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Section 0103 Monday at 8:30 AM

AGR 1110 – Introduction to Agri-Food Systems

Due: November 24th 2014

Exportation of Tassel and Shoot Bags for Hand Pollination of Corn

PART 1

Nepal is a small country located between China and India and their agricultural sector is very important to their GDP. In fact 30% of their current GDP comes from the agricultural sector (Khanal, R., personal communication, October 3, 2014). Nepal's climate is also quite interesting as they have 3 different climatic regions within the country. Nepal has a Himalayan region, Middle Hill region and Terai region (Khanal, R., personal communication, October 3, 2014). The Terai region is farmed year round while the Middle Hill region and Himalayan region have specific growing seasons much like Canada (Khanal, R., personal communication, October 3, 2014). Nepal's agriculture is also mainly a subsistence farming operation with farmers having less than 1 hectare of land per farmer (Khanal, R., personal communication, October 3, 2014). The cropping system within Nepal in the Terai region is a 3 to 4 crop per year rotation (Khanal, R., personal communication, October 3, 2014). The most common rotation is rice, cauliflower, mustard then corn and most farmers use their seeds from the previous years crop to plant their current years crops (Khanal, R., personal communication, October 3, 2014). There has been a progression lately towards more research and development within the agricultural sector and farmers are becoming more organized and working within small groups to farm larger areas with more commercial crops being produced (Khanal, R., personal communication, October 3, 2014). However farmers also do not want to become too large due to the labour input being high as well as the demand within the market not being extensive (Khanal, R., personal communication, October 3, 2014). There is also some trading done between farms as well as labour swapping (Khanal, R., personal communication, October 3, 2014). Due to the world wide climate change issue, the environment for certain crops are changing and this has lead to new hybrids of all crops being produced in developed countries. The implementation of

the shoot and tassel bags should be done in various elevations of Nepal to produce new hybrids suited to that climate.

Product Information:

Since there has been a progression towards more research and development practices an exportation product that could be beneficial to Nepal are shoot and tassel bags for hybrid seed development. Specifically the exportation of these 2 products would be for the development of corn hybrids that are genetically suited for Nepal climate. The shoot bags are very similar to plastic bags and the specific product that is recommended is a Uline product called Autobag Bags. Uline is a Canadian – owned and operated company that currently has a branch office located in Toronto, Ontario (Lal, K., 2014). The Autobag bags that are produced by Uline are manufactured on a roll, which makes work efficient as they are also pre-opened and perforated (Lal, K., 2014). The size of bag that is suitable for shoot bags is model number S-8430 and is 5” x 7” (Lal, K., 2014). The number of bags per roll is 2000 and the price for 1 roll is \$53 (Lal, K., 2014). If one were to order 6 or more rolls of this product the price would be \$45 per roll (Lal, K., 2014). The tassel bags are very similar to paper bags and the product that is recommended for export to Nepal is a product from Atlantic Packaging. Atlantic Packaging is a Canadian – owned and operated business located in Toronto, Ontario and does business though out North America (Fish, 2014). The specific product from Atlantic Packaging would be the standard paper lunch bag that comes in a package containing 500 paper bags (Fish 2014). The dimensions of that paper bag would be 5” x 3” x 11” and has a total package weight of about 5 pounds (Fish, 2014). The individual price for 1 package of 500 paper bags would be 8 Canadian dollars (Fish, 2014). Atlantic Packaging was recommend by the Atlas Paper Bag Company Ltd. because Atlas Paper Bag is not set up to deal with the public and for that reason would not provide any

information on specific products and prices (Wrona, 2014). If Atlas Paper Bag products were to be used that specific product would be the 1 pound Kraft Grocery Bag, which is available in packages of 500 (Calvo, 2013). However there is no information on pricing available for this product and is not recommended due to the purchasing being done by individual farmers or cooperatives.

