



## Agro textiles – A sustainable product

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The word “agro textiles” now is used to classify the woven, nonwovens and knitted fabrics applied for agricultural and horticultural uses. India has tremendous potential for production, consumption and export of technical textile. “Agriculture is the backbone of our country” went the saying so far. A textile fabric has a long history of application in agriculture. Agro- textile contributes about 1.5 per cent to the total production of technical textile goods in India, while the globally growing demand for agricultural products is expected to boost the need for agro-textile products.

### Definition :

- Technical textiles used for agricultural applications are called as agro-textiles.
- Agro textiles are application of textile materials in the agriculture field.

**Properties required :** Man-made fibres are preferred for agricultural products than the natural fibres, mainly due to their favorable price performance ratio, ease of transport, space saving storage and long service life as well as properties such as:

**Resistance to solar-radiation:** Agro-textiles are laid over the cultivated areas immediately after sowing or planting. For such application, agro-textiles have to withstand solar radiation with varying surrounding temperatures.

**Resistance to ultraviolet radiation:** Polyethylene is resistant to radiation in the visible range. But UV radiation leads to degradation of molecular chains. Hence when used as an outdoor material, polyethylene is treated with the appropriate UV stabilizers. These are special types of carbon black, which convert the UV radiation into thermal radiation. Good potential to reduce the impact of UV radiation on plants by light-absorbing or light-reflecting nonwoven (light permeability: 80 to 90% to allow photosynthesis to take place).

**Biodegradability:** Natural fibres like wool, jute, and cotton are also used where the biodegradability of product is essential. Natural polymer gives the advantage of

biodegradation but has low service life when compared to the synthetics.

**High potential to retain water:** This is achieved by means of fibre materials, which allow taking in much water and by filling in super-absorbers. While nonwovens meant for the covering of plants show a mass per unit area of 15 to 60 g/m<sup>2</sup>, values between 100 and 500 g/m<sup>2</sup> are reached with materials for use on embankments and slopes.

**Protection property:** Protection from wind and the creation of a micro-climate between the ground and the nonwoven, which results in temperature and humidity being balanced out. At the same time, temperatures in the root area rise. This is what causes earlier harvests. Sufficient stiffness, flexibility, evenness, elasticity, biodegradability, dimensional stability and resistance to wetness. Fungicidal finish (upto 2% of the total mass), which avoids soil contamination.

**Techniques of producing agro textile product :** Several techniques of fabric production can be used to produce Agro textiles; each method offers specific advantages for particular product. The techniques are, Woven, Knitting, Nonwoven.

**Woven :** Woven products are produced by using weaving machines especially Seltzer projectile weaving machines. The range of light to heavy and wide width fabric production is possible with Seltzer projectile weaving machine. The machines with weaving width of 540 cm to 846 cm are available for the production of agro textiles. The nets with a mesh width of 1.8 mm to 40 mm can be produced. Other systems of woven fabric production such as air jet and rapier weaving machines are not preferred for the manufacture of such fabrics, as they do not have required weaving width.

**Knitting :** Warp knitting technique is most widely used compare than the weft knitting. Warp knitted protective nets are used in different sectors, which are produced on raschel machines. Agro nets are produced in various constructions or lapping. Here, the construction or lapping is a way in which individual yarn systems are converted

into fabrics.

**Nonwovens** : There are many techniques to produce Nonwoven fabrics.

- Needle-punched nonwovens
- Stitch-bonded nonwovens
- Thermally bonded nonwovens
- Hydro entangled nonwovens
- Spun bonded nonwovens
- Wet nonwovens

Spun bonding and needle punch techniques are mainly used for the production of nonwoven Agro textiles. The spun bonded fabric has high and constant tensile strength in all directions. It has also good tearing strength. Needle punched fabric plant bags provide advantages over conventional fired clay pots. All natural fibres offer an added advantage of that the container decomposes after being planted in the ground. Even with manmade fibres the roots find their way through the fabric.

