

## **Significance of Agro-Textiles and Future Prospects in Bangladesh**

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### **Abstract**

Agro-textile is a crucial and emerging sector among all the twelve sectors of technical textiles. It covers all the textile products from horticulture application to fishing and animal husbandry application. However, the significance of agro-textiles can be stated substantial all over the world. Also in Bangladesh, some application of agro-textiles products have shown great extent of outcomes and it has positive impacts on growth and production of various crops, vegetables. The main purpose of this research is to deliver an overview and importance of agro-textiles and to indicate the prospect of agro-textiles in future of Bangladesh. For this research some market analysis has been done, which implies some indication about the rise in utilization and also in local production of agro-tech. An alternate intention of this study to make the industrialists, the businessmen and the entrepreneurs comprehend about this sector and to encourage them in investment.

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**Keywords:** Agro-textile, Bangladesh market, Price, Raw material, SWOT analysis

### **Introduction**

Agriculture is the most ancient occupation of human kind and still now it is one of the major global industries. Agro-textile sector includes application of textiles in agriculture, forestry, horticulture, floriculture, fishing segments, landscape, gardening, animal husbandry, aquaculture and agro-engineering. Agro-textile products can be woven, non woven or knitted

and they are used in various agricultural applications such as shade cloth, fishing net, mulch mat etc. (Rohit Landge, January,2015).

Bangladesh is an agricultural country. About 60 percent of the population directly or indirectly depends on agriculture for their livelihoods. Rural peoples are mostly related to agricultural work. The agricultural sector supports around 20 percent of gross domestic product (GDP). (Talukder, June 2014). The current population of Bangladesh is around 162 million in 2016 (UN Data. A world of information). Bangladesh has a population increasing rate with annual population growth of 1.8 million people. Food insecurity in this country is growing, as population continues to grow and to urbanize at unprecedented rates. Bangladesh needs to grow more food using less land, less water supply, overcoming new climate challenges. (Ghose Bishwajit).The nature of Bangladesh is favorable for agricultural production. But for the lack of technical application, awareness and its poor exploitation are preventing the country to be food secured.

The importance of Agro-textile is wide. It protects crops from climatic effect and yields the production, helps to increase plant height, reduces the requirement of pesticides and fertilizers. Agro-textiles prevent the soil from drying and also improve product quality. These also protect the farmer from harmful pesticides. In greenhouse agro-textiles such as thermal screen saves energy for heating up to 40%. The use of agro-textiles improve color uniformity and prevent staining of fruits and vegetables. (Agrawal, July, 2013). For tomatoes and capsicum, yield increase was seen 60-100% by application of shade net. For capsicum, compared to cases where fertilizers have extensively been used, yield productions was obtained with only shade nets and fertilizer use were dropped by 25%. Similarly the use of jute mulch mat increases in yield of curry leaves about 64%. Mulch mat use for mango cultivation showed a twofold benefit – an increase of yield of 33% and an increase in average selling price of 30%. (Study on Developing Measures to Promote the Use of Agrotexiles in India, 2013)

Bangladesh is lagging behind in using textiles in agriculture. Most of the farmers are not familiar with the importance of using agro-textiles. To overcome the increased demand of food for increasing numbers of people she has to increase the food production. For meeting this demand, farmers are using more fertilizers and pesticide. But fertilizers and pesticides have hazardous effect on health. From this perspective agro-textile can play an important role in Bangladesh.

Classification of Agro-tech on basis of application:

Depending on use, agro-textile can be classified as:

- Agro-textile products for crop production and packing
- Agro-textile products for horticulture and floriculture
- Agro-textile products for forestry

- Agro-textile products for animal husbandry
- Agro-textile products for fishing and aquaculture

There are many agro-textiles product used in various agricultural sectors. They are shown in table 1.