Required Inputs:

The inputs that are required for the production of the shoot and tassel bags within Canada are based on the manufacturing plant requirements to create the plastic and paper bags. Another input involved in Canada would be the exportation of the paper bags due to Atlantic Packaging solely having dealt only within North America (Fish, 2014). The inputs that are required in Nepal for the implementation of these products is more extensive as the actual timing of implementation is key to the success of the products. Both bags need to be placed over the shoot and tassel before pollination has taken place in order to collect that pollen and breed new hybrids. After the pollen from the plants has been collected Nepalese farmers will need to cross the model plants together to create an offspring with ideal characteristics for Nepal's climate. By crossing the model corn plants together the ideal outcome would be to produce an offspring that is higher yielding and early maturing. This new hybrid would then be ideal crop for the unique crop rotation in Nepal.

Patents and Intellectual property constraints:

One potential issue that could occur with individual farmers creating their own hybrids may be patent issues if they retain seed from a company that requires farmers to purchase seed every year. Currently farmers in Nepal retain a certain amount of seed each year so that they can plant a crop in the next year (Khanal, R., personal communication, October 3, 2014). If new

hybrids were to be developed by an individual who patented the seed, there could be future issues involved with subsistence farmers retaining their seed from year to year. This is something that should be addressed before it occurs, as this would be added stress to the farmers.

Market Opportunity:

The specific market for these products would be the research and development sector of the Nepalese government. By providing the Nepalese government with different tools for hybrid breeding more trials could be conducted through out all regions of Nepal. These products would also be beneficial to farmers whose current crop is not ideal for their climate and is wishing to change the seed that is produced. However since the product currently will be shipped in bulk quantities it is not ideal for a single farmer to purchase 1 order of product as that farmer would have a large amount of excess product. These products should be shipped to a local cooperative so that the cost to an individual farmer would be reduced and a larger amount of variation of crop hybrids are produced.

Benefits to Canada:

The benefits to Canada would be within the specific companies Uline and Atlantic Packaging, as they would have increased sales and profit. There would also be a benefit to companies that collect and produce the recycled paper that Atlantic Packaging uses to create their paper bags. The contacts for these companies is included in the attached table in appendix 1.2.

There could also be a potential market for the Nepal hybrids in Western Canada. Currently the Northern areas of Saskatchewan and Alberta cannot produce corn or soybean crops due to unfavorable heat units and climate conditions. It may be possible that due to new hybrids being potentially developed in Nepal that are early maturing; those corn hybrids may be suitable

for Western Canadian producers. There are some Western producers that are currently attempting to grow a variety of corn that is low in heat units and are sharing the cost of the planting and harvesting equipment (Maxwell, S. personal communication, November 18th, 2014). Due to Nepal producing 4 crops per season off one field the corn hybrids that potentially will be developed may be suitable for the short growing season in Western Canada. As well if there was to be a corn hybrid that was developed for the Middle Hill region in Nepal that was early maturing, it is believed that that corn hybrid would be the most suitable for Western Canadian climate conditions. The benefit beyond the increased sale and profit of Uline and Atlas Paper Bag is small due to the hybrids that will be produced in Nepal more than likely will not be suitable for most Canadian agriculture.

Environmental Sustainability:

The environmental sustainability of the shoot and tassel bags is not ideal because of the use of plastic and paper however could be improved with the use of recycled products. In regards to the plastic bags that are produced by Uline the specific AutoBags that are recommended for export does not fall under Uline's list of environmentally friendly products (Lal, K., 2014). Uline does have some biodegradable products as well as some compostable products however at this time the Autobags are not apart of that line up and are not recommended for use as shoot bags in Nepal at this time (Lal, K., 2014). An ideal situation in regards to everyone being environmentally sustainable would be to use recycled plastics to produce the required plastic bags. After the bags have been used they should then be recycled as well. The paper bags from Atlantic Packaging are produced from 100 percent recycled paper and is about 85 percent post-consumer products (Fish, 2014). These bags are also recyclable,

compostable and biodegradable making them environmentally friendly and sustainable (Fish, 2014).