**Applications of agro textiles** : Wide varieties of agro textile products are available and the selection of suitable type of products depends on the protection that the crop. Selection of the agrotextile is greatly influenced by the geographical location. At some location Agrotextiles are used to protect the plantation from excessive sunlight while at some places it is expected to protect plant from cold. Therefore selection of agrotextile is done as per the location and the desired protection from the external agencies. With the use of high quality agrotextiles quality and yield of agro products can be enhanced.

Some of the applications of agrotextiles are as follows:

**Sunscreens** : In order to protect fields and greenhouses from the intense solar radiation for healthy plant growth and good harvest. Sunscreen nets with open mesh construction are used to control sunshine and amount of shade required. These net fabrics allow the air to flow freely. So the excess heat does not built up under the screen.

**Bird protection nets** : Knitted monofilament nets (Open, knitted, nets for crop protection) offer effective passive protection of seeds, crops and fruit against damage caused by birds and a variety of pests. Open-mesh net fabrics are used as a means of protecting fruit plantation. The special open structure repels birds, provides minimal shading and excellent air circulation - allowing plants to flourish, whilst avoiding the risk of dangerous mould developing on the fruit.

**Plant net** : Fruits, which grow close to the ground, can be kept away from 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.

**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, whilst allowing roots to breathe and water, air and nutrients to permeate through. This maintains higher soil temperatures and promotes more rapid and even plant growth. It has a high degree of UV stabilizer added to protect it from the harmful effects of exposure to sunlight. It effectively suppresses competitive weed growth, conserves ground moisture, maintains a clean surface, and creates a favorable environment for health plant growth. Ground covers can reduce the costs and minimizes undesirable herbicide use.

**Horticultural benefits** : Using this ground cover in display areas, nurseries and greenhouses will provide a clean, free draining and hard wearing surface. While the pre-marked white grid aids spacing. In orchards and fruit beds the fabric is regularly used to maintain a clean crop and reduce maintenance and disease problems.

**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.

**Root ball net** : It is extremely important for safe and speedy growing of young plants that root system is not damaged when they are dug up, transported or replanted. Normally the root balls are wrapped in cloth. Elastic net tubes are alternative to this. When the plants are transplanted the nets on the outside do not have to be removed since the roots can protrude through the nets.

**Insect meshes** : Fine, woven, meshes which resist insect penetration. Clear, woven, and knitted, polyethylene monofilament meshes to exclude harmful insects from greenhouses and tunnels, or to keep pollinating insects inside. The fine woven screens protect plants from insect attack (without the use of insecticides). Insect meshes can also be placed over the openings of greenhouses to prevent pollinating insects, such as bumblebees, from escaping.

**Turf protection net** : Nets are put over the grassy areas on riverbanks, dykes etc., so that lumps of earth are not removed while animals are grazing them. This will help in minimizing soil erosion loss and improve conservation.

**Mulch mat** : Mulch mats are used to suppress weed growth in horticulture applications. It covers the soil, blocking of light and preventing the competitive wheat growth around seed links. This also reduces the need for herbicides required for weed control. Needle punched non

woven and black plastic sheet are used for this application. Bio degradable and non biodegradable types of mulch mats are available.

**Monofil nets :** Tough, knitted Monofil, nets for windbreak fences and shading/privacy screens. A suitable windbreak, set at a right-angle to the prevailing wind, will protect plants against the harmful effects of blustery weather - which can break young branches, damage flowers and cause leaves to dry or tear. They can also be used to block sand and salinity as well as reduce wind erosion. The nets also protect against frosts and help enhance the micro climate (Photosynthesis, and ground moisture, are improved by reduced evaporation and transpiration). While special anti-hail net grades have been designed to withstand the impact of heavy hailstorms, when installed in roof-profile above crops and orchards. This not only safeguards the current harvest but also benefits future crops, since the woody part of the plant are protected too.

