country's largest shoe retailer, which is actively expanding in Poland.

Russian analysts believe Gloria Jeans may gain a foothold in the global apparel market; however, much will depend on its ability to compete with local companies, which know the market better and can afford to keep prices lower.

In 2011, there were 435 Gloria Jeans stores with a total revenue of RUB15.5bn (US\$530m). According to the company's predictions, by the end of 2012 the number of its stores will reach 600 with revenue at RUB28bn (US\$934m).

According to Melnikov, the company is valued at RUB42bn (US\$1.4bn).

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## TEXTILES SOUTH EAST ASIA

MONTHLY NEWS OF THE TEXTILE AND CLOTHING INDUSTRIES  
IN THE EMERGING MARKETS OF ASEAN

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### 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 Central America were once the nation's largest export markets during the 1970s and 1980s. During the 1990s and 2000s, China and Vietnam grabbed the country's attention with their vast consumer markets. Now, Myanmar and Cambodia have become the export base of South Korea's textile industry.

For example, in April 2011, South Korean apparel producer E-Land acquired a sewing factory located in the southern area of Yangon, Vietnam, and another in the north of Yangon in February this year.

The company also has a combined total of 24 production lines and 3,000 employees in Myanmar. "This acquisition is part of our efforts to secure manufacturing bases in low production costs," an E-Land official noted.

Another South Korean apparel company, Sae-A Trading, is also on track to start manufacturing textile products in the second half of this year by acquiring garment plants in Phnom Penh, Cambodia, which can handle 16 production lines.

After searching for a long time, Sae-A selected Cambodia as a place to secure its additional production plants because the country's low labour costs will enable the company to reduce production costs. Sae-A already has operations in other countries, including Mexico, Guatemala and China. The company is currently carrying out inspections into the local market with the aim of making an investment.

Meanwhile, apparel company Shinsung Tongsang, which is well-known for its clothing brands including Polham and Union Bay, operates four garment plants with 69 product lines and is considering expanding production to keep up with growing export demand, it is reported.

An estimated 50 and 38 South Korean apparel companies have moved into Myanmar and Cambodia respectively, according to the Korea Federation of Textile Industry (KOFOTI).

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• Sae-A Trading Co Ltd, Sae-A Venture Tower, 8th Floor, Daechi-dong, Seoul 135-028, South Korea. Tel: +82 2 6252 7000. E-mail: karen@www.sae-a.com

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