

UNIVERSITY OF GUELPH

# Export of Floating Row Covers to Nepal

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**Nikoletta Watlikiewicz**  
**AGR 1110**  
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### Product Description

Agribon floating row covers come in a variety of weights for a variety of functions. The Agribon AG-19, referred to as AG-19 for the rest of the paper, is suitable for Nepal's agriculture. AG-19 is a nonwoven, spunbonded fabric made of 100% polypropylene using the latest hot melt technology. It has strong, glued seams and is enhanced with UV stabilizers to optimize durability. This product can be placed directly on the plants or it can be stretched over wire hoops for more sensitive plants. If used with care, it can be reused year after year by consumers.

AG-19 provides up to 4°F of frost protection. It extends growing seasons by enabling sensitive plants to be transplanted into the soil at an earlier date and postponing harvest. A study done in 1993, when spunbonded floating row covers were just coming into use, found that yield was significantly higher in the row cover treatments compared to the control treatment (Natwick and Laemmlen 1993). AG-19 is also an excellent control mechanism against insects. Thrips, aphids, beetles, and most other insects cannot penetrate the cover to proliferate and infest crops and vegetables. Row covers also seemed to keep the worst of disease symptoms at bay and delayed the few symptoms that did appear. Although insect and virus protection does contribute to yield increases, other factors such as heat retention might also have contributed to the higher yields. Regardless if it was protection from insects and diseases or if it was heat retention, floating row covers demonstrated the ability to increase yields (Natwick and Laemmlen 1993).

Soil erosion is a significant issue worldwide that is continuously getting worse. In Europe, the tolerable soil loss level is less than 1.0 t/ha/year however, the actual level of loss occurring is between 4.5 and 38.8 t/ha/year (Jones et al. 2004). This is seen in Nepal, where the

heavy rain falls and steep slopes cause soil to be extremely susceptible to erosion (Tamang 1992). Soil loss due to rainfall was significantly reduced under a nonwoven, polypropylene fabric (Übelhör et al. 2014). On a 12% slope, soil loss was reduced by 78% compared to no cover and on an 18% slope, soil loss was reduced by 90%. Row covers reduce loss by such significant percentages because the force of the raindrop is broken on the cover rather than on the soil (Davies et al. 2006). This causes the aggregates to remain intact and moisture reaching the soil is not impeded.

Agribon row covers allow different percentages of light transmission to come through based on the weight and thickness of the fabric. AG-19 permits 85% of light to transmit through. The UV stabilizers function to protect the fabric against sun damage, as well as mildly protect the plants from harmful UV radiation. Studies have shown that elevated levels of UV-B radiation inhibit plant growth which in turn, reduces yields (Pal et al. 2006). AG-19 helps lessen the effect of UV-B damage on plants by decreasing the amount of harmful rays reaching the plants.

### Production

Polymer Group Inc. is the parent company of many companies worldwide. One such company is Fabrene which is located in North Bay, Ontario. Fabrene specializes in nonwoven fabrics for many business sectors, particularly building and construction. They currently operate several factories and employ 250 local area residents with plans for expansion. Including nonwoven agrotexiles, such as Agribon might be a possible way to move forward with these expansion plans.

Spunbond technology consists of laying multiple fibre filaments in a random method on a collecting belt. These fibres are then partially melted by applying heated rolls or needles. The polymer fibres are fused together to create a web like fabric. Figure 1 shows the spunbonding

process. There are many different polymers that can be used with spunbond technology.

Polypropylene, the polymer used in AG-19, is the most widely used as it provides the highest yield for the lowest cost. Polypropylene fabrics were first introduced to the market in the 1960's and have since improved significantly. In its most basic form, UV light has deteriorating effects on the fabric however, the addition of stabilizers preserves the fabric and permits several years of use outdoors.

Spunbonded fabrics have many properties that are desirable for geotextiles. Resistance to tearing, fraying, and creasing are amongst the top qualities. Compared to other non woven, woven, and knitted structures, spunbond technology significantly increases strength-to-weight ratios. Figure 2 demonstrates the stress-strain curves of three fabrics. The shape of the thermally bonded fabric curve can be attributed to the fibres ability to move when under stress.

### Market Opportunity

AG-19 is particularly suitable for vegetable producers as vegetables are typically grown in rows easily covered by fabric. A survey showed that seventy percent of households in the Himalayan region grew vegetables in home gardens (Brown and Shrestha 2000). Home gardens are often a well established production system within small and large homesteads. They provide food for the family and are also important for income and cultural practices (Sunwar et al 2006). Two regions, mid-hill and terai in Western Nepal were studied. It was found that the average sizes of gardens in mid-hill and terai were 402 m<sup>2</sup> and 434 m<sup>2</sup> respectively. The sizes of home gardens had increased over the last 15 years. Figure 3 shows the comparison of total land holding and how much of that land was allocated to a home garden. Vegetables were the major component of these home gardens followed by fruit. Floating row covers would be an asset to these home gardens. The main focus of this study was to observe the change in species

composition over the years. It was revealed that many crop species were lost, mainly due to the lack of planting resources (Sunwar et al. 2006). Although row covers have not been used in the past, they could become a valuable resource in enriching species richness due to the many functions provided.