**Weed control fabric :** Prevent weed growth naturally with this protective fabric based on Tex-R® technology. You'll find plenty of uses for this multipurpose membrane. And it is breathable, letting air and water through effortlessly. Available in rolls covering 86 sq ft to 1506 sq ft. Needle punched nonwoven fabric is mainly used for the purpose of weed control applications.

**Tape nets :** Knitted flat tape nets are available in a wide range of densities for shade, reduced sunlight intensity, fruit support, privacy screening and animal protection. The nets are practical, economical and easy to install; creating ideal growing conditions by avoiding overheating, scorching and moisture loss. The low shade factor nets are used for growing vegetables, while those with medium light-reduction/screening offer ideal conditions for storage areas, cultivating flowering plants/house plants and acclimatizing plants moved out of greenhouses. In the area of agriculture it is possible to use non-woven blanket fabric that is permeable for water, air and light and during vegetation it creates microclimate optimal for the plant development and growth. Plants are protected against weather changes (short-term frost), strong wind, hail and pests. Light weight, knitted tape, nets for shade and frost protection. In the alternative agriculture, they often use black mulching fabric that is laid directly on the soil and prevents the growth and spread of weed, which significantly decreases or eliminates the need of herbicides. This fabric is water permeable; it allows the soil to get warm, minimizes non-productive evaporation and prevents creation of soil crust. Pegatex® S - (spun bond) is non-woven fabric manufactured by means of spun bond

technology (S) from polypropylene. The basic quality of this type of non-woven fabric is barrier quality, which is used for manufacturing of single-use products. This type of non-woven fabric used in a wide range of applications, from the production of hygienic products (baby nappies, ladies hygiene products, incontinency nappies and towels) to agriculture, building industry or automotive industry.

**Cherry covers :** Growing cherries has proved an uncertain business because of their vulnerability to the weather damage - especially during the blossom, stoning and fruit ripening periods. The new cherry cover system has been specifically designed to tackle these problems; offering protection throughout the season from frost, rain, hail and wind. The fabric is very tough, with a high degree of UV stabilization (to protect against breakdown in sunlight), so will provide many years of use, and the suppleness makes it very easy to handle. The unique property of this system is unrivalled performance. The cover creates a micro-climate (without hindering ventilation) which gives protection against adverse weather conditions - improving both quality and yields.

**Nets for covering pallets :** For safe transportation of fruits and vegetables to the market the boxes are covered with large mesh nets and pallets to stop the boxes being turned upside down. This prevents damage to goods during transportation.

**Packing materials for agricultural products :** Nets can be used for packaging of farm products for many end uses. It includes:

- Packing sacks for vegetables
- Tubula packing nets for fruits
- Wrappers for Christmas trees

Net structures are preferred because of their high strength, low weight, air permeability and cheapness.

Nylon and Polyester identification belts are used in cows. Textile nets are used to support the large udders. Nonwoven fabrics are used to filter the milk in automatic milking systems. Nonwoven fabrics are used as an underlay to reduce mud on cattle paths and trails.

**Horticulture :** Nets, nonwoven mats, movable screens for glass houses, nonwoven sheets, mixed bed for mushrooms, cordage and strings are used in horticulture. Fabric protective greenhouses provide virus-free cultivation of young plants. Nylon fabric beds are used to grow mushrooms. Nonwoven sheets are also used in the field to protect young plants such as strawberries, potatoes and lettuce from extreme cold, night frost and viruses.

**Conclusion :** Thus, the need of textile goods in the field of agriculture has been stressed and their role in the

reduced usage of harmful pesticides and herbicides to render a healthy farming culture underlined. Unique manufacturing techniques and properties of this blend of agro-textile sector products whose cost is lesser than that of pesticides and chemical herbicides have been

emphasized. Textiles prove to be flexible in their suitability for specific geographical locations. So now it is our turn, to carefully and beautifully shape this infant technology, to contribute to the nation's economy.

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