**Table 1:** Classification of agro-textiles product with the fabric type (Agrawal, July, 2013)  
(Dr V Subramaniam, April 2009) (Gopalakrishnan)

Fabric Type	Classification				
	Crop Production and packing	Horticulture & Floriculture	Forestry	Animal Husbandry	Fishing & Aquaculture
Woven	Sunscreen, Packing sack, Insect meshes, Cold and frost control fabrics, Nets for covering pallets, Tape nets, Ground cover.	Sunscreen, Root ball net	Soil protection fabric	Tape net, Mats for animals	Anti fouling nets
Non woven	Mulch mat	Mulch mat, mixed bed for mushroom	Weed control fabric	Underlay for reducing mud, Filter for milking	Anti fouling nets
Knitted	Plant net, Bird protection net, Shade cloth, Wind shield, Anti hailstone nets, Support nets, Monofil nets.	Plant net, Bird protection net, Shade cloth, Windshield, Anti hailstone nets, Harvesting nets, Insect meshes.		Udder protection nets, mosquito protection nets, tape nets	Fishing nets, Aquaculture nets, Anti fouling nets.
Plastic Sheets	Ground cover, Cherry cover	Ground cover, Greenhouse cover, Rain protection fabric			Ultraviolet radiation protection sheets
Braided & Twisted				Baler twine, belt	Fishing line

**Characteristics required for Agro-textile:**

The key functional properties of agro-textile products are as follows (Handbook for Agrotextiles, 2013) (Agrawal, July, 2013):

- Weather resistance
- Resistance to micro-organisms
- Light Weight
- Resistant to solar radiation
- Resistant to ultraviolet radiation
- Long service life
- Biodegradability
- Water conservation
- Stable construction
- Tensile strength
- Abrasion resistance
- Protection properties

**Raw materials for agro-textile products:**

The most important requirements of textiles for agricultural applications are weather resistant and resistant to micro-organisms. Therefore, synthetic fibers are the best choice of material for designing of agro-textile products. Among all these fibers the polypropylene and polyethylene are extensively used. Whereas among the natural fibers only jute is used, as it serves not only the functional purposes, but also has biodegradability and acts as a natural fertilizer at that point.

**Table 2:** Different types of fiber which are used for agro-textiles.




Jute	Viscose	LDPE, HDPE
Cotton	Polypropylene	Hemp, Coir
Wool, Sisal fiber	Polyethylene mono filament & multi filament	Polyester
Cotton-polyester blend	Nylon mono filament & multi filament	HMPE








**Table 3:** Different types of agro-textile products with constituent fiber

Products	Fiber type	Products	Fiber type
Sunscreen	Polyethylene	Root ball net	Cotton, Polyester, Cotton-polyester blend
Packing material	Jute, plastic, polypropylene FIBC	Soil protection fabric	Polypropylene, Jute
Insect meshes	Polyethylene mono filament & multi filament, Nylon	Nets for covering pallets	Polyethylene, Nylon, Polyester
Cold and frost control fabrics	Polypropylene	Anti fouling nets	Nylon
Weed control fabric	Polyethylene	Mosquito protection nets	Nylon
Tape nets	Polypropylene	Monofil nets	Nylon, HDPE

Mulch mat	HDPE, LDPE, Polypropylene, Wool	Filter for milking	Cellulose, viscose, cotton, polyester
Anti hailstone nets	Polyethylene mono filament	Plant net	Polyolefin type fiber
Harvesting nets	HDPE, Nylon, Cotton	Bird protection net	Co-polymer nylon, Polyethylene, Polypropylene
Support nets	Nylon	Shade cloth	Polyethylene
Baler twine	100% Polypropylene, Sisal fiber	Udder protection nets	Cotton, Cotton-poly blend
Aquaculture nets	Nylon mono filament, multi filament, HDPE	Fishing nets	Nylon mono filament, multi filament, HDPE
Ground cover	100% Polypropylene	Fishing line	HMPE (e.g. Dyneema and Spectra), HDPE, PP, Nylon
Cherry cover	Polypropylene, Polyethylene	Belt	Nylon, Polyester
Rain protection fabric	Polyethylene	Ultraviolet radiation protection sheets	Cotton, Cotton-poly blend, Polypropylene
Greenhouse cover	Polyethylene	Porous tube for localized irrigation	Recycled vehicle tire



