

The Export of the Canadian Product, Pest Netting, to Better the Agriculture System in Nepal

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Product Information

A product that has the potential to better the agricultural sector of Nepal as well as provide benefits to the Canadian economy through exports and an increase in Canadian jobs is protective netting for gardens and small farms. The purpose of this netting is to protect fruit and vegetable crops from mainly insects and birds, although it would also be efficient for keeping away wild animals that may also cause damage to a farmer's field. By reducing the damage done by pests, Nepalese farmers can increase yields allowing for an increase in production as well as a higher quality of crop overall. When one is to look at the effects this would have on a farmer's life it becomes clear that more crop production means more food to feed their family as well as a better chance for Nepalese farmers to have some crop left over to either sell to their neighbors or send to the market.

Canadian Product Companies

The Canadian companies that would be best for this project are Syfilco Ltd, Industrial Knitting and Dubois Agrinnovation. Syfilco Ltd is a three-generation family owned and operated Canadian business located in Exeter Ontario since 1979. This company produces materials such as bale net wraps, pallet net wraps, golf netting, ice wine netting, bird netting etc. Dubois Agrinnovation is also a Canadian company, with major headquarters in Simcoe Ontario as well as Saint-Remi Quebec.

The first contact made with Syfilco was through email with Marg Knip (mknip@syfilco.on.ca), and she stated that she was very excited and willing to take part in a project such as this (Knip, Pers.Com., 2014). She then passed my contact information forward to Aaron and Tony Deboer who got back to me on some specifics. Soon after this first communication Aaron Deboer got back to me via email (aaron.deboer@syfilco.on.ca) with his expert opinion as well as other products he felt would be well suited for dealing with pest prevention in Nepal. He recommended the $\frac{3}{4}$ Bird Netting for the prevention of bird damage and disease. The green polyethylene

fabric weighs 14.5 grams per meter², is UV stabilized, allowing for a more durable product, and has a ¾ inch diamond mesh. The cost for this product is approximately \$0.28/sq. ft. CDN. There were also two styles of netting that Aaron spoke about. There were both over the row and structure application style. Over the row would be more useful for smaller production and structure, which covers an entire section or field of crops versus single rows at a time, would be more ideal for a large scale, commercial production. He then said that they did not carry any netting that would be efficient for keeping bugs out but he recommended that contact be made with the Canadian company, Dubois Agrinovation, as they would be more equipped to handle bug netting (Deboer, Pers. Com. 2014).

I then contacted Colton Oughtred of Dubois Agrinovation via email (coughtred@duboisag.com) and he described to me the best options for Nepal. Colton recommended the AGRYL P-12 Floating Row Cover (product no. AGRYP121,6X100) for optimal insect protection. The dimensions of this product are 5' X 328', weighing 4.2lbs, it is UV treated and the price starts at \$40 CDN a unit. The benefit to this product is that it is a floating row cover. A floating row cover is much more efficient at keeping bugs out as it prevents insects from laying eggs that can pass through the netting and land on the leaves of the plant. He also recommended anything that came from their ProtekNet series. Figure 1 shows the different options for ProtekNet, there are many options in the size and weight of this product although he recommended the lightest netting, which is 25gr, to keep the cost down for Nepalese farmers (Oughtred, Pers.Com. 2014). Bug netting would be more efficient to sell to the Nepalese, as it would also keep out birds, whereas the bird netting would not keep out smaller insects.