PART 2:

Transportation Logistics:

The transportation methods involved with exporting tassel and shoot bags to Nepal would be air transportation and well as land transportation. Shipping by air is one of the more feasible options due to the location of Nepal, and because Toronto is surrounded by landmasses. Air transportation is also ideal for shipping this product because the of the size of the packages not being overly large. The product will be flown from Toronto Pearson International Airport to either Pokhara International Airport or Trubhuvan International Airport, depending on which part of the country that particular shipment is going to. There could be shipments going to both airports due to the ideal situation being that many retailers offer these products through out Nepal so that there is easy access to shoot and tassel bags for all farmers. The cost for shipping via UPS the cost of 1 package of AutoBags containing 3 rolls of AutoBags would be \$734.76 and would take 6 days to get from Toronto to Nepal by air (UPS, 2014). This cost of transportation does not include the cost of purchasing the AutoBags. There is an example of a simplified version of a potential transportation route from Canada to the development of a new corn hybrid attached in appendix 1, which details the steps involved for air transportation of the paper and plastic bags.

Cost Analysis:

For an individual farmer this product is not realistic to purchase, not only in terms of price but also in terms of quantity. For one roll of plastic AutoBags the cost is \$53 and that is without taxes or the cost of shipping (Uline, 2014). The one roll of AutoBags also contains 2000

bags, which is far too many for one subsistence farmer to use in one year. If that farmer was to purchase one roll and continue to use them year after year then it may make sense to purchase that amount of product. If a cooperative or village was to buy one or more rolls of the AutoBags the cost to the individual farmer would decrease, as it would be a shared price. The ideal situation would be for a cooperative to purchase at least one roll of Autobags so that everyone within a village could participate in selectively breeding corn varieties. For the purchase of paper bags the cost is substantially less than the plastic bags however the quantity of plastic bags is not ideal for a single farmer. For one package of 500 paper bags the cost is \$8 (Fish, 2014). In addition to this cost is the Canadian taxes and the cost of shipment from Canada to Nepal, which would be about 266 Canadian Dollars and take approximately 10 days to reach Nepal (UPS, 2014).

Benefits and Needs of Nepal:

The benefits of exporting shoot and tassel bags to Nepal are for the development of corn hybrids that are suitable for Nepal's climate. With the development of new corn hybrids that are early maturing and higher yielding Nepalese farmers will be able to produce more corn in a shorter amount of time. This will result in an increase in food product, an increase in product available for market, an increase in animal feed as well as an increase in seed for the next growing season. The environmental benefits within Nepal would be mainly combating climate change. It is known that Nepal does not have many weeds or disease pressures and so developing a disease tolerant crop is not a concern (Khanal, R., personal communication, October 3, 2014). The ideal situation with exporting the shoot and tassel bags to Nepal for hand pollination is to control the development of new hybrids and make them specifically tailored to that farmers needs. Global warming is changing the climates of many areas and developing an

early maturing and higher yielding corn variety would allow for ultimately more food production for the individual farmer. The benefits to smallholder farms in Nepal is small and is not recommended due to high prices and excess of product. If an entire village or multiple villages such as a cooperative were to work together in purchasing and using the products that would be ideal. The cost to the individual farmer would be reduced as well as bulk prices would apply if more product was required for a larger amount of farmers participating in the development of new hybrids. The Nepal Government has a sector specifically for research and development, which is within the Department of Agriculture (Department of Agriculture, 2014). The Ministry of Agricultural Development is the specific branch of the Agricultural department of the government in which the shoot and tassel bags should be exported too. This branch of government is directly involved with the development of new corn hybrids as they have done studies involving corn hybrids and current farmers within Nepal (Tiwari, 2008). One study that was done recently that is relevant to corn hybrids is a study done by Tiwari that involved farmer participation in regards to the adoption of new maize varieties for complex hillside farming operations (Tiwari, 2008). By consulting this study researchers and farmers in Nepal will be able to develop new corn hybrids from the varieties that have been shown to do well in certain climates and environments of Nepal. Another consumer that could potentially benefit from the exportation and importation of shoot and tassel bags to Nepal is Agricultural and Forestry University. This university would be able to do trials involving corn by using the shoot and tassel bags to control pollination within a field or greenhouse setting. By controlling the pollination of corn, researchers can chose which features of certain plants will succeed in Nepal's climate.