**Function of different agro-textile product:**

Name	Function	Product Picture
Sunscreen	Sunscreen allows controlled amount of shade and sunshine to plant. The shadow percentage varies according to mesh size.	
Mulch mat	Mulch mat is used for reducing growth of weed by covering the soil, blocking the sunlight. (Handbook for Agrotextiles, 2013)	
Harvesting nets	Fruits, which are susceptible to mold infections, darkened kernels, insect and bug invasion due to laying on the ground, can be protected by this net. This net makes harvesting easier, cleaner, sustainable. It also reduces time for fruits collecting.	

<p>Ground cover</p>	<p>For long-term weed control, reservation of moisture and separation, ground cover is easy solution. They are used in landscaping and horticulture. (Agrawal, July, 2013)</p>	
<p>Anti hailstone net</p>	<p>These nets are suitable to protect cultivations from hail damages.</p>	
<p>Udder protection nets</p>	<p>These protect against udder damage in the pasture and in crowded barns. It is also ideal to protect the udder against steps injuries.</p>	
<p>Porous tube for localized irrigation</p>	<p>Porous tube connects the whole field with watering pipe. It controls uniform watering throughout the field and garden.</p>	
<p>Support nets</p>	<p>These nets support climbing vines and vertical growing plants and also facilitate flowers growing. It supports large fruit to hold in plants.</p>	
<p>Insect meshes</p>	<p>This mesh keeps pollinating insects inside the mesh. They retain harmful insects from entering to greenhouses and tunnels. This fine woven screen gives protection from insect without using any insecticides. (Agrawal, July, 2013)</p>	
<p>Cold and frost control fabrics</p>	<p>Frost Protection Fabric creates a good micro climate which captures extra heat during the day and reduces the loss of accumulated heat at night from the soil. Thus the fabric downs to minimum temperatures, without damaging the plants. (Handbook for Agrotexiles, 2013)</p>	

<p>Mosquito protection nets</p>	<p>It protects cattle from mosquito and harmful insects.</p>	
<p>Root ball net</p>	<p>It is a biodegradable material which protects root balls from any harm during transportation and storage. It also helps to keep soil sticking to the roots. (Handbook for Agrotextiles, 2013)</p>	
<p>Anti fouling nets</p>	<p>It provides a physical barrier for bio fouling. This net has long lifetime. They have higher wear and tear resistance in salt water than normal fishing net.</p>	
<p>Bird protection net</p>	<p>It protects seeds, crops and fruit from damage, caused by birds and a other pests. But the mesh size is big enough to allow movement of bees. (Agrawal, July, 2013)</p>	
<p>Weed control fabric</p>	<p>This type of fabric is used to control the growth of weed. They are normally needle punched non woven fabric.</p>	
<p>Packing material for agricultural goods</p>	<p>These nets are used for packing various farm products. It may be packing sacks or tubular packing nets. (Agrawal, July, 2013)</p>	
<p>Fishing nets</p>	<p>Fishing nets are knitted fabrics.They are used for fishing.</p>	
<p>Windshield</p>	<p>Windshield protects crops, small trees and plants from strong winds. Healthy trees can be seen if they are protected from strong winds. (Handbook for Agrotextiles, 2013)</p>	



Cherry cover	Cherry cultivation is hard. They are easily harmed by frost, rain, hail, wind. The cherry covers are designed to protect them from frost, rain, hail and wind throughout the season.	
Net for covering pallet	For safe transportation of fruits and vegetables to the market, it is widely used. The boxes are covered with large nets and pallets to stop damaging during transportation. (Agrawal, July, 2013)	
Aquaculture net	This net is used to cultivate different types of fish in the same pond. Such as cultivation of predatory fish with normal fish, cultivation of different size of fish in one pond or lake.	

Some manufacturing company with origin:

Major agro-textile producing countries are USA, Germany, China, India, Sweden, UK, Netherland, Canada, Israel. Bangladesh also produces some agro-textile product.