Figure 1: Comparison of Different Bug Netting Options from Dubois Agrinovation

Features	ProtekNet 17 gr	ProtekNet 25 gr	ProtekNet 52 gr *	ProtekNet 60 gr	ProtekNet 70 gr *	ProtekNet 80 gr
Mesh size	0,85 mm X 0,85 mm 0.0335" X 0.0335"	0,35 mm X 0,35 mm 0.0138" X 0.0138"	0,25 mm X 0,73 mm 0.0098" X 0.0287"	0,95 mm X 1,9 mm 0.04" X 0.07"	0,90mm X 1,70 mm 0.0354" X 0.0669"	0,60 mm X 1 mm 0.0236" X 0.0394"
Material	Polyamide	Polyamide	Polypropylene	High Density Polyethylene	Polyethylene	High Density Polyethylene
Weight	17 gr / m ² 0.056 oz / ft ²	25 gr / m ² 0.082 oz / ft ²	52 gr / m ² 0.171 oz / ft ²	60 gr / m ² 0.197 oz / ft ²	70 gr / m ² 0.230 oz / ft ²	80 gr / m ² 0.262 oz / ft ²
U.V. Treated	Yes	Yes	Yes	Yes	Yes	Yes
Porosity	≈ 75%	≈ 62%	≈ 80%	≈ 95%	≈ 95%	≈ 80%
Light Transmission	≈ 93%	≈ 90%	≈ 93%	≈ 93%	≈ 90%	≈ 90%
Color	Clear	Clear	Clear	Clear	Clear	Clear
Lifespan	1 - 2 Years	1 - 3 Years	5 Years	5 Years	5 Years	7 Years
Widths**	2,20 m - 3,30 m 4,20 m - 5,20 m 7.2' - 10.8' 14' - 17'	2,10 m - 3,10 m 4,20 m - 6,30 m 6.9' - 10' 14' - 21'	1,60 m - 2,10 m 4,20 m 5.2' - 6.9' 14'	2 m - 4 m 6 m - 8 m 6.6' - 13' 20' - 26'	2,10 m 4,20 m 6.9' - 14'	2 m 4 m 6.6' - 13'
Lengths**	100 m - 250 m - 500 m 328' - 820' - 1640'	100 m - 250 m 328' - 820'	100m - 200 m 328' - 656'	100 m 328'	100 m - 250 m - 500 m 328' - 820' - 1640'	100 m 328'
Insects	ProtekNet 17 gr	ProtekNet 25 gr	ProtekNet 52 gr *	ProtekNet 60 gr	ProtekNet 70 gr *	ProtekNet 80 gr
Aphids		X	X			
Armyworm	X	X	X	X	X	X
Cabbage Root Fly	X	X	X	X	X	X
Carrot Rust Fly		X	X			
Chrysomelid	X	X	X	X	X	X
Corn Borer	X	X	X	X	X	X
Eriophyid Mite		X (Not 100%)				
Flea Beetles		X	X			
Leafhopper	X	X	X			X
Leek Moth		X	X (Not 100%)			X
Nymph		X	X (Not 100%)			
Onion Maggot	X	X	X	X	X	X
Sawfly	X	X	X	X	X	X
Seedcorn	X	X	X	X	X	X
Spotted Wing Drosophila	X	X	X	X (Not 100%)		X
Squash Bug	X	X	X	X	X	X
Swede Midge		X (Not 100%)				
Tarnished Plant Bug	X	X	X	X	X	X
Thrips		X (Not 100%)				
Twospotted Spider mite		X (Not 100%)	X (Not 100%)			
White Fly		X (Not 100%)				

(Dubois Agrinovations 2014)

Shipping

Using the Canadian company A1 Freight Forwarding, the cost of airfreight from Toronto Ontario, Canada to Kathmandu Nepal for 100lbs of either product would be

\$906.12 CND or 80,205.79 Nepalese rupees. This Canadian option was much more affordable in comparison to UPS freight at \$1,697 CND or 150,270 Nepalese rupees for the same weight and distance.

Benefits to Canada

The export of this product has the potential to involve up to three Canadian companies. There is huge potential for benefit to the Canadian economy through both an increase in exports as well as an increase in Canadian jobs. Both Syfilco and Dubois Agrinovations started off as small family owned operations and have grown to become major market players in the field of industrial knitting and crop protection. By increasing their sales and profit they may also be able to update their Canadian production and lower costs, intern better serving and accommodating their Canadian customers. All of the products sold would be produced and processed in Canada as well.