The Canadian International Development Agency has recently funded a project in Nepal with the goal of improving the livelihood of farmers in Nepal through the production and commercialization of organic agriculture. Vast amounts of land currently in agriculture use in Nepal are free of inorganic fertilizers and pesticides mostly due to the fact that many farmers do not have access to, or are not aware of synthetic chemicals (Khatri-Chhetri 2006). The demand for organic vegetables is currently on the rise within Nepal (Bhandari 2006). Farmers looking to penetrate this market would benefit from the use of AG-19 row covers as they are an organic method of pest control and heat retention. Because of the project between Canada and Nepal in the increase of production and commercialization of organic products, a Canadian company might find it easier to enter this market with organic farming methods.

#### Benefits to Canada

Although this product is not currently being made by a Canadian company, there is an affiliate company in North Bay, Ontario that is outfitted with the machinery required for nonwoven fabrics. This company is looking to expand and agricultural textiles could be a possible market to expand into. They employ many employees in the area and an expansion would increase job availability. By producing row covers in Canada, many jobs would also become available in the distribution of the product.

Many smaller Canadian companies already sell this product. Companies such as William Dam Seeds and Vesey's seeds make a profit off Agribon Row Covers. If the manufacturing

occurs closer to home, these companies will not have to spend as much on shipping of the product from its current manufacturing location, Mexico. Depending on how well the product sells, Canadian companies might be able to use this additional profit for expansion or to hire more people. This same logic would make sense for Canadian farmers. The product is being made closer to home and farmers would not have to pay the extra shipping charges to import it from Mexico.

Currently Mexico is producing this product however, because the factories are owned by the same parent company, Mexico would not be a large competitor. There are many more aggressive competitors manufacturing product in China. China is much closer to Nepal and its entrepreneurs are being encouraged to expand trade with Nepal (Liang 2000). This means China could soon become a large exporter to Nepal and as a result, a large competitor to Canada.

## **Part II: Export Potential to Nepal**

### Nepalese Agriculture

Approximately 66% of the Nepalese population depends on agriculture as a career and it accounts for approximately 39 percent of the Nepalese GDP (Poudel and Kotani, 2013). Nepal has four seasons; shown in Table 1. The central region of Nepal produces about a third of the country's food supply and is considered the "food basket" of Nepal. It is divided into 3 agriculturally significant regions; Terai plains which have a low altitude, the Hills which are mid altitude, and the Mountains which have a high altitude (see Figure 4). The average annual temperatures vary based on the region and are currently undergoing climatic changes due to global warming. The highest fluctuations in temperature have been observed in the high altitude areas and increases in average rainfall are being observed throughout all three regions. Rice and

wheat are the most popular cash crops grown by farmers however, vegetables are slowly increasing in popularity (Sunwar et al 2006).

### Benefits to Nepal

Agribon floating row covers would be an asset to the farmers in the mountainous region of the Nepalese "food basket" as this region has the coldest climate with an average high temperature of 16°C in spring and 18°C in summer (Poudel and Kotani 2013). AG-19 would allow farmers to plant or transplant frost sensitive plants earlier in the spring and harvest later in the autumn. AG-19 is a good heat retainer which could help increase yields of vegetables that need a period of high heat.

Increases in temperature, which are occurring throughout Nepal encourage pest proliferation. AG-19 is able to keep pests from the plants beneath the cover while still permitting light, air and moisture to come through. Row covers seemed to be very efficient at reducing pest infestation as well as reducing and delaying disease symptoms (Natwick and Laemmlen 1993).

Rainfall is also expected to steadily increase annually which means an increase in soil erosion if precautions are not taken (Poudel and Kotani, 2013). AG-19 reduces the impact rain drops have on the erosion of soil by reducing the force with which the rain drop hits the soil. Moisture is still permitted through the fabric giving the plants the resources they need to grow and thrive.

The organic market is slowly expanding in Nepal with consumer pesticide concern steadily rising (Adhikari et al 2012). AG-19 can help farmers penetrate the market of consumers interested in organic agriculture as the row covers are a great help in insect control. This product would help individual smallhold farmers the most because it is a reusable tool that increases yields. It would not be practical for a village to purchase the product together or for a cooperative

to purchase the product for a few villages to share as floating row covers are needed on the plants at a specific time in the growth process. If row covers were to be shared, some farmers would not be able to use the row covers at the time when they are needed. This product is very practical both on a small scale, like a home garden, and on a large scale, such as a full field of vegetables.