**Table 4:** Agro-textile manufacturing company with origin and price.

Products	Company & Origin	Price (US \$)	Products	Company & Origin	Price (US \$)
Sun blocker Shade Curtain	Growers Supply (USA)	\$4-8 /FT	Mosquito netting, Garden Insect Barrier Bag, Fruit Protect Bag	Mr Garden (USA)	\$7.60/ piece
Cold and frost control fabrics	Bigfly (USA)	Start from \$15	Weed control fabric	AGFABRIC (USA)	\$15.8 (3*50 FT)
Green House cover	Svensson (Sweden), Farmtek (USA)	\$60 (15' x 40')	Udder protection nets	Kerbl (Germany), Leedstone (USA), Holland animal Care (Netherlands)	\$40 /piece



Animal mat	Animat (Canada), Sumangalam Dairy Farm solution Pvt. Ltd. (India)	\$6-20 /piece	Fishing nets	Florida Gifts (USA), Rupsha Fishing Net Industries (Bangladesh), Oxfam Gb (BD), Panama Industries Ltd. (BD)	\$3-6 /Kg
Porous tube for localized irrigation	Jiangyin Zhengmei Machinery Equipments Co. Ltd. (China)	\$0.42-.52 /Meter	Mulch Mats	Tubex (UK), Greentech (UK), GardenMats (UK), Bangjin (Bangladesh)	\$61 for 36" x 20" Roll
Bird Protection net	Safe nets (India), Bird-X Inc.(USA)	\$252 for 100 x 14 ft	Filter for milking	DeLaval (Sweden), KenAG (USA)	\$6.95 for 6.5" disks. Box of 100.
Ground Cover	Picplast (Israel), Weifang Gold Sun Plastic Co. Ltd. (China)	\$2-3.5 /KG	Fishing line	Kastking (USA)	\$15-60 /Roll

### Agro-textile in Bangladesh:

Use of agro-textile is versatile in Bangladesh. In Bangladesh farmers use alternative things to meet the purpose of agro-textiles. Most of the farmers do not afford to buy agro-textile directly, rather than they use alternative materials to fulfill the purpose of agro-textiles.

For insect protection it is seen to use nets of small mesh which is not actual insect mesh, but it fulfills the purpose for them locally. These nets are found in different mesh sizes according to end use. The use of some brown bag of nets has been seen for the cultivation of mango, watermelon, eggplant, Bottle Gourd, pumpkin.

In Bangladesh actual mulchmat is not used. Most farmers do not know what mulch mat is. They use other materials like polyethylene sheets, jute bag, dry leaves to do mulch mat's function of weed controlling. Sometimes they use water hyacinth, rice straw for mulching. (Md. Meftaul Islam, 2014)

The use of aquaculture net in Bangladesh is rarely found. But in some places of Jamalpur and Mymensingh use of these nets are seen. They are used where various types of fishes are cultivated in one pond.

Use of mosquito net is various in agricultural field. They are used for protecting domestic animal from mosquito, bugs. It is also used as bird protection net, windshield net, support net. During the harvesting season, fruits such as lychee, banana, mango, guava etc. are protected from birds, bats by using mosquito nets. Because bird protection nets are costly and most of the farmers cannot afford it. They are also used as harvesting net. Different types of net are found in markets of Bangladesh. They differ from raw materials or mesh sizes.

Polyethylene sheets are used as rain protection fabric in Bangladesh. Uses of these sheets are seen in Jamalpur, Mymensingh and north region of Bangladesh. In summer, rain protection sheet is used in cultivating different types of vegetables like tomato, eggplant Etc.

In Bangladesh milking cows are domesticated in confined places. The uses of udder protection net is needed mostly for cows which are grazing in a pasture. So the use of udder protection net is very limited here. For animal husbandry jute sacks, mosquito nets, animal mats are used. Jute sacks are used to keep the animal warm in winter.