Once the initial product of bug nets has been sold and accepted into the Nepalese agricultural system, if the farmers enjoy the durability of this product they may look for other products from the Canadian companies. They could purchase different netting for vineyard production, bale netting for hay production as well as, pallet net wraps and even drainage filters (Syfilco 2014).

Critical Analysis of Potential Benefits to Nepal

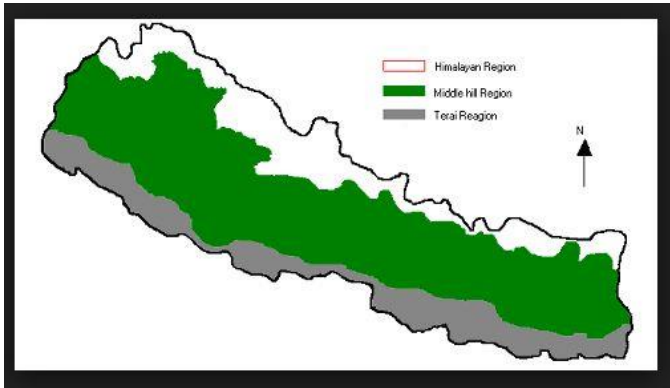
Introduction to Nepal

To better understand why and what the purpose of trading to Nepal is, one should look at the country itself and the structure of its agricultural system. Nepal is a small landlocked country located between China from the North and India from the South (Anonymous 2010). Nepal is broken up into three different regions: the Himalayan or mountainous region (15%), the hilly region (68%) and the Terai region (17%). The Teria was originally covered with tropical vegetation but now as almost completely been converted to farm land. It is also known as the breadbasket of Nepal. Its total area is

approximately 147,000 square km and the population is 267.8 million people

(Anonymous 2010). Figure 2 displays these three different regions.

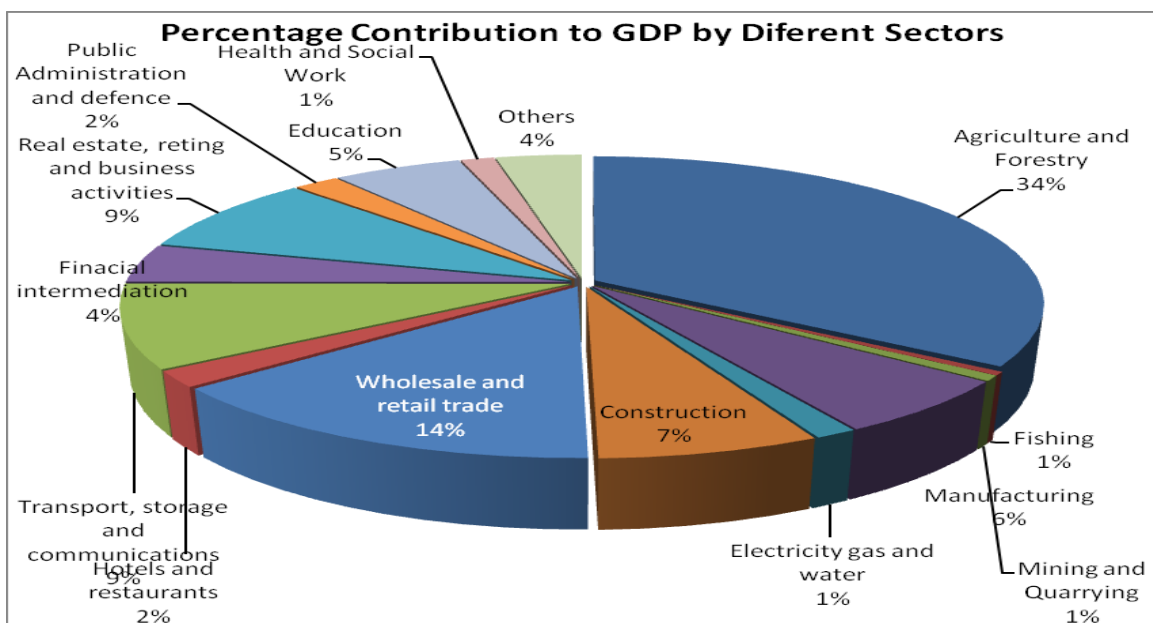
Figure 2: Major geographical regions of Nepal