### Cost Analysis

AG-19 and other Agribon row covers come in a variety of sizes. The smallest size available is 345.5 sq. ft and is priced at \$10.12CAD. The largest size is 50,000 sq. ft. and is priced at \$786.53 CAD. Buying the smallest size rather than the largest size would result in an additional cost of \$680.47 CAD if the full 50,000 sq. ft. were to be purchased in the smaller amounts. Therefore, it makes the most economic sense to buy the largest size and sell it in smaller quantities if necessary.

Assuming that the average person has a home garden of 600 sq. ft., dividing the 50,000 sq. ft. roll into 600 sq. ft. sections would come to costing \$9.47 CAD per section. If the smallest size was purchased instead, the same sized section would cost the consumer \$8.13 CAD more. Based on the distributor costs provided by Agribon and not accounting for shipping charges, an average roll of row cover fabric would sell for distributor price + 35%. If shipping were to be accounted for, it would cost approximately \$5682.00 CAD to ship 25 rolls in one standard sized crate with the dimensions 53' (L) x 8' (W) x 8' (H) if the 50,000 sq ft roll measured 50' (L) x 1.5' (W) x 1.5' (H).

Using the above measurements and calculations, to ship one roll to Nepal would cost approximately \$227.30 CAD per roll. One 50,000 sq. ft roll would retail for \$786.35 (distributor price) + \$275.22 (35% mark up) + 227.30 (Shipping) = \$1,288.87 CAD. Going back to the

assumption that an average home garden is 600 sq. ft., an average Nepalese gardener can expect to pay a little over \$15 CAD for a 600 sq. ft. piece for their garden vegetables.

### Marketing in Nepal

In recent years, the Nepalese government has been concentrating on vegetable value chains and how to change the mindset from a conventional supply-push approach, to a demand-pull approach that is more consumer oriented (Adhikari et al 2012). This means that farmers in Nepal now need to be more conscious of their consumers and provide the product that is in demand rather than providing a product and pushing it on consumers.

A study was done on the various consumer clusters that buy fresh vegetables. The first cluster, High-Value Discerning Consumers, were consumers that valued premium products, usually purchased at the supermarket, over price (Adhikari et al 2012). Organic production, freshness, and pesticide residue were the most important factors to them. 75% of these consumers come from high income brackets. Similarly, Low-Value Rational Consumers are most concerned with the same variables despite being from a much lower income bracket. This shows to farmers that organic production is becoming an attractive attribute to many consumers from a variety of pay-scales. AG-19 can be marketed as a product that can help in the production of organic produce to target these consumers.

On the other side of the spectrum, Low-Value Institutional Consumers and Price-Centric Non-Informed Consumers were the least concerned with pesticide residue and organic production. Low-price, ripeness, and external physical attributes were the factors most concerning to these consumers. These consumers were typically operates of institutions like low-standard hotels and catering services (Adhikari et al 2012). AG-19 can be marketed as a product that can also be used in the production of vegetables for this consumer group. With its ability to

keep insects away, farmers would not need to input chemical pesticides and could therefore keep prices low for the consumers in this cluster. AG-19 also reduces and delays symptoms of disease which would give the product positive physical attributes, a concern for these consumers.

Agribon AG-19 is a product that can be used in a very diverse range of production systems. It could be an invaluable tool in organic farming, soil preservation, and conventional farming. However, sometimes it can be difficult to persuade the target consumers to spend their hard earned money on it. One possible way to get the product on the market could be through free samples. A study done on the effect of free samples on a consumers readiness to buy found a positive correlation between the two (Lammers 1991). Consumers that were given a free sample were more likely to make a purchase.

### Regional and Global Competition

Nepal is a small, land-locked country, wedged between two really large exporters: China and India. Until recently, Nepal was limited to China and India for trade (Dugar 2014). They are currently expanding their trade partners and attempting to become a more export-oriented and market economy. Despite possible higher prices, Nepal might be looking to countries other than China and India as trade partners in order to begin building relationships and expanding their horizons.

However, China is still extremely close to Nepal and has a strong exporting market. Although China is still not a direct competitor to Canada in the US market, it has become a strong competitor in third markets (Boileau 2006). An article was printed in the China Daily newspaper a few years ago encouraging entrepreneurs to establish a trade relationship with Nepal (Liang 2000). Many Chinese companies have had success entering the Nepalese market and with their competitive pricing as well as closeness to Nepal, this success will most likely

keep rising.