In Bangladesh, fishing nets are used enormously. Many people of coastal area related to fishing businesses. There is always a great demand for fishing nets. Fine mesh net is used in tilapia hatchery. It is normally blue color mesh. Thin Markin fabrics are used for collecting eggs in hatcheries. There are many producers for fishing nets. Some of them are Rupsha Fishing Net Industries, Oxfam Gb, Panama Industries (Pvt.) Ltd, Meghna Fabric Industries Ltd, M/S Suma Impex International, Hicotex Ltd, Eagle Fiber Industries Ltd. They meet the local demand and also export fishing nets.

Different packing materials are used in collecting, packaging and storing of agricultural products like fruits, vegetables, crops, grains. For these purpose poly bags, jute bags, paper bags are mostly used. Nowadays non woven bags are also seen to be used as packing material. Due to environmental issue non woven and jute bags are gaining popularity.

For sunscreen purpose here polyethylene sheets, nets are used commonly. Bangladesh export betel leaf in a large scale. For cultivation of betel leaf shady place is required. This shade is given by using coconut leaves, dried leaves, areca palm tree's leaves Etc.

Cold and frost control fabrics, anti hailstone nets, cherry covers, anti fouling nets, ultraviolet radiation protection net, greenhouse cover are not used in Bangladesh.

The UV-blocking film was used in Sher-e-Bangla Agricultural University for only research purpose. But it is not used for mass cultivation. The proportion of insect, pest and parasites balance was hampered because of the UV-blocking films. The plant height, fresh weight and dry weight were enhanced by using partial UV-blocking films. (Solaiman, 2016).

The following figures are showing some application of agro-textiles in Bangladesh:



Mulch Mat



Fishing net



Windshield



Packing material



Polyethylene bag instead of root ball net



Polyethylene sheet as Rain Protector



Shade Net



Bird protection net



Mosquito net for animal husbandry



Shade net



Leno Bag for packing



Shade Net

**Figure 1:** Application of agro-textiles in Bangladesh (collected from various local fields)

### Market Analysis of Bangladesh:

Among the huge products of agro-textiles, in Bangladesh only limited numbers of products are produced. From the investigation, it has been found that only different kinds of nets are produced in Bangladesh. They are applied in various agricultural and fishing purposes. At present, Bangladesh meets all the local demands of these nets, in some cases Bangladesh also exports these nets to various countries.

Fulbaria and Chawkbazar are the biggest market place of agriculture net and fishing net. Both of them are located in old Dhaka. From the investigation of City Super Market, Fulbaria and Mogoltuli Market, Chawkbazar, it was found that the suppliers of different agriculture, mosquito and fishing nets are:

- Anik Composite Mills Limited, Vulta, Narayanganj
- Marium Textile Mills Limited, Tongi, Gazipur
- Pepcon Textile, Narayanganj
- Spider Fiber Industries Limited, Munshiganj
- Tiger Fiber Industries Limited, Munshiganj
- AB Textile Mills Limited, Gazipur
- Sufia Fabrics Limited
- Master Ship Fishing Industries
- Rupsha Fishing Net Industries
- Oxfam Gb
- Panama Industries (Pvt.) limited
- Meghna Fabric Industries Limited
- M/S Suma Impex International
- Hicotex Limited
- Eagle Fiber Industries Limited
- Rupchanda fishing net

**Table 5:** Available agro-textile product in Bangladesh market

Product Name	Company	Origin	Uses in BD	Price
Blue filters	Spider Textile Mills Limited	Bangladesh	Tilapia hatchery, filter for irrigation, insect mesh	1000-1400 BDT / roll (50yards×60")
Agriculture net	AB Textile Mills Limited	Bangladesh	Support net, bird protection, fence, harvesting	500-1500 BDT/roll (50 yards ×71")
Plastic Fence	Eagle Fiber Industries Limited	Bangladesh	For fencing garden, field	260-300 BDT / Kg
Cord Fence	Tiger Fiber Industries Limited	Bangladesh	For fencing garden, field	230-270 BDT / Kg
Fishing net	Rupsha Fishing Net	Bangladesh	Fishing, aquaculture net	500-1000 BDT / Kg

	<b>Industries</b>			
Mosquito net	Marium Textile Mills Limited	Bangladesh	Mosquito protection, wind shield, harvesting fruits	For round mesh:18-20 BDT/yards. For square mesh: 10- 20 BDT/yards

All these nets and filters are made from 100% polyester, nylon or plastic materials which are imported from various countries. Yarns or sometimes chips of polyester and plastic are imported which are made into yarns are used to manufacture these types of fabrics. The yarns and chips are imported from USA, Germany, India, China, Japan, Taiwan Etc.