(Kul, 2013)

Nepal also has over 100 regional and indigenous languages, which is an important fact to consider when thinking about trade structure within the country (Anonymous 2010). Nepal has a strong base in agriculture as it consumes over 79% of the country's workforce as well as provides 34% of the GDP. Figure 3 displays how the GDP is spread out amongst the different careers.

Figure 3: Percentage Contribution to the GDP by Different Sectors in Nepal



(Khanal, Mallick 2013)

Nepal's per capita income \$427, once again something to consider while talking trade with this country (Anonymous 2010). Nepal is also ranked 57th out of 88 countries in the Global Index for Hunger. (Bista, Amgain, Shrestha 2013) The currency in Nepal is the Nepalese rupee, which is equivalent to 0.011 Canadian dollars. Some of Nepal's top produced crops are paddy, maize, millet, and wheat as shown below in Figure 4 (Sharmia 2000). Unfortunately it is estimated that the Nepalese loose up to 35% of their crop harvest due to pests and storage issues (Palikhe, 2002).

Figure 4. Area, Production and Yield 1998/99 (Nepal)

	Crops	Area (ha)	Production (MT)	Yield (kg/ha)
1.	Paddy	1514210	3709770	2450
2.	Maize	802290	1345910	1678
3.	Millet	263950	291370	1104
4.	Wheat	640802	1086470	1695
5.	Barley	31843	31798	999
6.	Oilseeds	190429	119731	629
7.	Potato	118043	1091218	9244
8.	Sugar cane	53894	1971646	36584
9.	Pulses	308008	228840	743

(Sharma, 2000)

The productivity of these crops varies from region to region. Using rice (or paddy), as it is the most important cereal crop in Nepal, for example the average productivity in mountains is 1.7-2.0 t/ha (tones/hectare), the average productivity in the hills is 1.3-2.3 t/ha and finally the highest yields from the Terai being 2.6-2.9 t/ha (Sharmia, 2000).

Another important concept to consider when thinking about trade with Nepal and agriculture in general is the cost involved with owning a farm in a country where a

growing population and limited arable land puts pressure on land prices. From 1977-2010 large amounts of cultivated land have been converted to different land use classes, with a large majority of this being urbanization (Rimal 2013). From 1977-2010 urban land use has grown from 6.33% to 51.42% and cultivated land has shrunken from 60.73% to 20.27%. With noticeable changes in land use as well as a swing in rural population from 2.9% in 1952/1954 to 17% in 2011 (a growth of 0.23 million to 4.5 million) as well as urban population from 86% in 2001 to 83% in 2011 it has never been more pertinent to come up with more efficient ways to work within the agricultural sector in Nepal (Rimal 2013).

Canada-Nepal Trade

When looking at trade between Canada and Nepal it is important to notice that a steady base for exports and imports between the two countries has already been established (Beck, Raj 2014). The trade between these two countries has increased comfortable over the past five years and shows few signs of slowing down as the in 2013 Canada exported \$10,296,214 CDN to Nepal, which can be seen below through Figure 6 (Beck, Raj 2014).

Figure 6: 5-year trade, Canada – Nepal

Year	Exports	Imports
2009	\$4,169,711	\$13,281,529
2010	\$5,496,537	\$15,376,553
2011	\$6,338,701	\$15,737,207
2012	\$6,557,819	\$12,292,706
2013	\$10,296,214	\$12,195,995

(Beck, Raj 2014)

The heaviest trades between these countries are, in their respective order, animal products; vegetable products; fat, oil, and wax products, food products, and minerals products (Beck, Raj 2014). This data shows that 4 out of the top 5 top products traded between Canada and Nepal are agriculture based. This data is very promising for the

Canadian products, bird and bug netting, as agricultural trade between Canada and Nepal would not be swimming in untested water (Beck, Raj 2014).