### Future Studies to Properly Evaluate Export Potential

In order to properly evaluate the export potential of row covers to Nepal, a few more unknowns need to be investigated. Transportation cost and best route for delivery from North Bay need to be properly evaluated for the most cost effective option. Studies need to be done on the effectiveness of Row covers on Nepalese insects and diseases. Although it is assumed all of Nepal could benefit from this product, a study could be done on which region would benefit the most so potential exporters know which region to focus on. Lastly, the Nepalese farming population would need to be taught how to use the product and what the advantages and disadvantages are.

### Figures and Tables

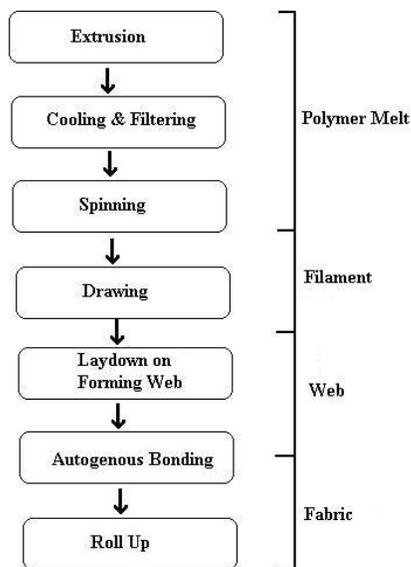


Figure 1: Flowchart of spunbonding process (Dahiya et al 2004)

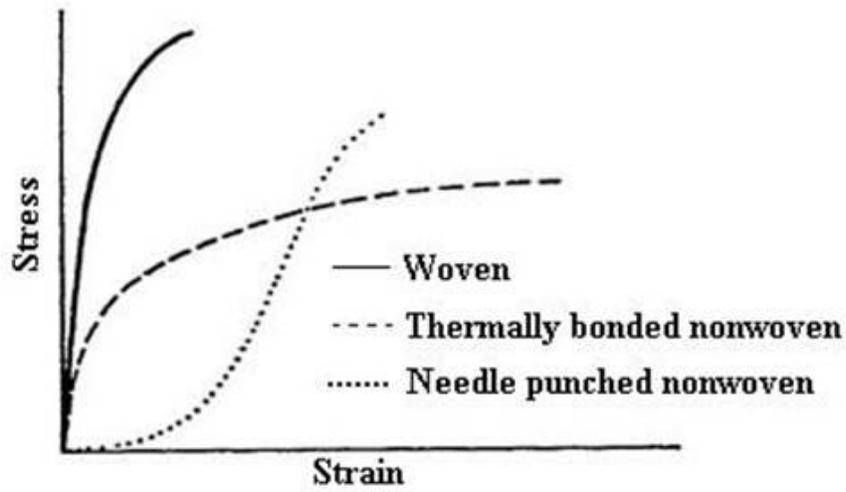


Figure 2: Typical Stress-strain curves

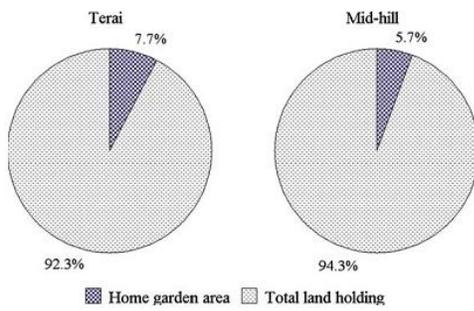


Figure 3: Proportion of home garden area over total land holding

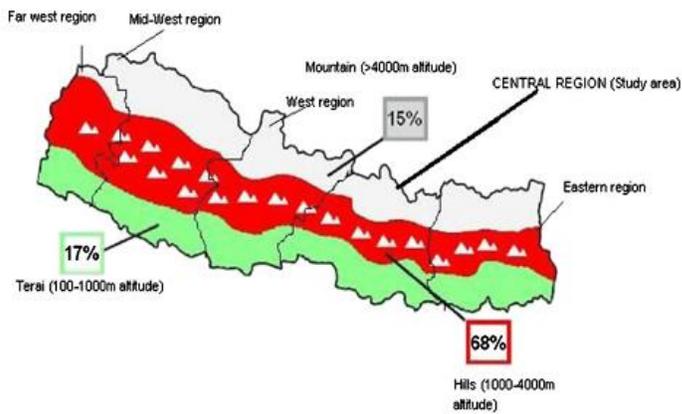


Figure 4: Ecological division of Nepal (Poudel and Kotani 2013).

Season	Months	Climate
Spring	March - May	Dry, Hot, Occasional Rainfall
Summer	June - September	Very Hot, 80% of annual rainfall
Autumn	October- November	Warm, Humid
Winter	December - February	Cold, Dry

Table 1: Summary of seasons in Nepal (Poudel and Kotani 2013)

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