Another leading agro-textile producer in our country is Bang Jin Ltd. They produce Jute Felt, Jute Tree Mat, Jute Mulch Mat. Most of them are exported. Jute Mulch Mat is used for vegetation in harsh environment. Without leaving any harmful residue, it degrades and form humus. Jute tree mat can be used for better growth of any tree. Jute tree mat can absorb large amounts of moisture, then they release it to the tree in drier time. Jute felt is 100% biodegradable. It degrades without leaving harmful traces. The product reduces water consumption and helps survival of plants in dry condition as it soaks moisture up to 5 times of its own weight. (Bangjin)

Though there are so many agro-textile products which are used all over the world, in Bangladesh farmers only use limited numbers of products. The use of agro-tech products such as agriculture net, mosquito net, fishing net, polyethylene sheet, packing materials have increased tremendously over past few decades. Unfortunately from this investigation the market size and total consumption of those agro-tech products in Bangladesh were not found, but according to the wholesalers of Fulbaria market, for some years Bangladesh is manufacturing those products locally and meeting her own demand. But a large number of agro-tech products are beyond application in Bangladesh and are not manufactured either. Despite of these facts, the use of agro-textile will increase in future for following reasons:

- Bangladesh needs to produce more food to feed more mouth and agro-textile can yield the production.
- Bangladesh is facing environmental challenge more than ever, in this situation agro-textile will be a great hope.
- Fertilizers and pesticides, water consumption can be reduced by agro-textile.

So, there is huge potential of agro-textile market in Bangladesh and she also has the potential to produce agro-textile. It may be a great source of earning foreign currency. But Bangladesh is lagging behind in this sector, though she achieved top most position in the traditional textile sector.

## **SWOT Analysis for The Possibility of Manufacturing Agro-textile In Bangladesh:**

The possibility of agro-textile manufacturing in our country is analyzed below.

### **Strength**

- Bangladesh is the second largest jute producing country after India and meet 41.94% of global demand (counting year 2012). (Data Bank of Jute, Kenaf and Allied Fibers). Jute can be used to manufacture various agro-textiles.
- Bangladesh has world class textile Industries, they can easily start a wing for agro-textiles.
- Relatively cheap labors which can give a competitive edge.
- Favorable place for foreign investor to establish new factories for agro-textile products. For foreign direct investment, there is no limitation pertaining to foreign equity participation, i.e. 100 percent foreign equity is allowed. Foreign investors or companies may obtain full working loans from local banks. (Bangladesh Bank).
- Abundance of manpower.
- Rise of weaving factory in Bangladesh.

### **Weakness**

- Lack of availability of synthetic raw material. Polyester, nylon, plastic chips are imported from China, India, Germany.
- Non woven and warp knitting technologies are two major techniques for producing agro-textiles but Bangladesh is not developed yet in those sectors.
- Poor infrastructure causes loss. Huge amount of time is wasted in transportation.
- Lack of supply of utility, severe gas crisis. This should be solved quickly.
- Lack of technical expertise and technical textile education.
- Lack of forward and backward linkage industry.

### **Opportunities:**

- Huge market potential in Bangladesh and throughout the world.
- Opportunity for more foreign currency as agro-textile products are highly priced than conventional textiles.
- US withdrawal from Trans-Pacific Partnership (TPP) can be a silver lining for Bangladesh to become a competitor in USA markets.
- Increased rate of consumption of agro-textile products.
- Solving unemployment problem.