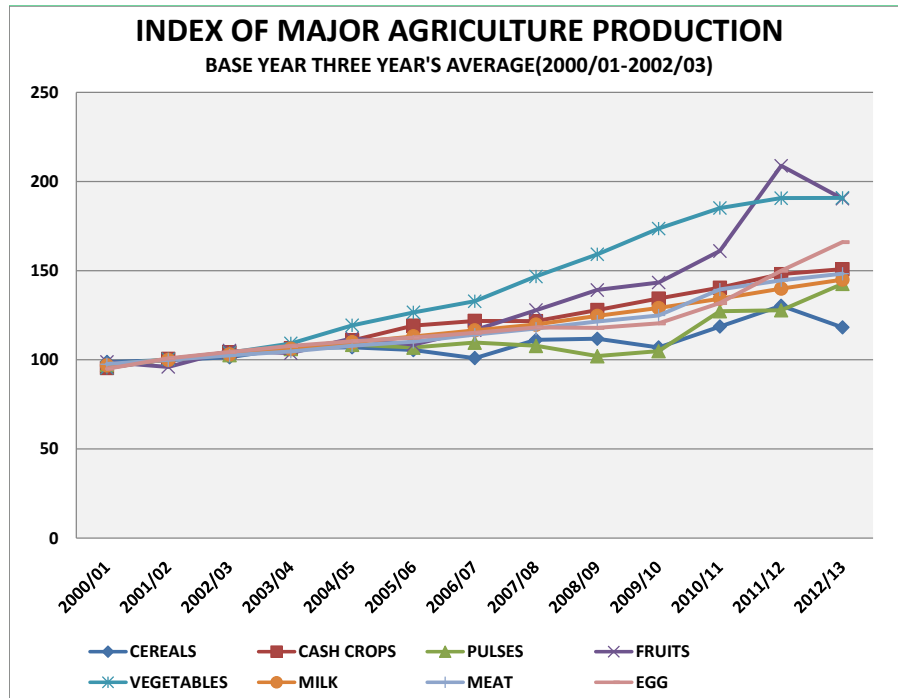
Who Would Buy this Product?

The target audience of my product is the small-scale farmers themselves. This is a product that would be most efficient at the individual level. It would work best for smaller scale production where pesticides are not educated about or affordable. Several problems may arise from the indiscriminate use of pesticides; pest resistance to pesticides; resurgence of pests; toxic residues in food, water, air and soil; disruption of ecosystems; and even accidental poisonings resulting in death have occurred (Palikhe 2002). It has also been reported that farmers generally do not follow the pre-harvest waiting period for applying pesticides, sometimes even the practice of dipping vegetables in pesticides before selling them at the market has been observed. Pest nets may not eliminate the use of pesticides however it may reduce the need of them in smaller scale productions, also limiting the negative effects that come with them (Palikhe 2002). Pest nets would not be ideal for larger scale production of fruit and vegetable production. This is because large-scale producers are more likely to use pesticides effectively instead of netting, as it is more time efficient.

The idea is that each farmer would have netting to suit their own personal acreages, and be able to reuse the product from year to year as they have different crops in need of protection from pests. This product would be for the farmer who is producing more fruits and vegetables on their farm in comparison for those who are growing cereal grains. The reason for this is that cereal grains are often grown in larger acreages in Nepal, as well as on a terracing system, which is not feasible to try and protect through netting, too much work would have to go in for a temporary solution (Sharma 2000). In addition to this, cereal grains do not have as obvious of a fruit or product to protect; often insects that attack cereal grains will consume the entire plant (Sharma 2000) This product

would be most effective at protecting a smaller, garden like system of crops. When looking at Figure 5 it becomes obvious that fruit and vegetable production in Nepal is increasing annually at a quick pace (Khanal, Mallick 2013).

Figure 5: Index of Major Agriculture Production in Nepal 2000-2013



(Khanal Mallick 2013)

What Does an Increase in Fruit and Vegetable Production Mean?

This increase in fruit and vegetable production can be interpreted one of two ways. On one hand a dramatic increase of production for these two categories of crops means that there could be great opportunity to introduce the Canadian product, bird and bug nets into the Nepalese agricultural system. The Nepalese will be looking for new ways of preventing bird and bug damage to their crop, once again trying to reduce that 35% loss that is already going on (Palikhe 2002). However since fruit and vegetables cannot be grown through the terracing systems and require more nutrient rich dirt it is likely that they are grown in a concentrated area through commercial farming (Anonymous 2010). Most of the fruit and vegetable production would not benefit from

the use of pest nets as it is more directed towards the small, self-sufficient farmer with small fruit and vegetable production.

Distributors

A great distributor in Nepal would be the leading super market chain Bhat-Bhateni. With more than 40,000 customs a day and 9 stores throughout Nepal this could be a great way to start distribution of the product. Once it has begun to catch on with the Nepalese people it will be important to get the product to more rural areas. There are many small cooperatives throughout the countryside in Nepal where farmers get their supplies and chemicals needed for their farm. This would be the ultimate goal, to get the product to somewhere where farmers could pick it up with their other farm supplies. These are more difficult to track down as often times they are not listed, farmers are just aware of their locations. This will be one of the more difficult parts to disturbing the product.

Benefits to Nepal

The group of people who would gain the most through the import of this product would be the small-scale farmer. This Canadian product will be able to increase yields in Nepal without costing farmers large sums of money. This product is low risk, low cost, low space uptake and requires little education on how to use it. This product would also eliminate some of the dangers that come along with the indiscriminate use of pesticides (Palikhe 2002).

By improving the Nepalese farmers' yield in a non-costly manor increases the amount of food being produced will also be impacted in a positive way. This increases the food available to feed his family and even sell on the market with little chance of food security issues. This product can be reused from year to year so the original cost that the farmer puts in will be the total cost. This product also has the ability to produce jobs in Nepal. If knitted products like this catch on within the agricultural sector and it become

more economically sensible to start producing the nets in Nepal the raw unwoven netting could be shipped from Canada to Nepal and workers could assemble it there, as well as any other knitted agricultural products that farmers have a demand for (bale netting, wine grape fencing etc).

Possible Drawback for the Nepalese People

One drawback that should be considered is that a bug or bird net is something that could most likely be hand made by Nepalese workers and by importing them it takes away job opportunities for them. Netting is something that could be woven together and sold at local markets, its not to say that farmer's wives couldn't even do it themselves and sell them for extra money to support the farm. A possible solution to this could just be importing the raw product, the unwoven netting, and selling it for a cheaper price. This would still allow for a benefit to the Canadian economy but it would also open the doors for some extra money to be made in Nepal, and even directly on farms.

A secondary possible drawback would be to the cooperatives that are selling pesticide. Many times co-ops are run by farmers in Nepal and if they are selling a lot of pesticide, eliminating the use for that product could do some damage to the profits that the farmers are making. This however is not as large of a drawback as the chemical companies make the most money through the sale of pesticides (Palikhe 2002).

Future Studies Needed

Moving forwards there is still much research that needs to be done on wither or not bug nets will catch on well in Nepal. Once they are introduced it will have to be evaluated if the effort required to set up the bug net will be worth the increase in yield or if it would be more efficient to educate farmers on the correct way to use pesticides

Another area that still needs improvement is the best way to distribute the bug nets. Since a lot of times cooperatives are set up by farmers, their location is not advertised, farmers just come to them to get what they need. When trying to find

information on co-op locations so far the little information available was written in a different language.