### **Threats:**

- Although this sector has great potential, industrialists are not interested in investments.
- Lack of encouragement to entrepreneurs for going into technical textiles.
- Low importance given to the long term benefits.
- Unavailability of research and development facilities.
- Government is not taking any initiative to start up technical textile business.
- Political instability is the main factor for not alluring foreign investor.

### **Conclusion**

As agriculture is the backbone of Bangladesh, opportunities should be enhanced to utilize more and more agro-textiles. In future use of agro-textile will increase and it is high time to boost the production agro-textiles. Informative and encouraging seminars and meetings should be taken place to inspire the industrialists, the businessmen and the entrepreneurs, to distribute knowledge and idea about technical aspects of textiles in agriculture and to encourage them investing into manufacturing agro-textile products knowing the long term benefit of the products. All the weakness and threats have to be overcome in the path of growing agro-tech industries, exploiting strength and opportunities to inundate the country with the achievement in this sector.

### **References:**

1. Agrawal, M. S. (July ,2013). APPLICATION OF TEXTILE IN AGRICULTURE . *International Journal Of Advance Research In Science And Engineering*, 9-18.
2. *Bangjin*. (n.d.). Retrieved from [www.bangjin.com: http://www.bangjin.com/product%20-%20jute.php](http://www.bangjin.com/product%20-%20jute.php)
3. *Bangladesh Bank*. (n.d.). Retrieved from [www.bb.org.bd: https://www.bb.org.bd/investfacility/invesfac.php](https://www.bb.org.bd/investfacility/invesfac.php)
4. Basu, D. S. (September 201). Agricultural & horticultural applications of textiles. *The Indian Textile Journal*.
5. D. Gopalakrishnan. (n.d.). Retrieved from [www.fibre2fashion.com: http://www.fibre2fashion.com/industry-article/textile-industry-articles/agro-textiles-a-rising-wave/agro-textiles-a-rising-wave1.asp](http://www.fibre2fashion.com/industry-article/textile-industry-articles/agro-textiles-a-rising-wave/agro-textiles-a-rising-wave1.asp)
6. *Data Bank of Jute, Kenaf and Allied Fibers*. International Jute Study Group.
7. Dr V Subramaniam, G. R. (April 2009). Agro-textiles: Production, properties & potential. *The Indian Textile Journal*.
8. Ghose Bishwajit, R. B. (n.d.). REVIEWING THE STATUS OF AGRICULTURAL PRODUCTION IN BANGLADESH FROM A



- FOOD SECURITY PERSPECTIVE. *Russian Journal of Agricultural and Socio-Economic Sciences*, 19-27.
9. (2013). *Handbook for Agro-textile*. Mumbai: Ministry of Textiles, India.
  10. Karl Mayer. (n.d.). Retrieved from [www.karlmayer.com](http://www.karlmayer.com): <http://www.karlmayer.com/en/products/warp-knitting-machines/raschel-machines/net-machines/>
  11. Md. Meftaul Islam, M. D. (2014). PERFORMANCE OF DIFFERENT MULCH MATERIALS ON GROWTH AND YIELD OF BROCCOLI. *J. Expt. Biosci.* , 43-48.
  12. Rohit Landge, A. B. (January,2015). A Review on Agro-Textile Applications. *Dye Chem Pharma Business News* , 42-45.
  13. Solaiman, A. H. (2016). The Influence of Partial UV-blocking Films in the Insect Infestation and in the Growth of Broccoli and Turnip Seedlings. *British Journal of Applied Science*, 1-11.
  14. (2013). *Study on Developing Measures to Promote the Use of Agrotexiles in India*. Mumbai: Ministry of Textiles, Government of India.
  15. Talukder, D. (June 2014). Agricultural Trade Liberalisation, Inequality and Poverty in Bangladesh. *Journal of Economics and Development Studies*, 47-78.
  16. UN Data. *A world of information*. (n.d.). Retrieved from <http://data.un.org>:  
<http://data.un.org/CountryProfile.aspx?crName=bangladesh>