Product Comparison to Other Nations

When comparing other nations prices to that of Canada’s, some are more expensive and some are cheaper, however it is also important to think about distance to Nepal and the difference in shipping prices, as well as the quality of the material. Figure 6 sums up some of the different pricing options for Nepal from nations such as China and the USA.

Figure 6: Price Comparison from other Nations

Country of Origin	Product	Price (\$US)	Special Notes
Shanghai, China	Garden Bug Netting	\$1,800-\$2,200	Minimum order 3tonnes
Tianjin, China	Nylon Bug Screening Net	\$0.12-0.25	Minimum 500 sq m
USA	Garden Insect Screen (00616)	\$32.80-\$980.74	\$32.80 for 6.5’x20’ \$980.74 for 13’x328’

(Alibaba.com, Americannettings.com 2104)

It is hard to accurately determine what the cheapest and most efficient option would be for Nepalese farmers. Often times options from China are much cheaper, as figure 6 above shows. The first product from figure 6 allows the netting to be bought in bulk with a much lower shipping costs since it is so much closer to Nepal. One would also have to consider the quality of the product. Neither Chinese options are UV stabilized meaning that the sun will deteriorate the product at a much quicker and it will not last the farmer as long as the Canadian option (Alibaba.com 2014). The American option is similar in price to the two Canadian companies however when looking on their product website it was observed that they has less specific sizing and product options as

well as most of their products were not produced in the USA (Americannetting.com 2014).

Critical Summary

When taking into consideration all the facts and discussions above it has been concluded that pest preventative netting would not be an efficient solution for Nepal. This has been the conclusion reached because it would be more feasible to educate the Nepalese farmers on the correct way to use pesticides (Palikhe, 2002). Most of the fruit and vegetable production done in Nepal is large scale, commercial production where pesticide use is a much more efficient way of reducing damage done by pests. If farmers already take short cuts on the easier option of pesticide use there is little chance that they would be willing to take the time to apply bug nets to all of their crops, especially if the demand for fruit and vegetable production continues to grow in Nepal (Khanalm Mallick 2013). The more feasible solution for the Nepalese agricultural system would be to for the government to implement incentive programs for farmers to practice proper use of pesticide on their farm (Palikhe 2002).

A program such as this could be ran very similarly to the Canada-Ontario Environmental Farm Plan, where farm families voluntarily prepare assessments to increase their environmental awareness in up to 23 different areas on their farm. Partaking in a program such as this allows for tax breaks to farmers as well as bursaries to put their plan into action (Agriculture and Agri-Food Canada 2014). This could have great benefit to a country such as Nepal where food security has risen to become a major concern throughout the agricultural sector (Palikhe 2002).

As far as the Canadian products from Syfilco and Dubois Agrinnovation goes, it would most likely do better in a country where agriculture is more advanced and there is a pressure to reduce the amount of pesticide used in crop production. An agricultural sector that could accommodate this more labor-intensive practice for reducing pest

damage to crops would be that of the Europeans. The ever-growing pressure to limit or completely ban the use of dichloro-diphenyl-trichloroethane (DDT) containing pesticides in many European nations is at its peak, where as the push to finally ban neonicotinoids in Europe had finally taken over as of April 2013. A two-year ban from neonicotinoids and an increasing pressure to ban many other pesticides in Europe has farmers beginning to search for new ways to prevent pest damage to their crops (Karin 2000). This has the potential to launch the Canadian made bug nets into the European agricultural system.

In conclusion although the agricultural system in Nepal could benefit from the use of pest netting, it is unlikely that Nepalese farmers will adapt this labor intensive practice pesticides (Palikhe 2010). These nets, however, would have a great benefit to the agricultural system in Europe where there are strict regulations on the use of pesticides and many have even been banned (Karin 2000). There are still many benefits to both countries through this topic, Nepal bettering their food security, possibly through a similar practice that Canada exercises (Environmental Farm Plan) and Canada increasing exports of agricultural based products from hard working companies.

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