Potential Contacts:

Silvia Fish from Atlantic Packaging could be a potential contact for a manufacturer and distributor of paper bags. There is still information that is unknown as to the specific amount of product required as well as some shipping details. Atlantic Packaging is not set up to ship internationally and that is something that would need to be discussed if this company was chosen for the exportation of their paper bags. Silvia's contact information is contained in the attached table in appendix 1.2.

Another potential contact in Toronto could be Robert Wrona from Atlas Paper Bag Company Ltd. One concern with Atlas Paper Bag Company Ltd. is that they are not set up to sell to the public which means that if they were to be contacted it would only be ideal if it was a cooperative or retail chain store that would be purchasing the paper bags. Mr. Wrona's contact information is also provided within the attached table in appendix 1.2.

A third potential contact within Canada is Uline's Canadian Branch Manager, Karam Lai. Uline's Canadian office is also located within Toronto, however Mr. Lai was not available for any conversations and therefore may not be willing to be a partner within in this project. His contact information is also provided in the attached table in appendix 1.2.

Regional and Global Competition:

Since Nepal is bordered by China and India it may be cheaper for Nepal farmers to obtain the paper and plastic bags from either of those countries however while looking into this it was difficult to find retailers online. One company that is present in China as well as online is Alibaba.com. One concern about this company is that their minimum purchase amount is quite high. For paper bags the minimum requirement is one package containing 500 bags, which is similar to Atlantic Packaging in Canada. For plastic bags however the minimum requirement is

one package containing 10000 bags, which is 5 times more than Uline requires as a minimum purchase.

Within India, currently there are producers of paper and plastic bags however the prices for these products was unavailable as you must send an inquiry and wait for a response from the company. A response was sent to this company however no response was obtained. The specific company that was sent an inquiry was Indiamart.com. Indiamart produces both paper and plastic bags and may be a suitable company to import from since it is in close proximity to Nepal. There are some concerns with this however because of the unknown minimum purchase requirements and cost of products.

In the United States there is a company, Quill, which is owned by Staples that also offers plastic and paper bags. The minimum requirements for each product are more reasonable than the Chinese requirements. For the plastic bags the minimum purchase requirement is one package containing 2000 plastic bags, which is very similar to Uline's minimum purchase requirement. For the paper bags the Quill's minimum purchase requirement is one package containing 25 paper bags where Atlantic Packaging's minimum requirement is one package of 500 paper bags.

When comparing the cost of each product from different companies the two most reasonably priced products in terms of only the individual product and excluding transportation costs is shown in the attached table in appendix 1.1. Atlantic Packaging would be the most reasonably priced paper bags at \$8 per package and are located in Canada. Quill.com would be the most reasonably priced plastic bags at about \$36 per package and are located in the United States. With this in mind Quill.com also provides the most reasonable amount of product as well compared to Alibaba.com, which is also shown in the attached table in appendix 1.1.

Future Studies/Unknown Information:

There are some aspects of the exportation of these products that are unknown. The exact transportation costs are unknown due to the fact that the amount of product being exported is also unknown. Another factor that is unknown is the documentation required for the exportation and importation of the shoot and tassel bags for Canada and Nepal. Some future studies that are required for the development of new corn hybrids is the successfulness of crossing corn plants with the use of shoot and tassel bags. The study would need to look at the genes that are appearing in the offspring to see if they are viable within the Nepal climate. Shoot and tassel bags may be able to germinate the corn stalks but the successfulness of the offspring is not fully understood in Nepal's climate. Another study that should be completed is trials pertaining to the successfulness of creating offspring using shoot and tassel bags within a field and greenhouse setting. In a field setting there are many environmental factors that are uncontrollable where as in a greenhouse the environment is controlled by computers that the experimenters can program.

Recommendations:

The recommendations for the exportation of plastic shoot bags and paper tassel bags to Nepal is to import the shoot and tassel bags from Canada for the development of new hybrid corn varieties. The price comparisons of the Canadian products looking at the current market is lower than the price of other products, which can be bought within India or China. There is a comparison of these prices within the price comparison table in appendix 1.1. Unfortunately there are currently no prices for the Indiamart products.

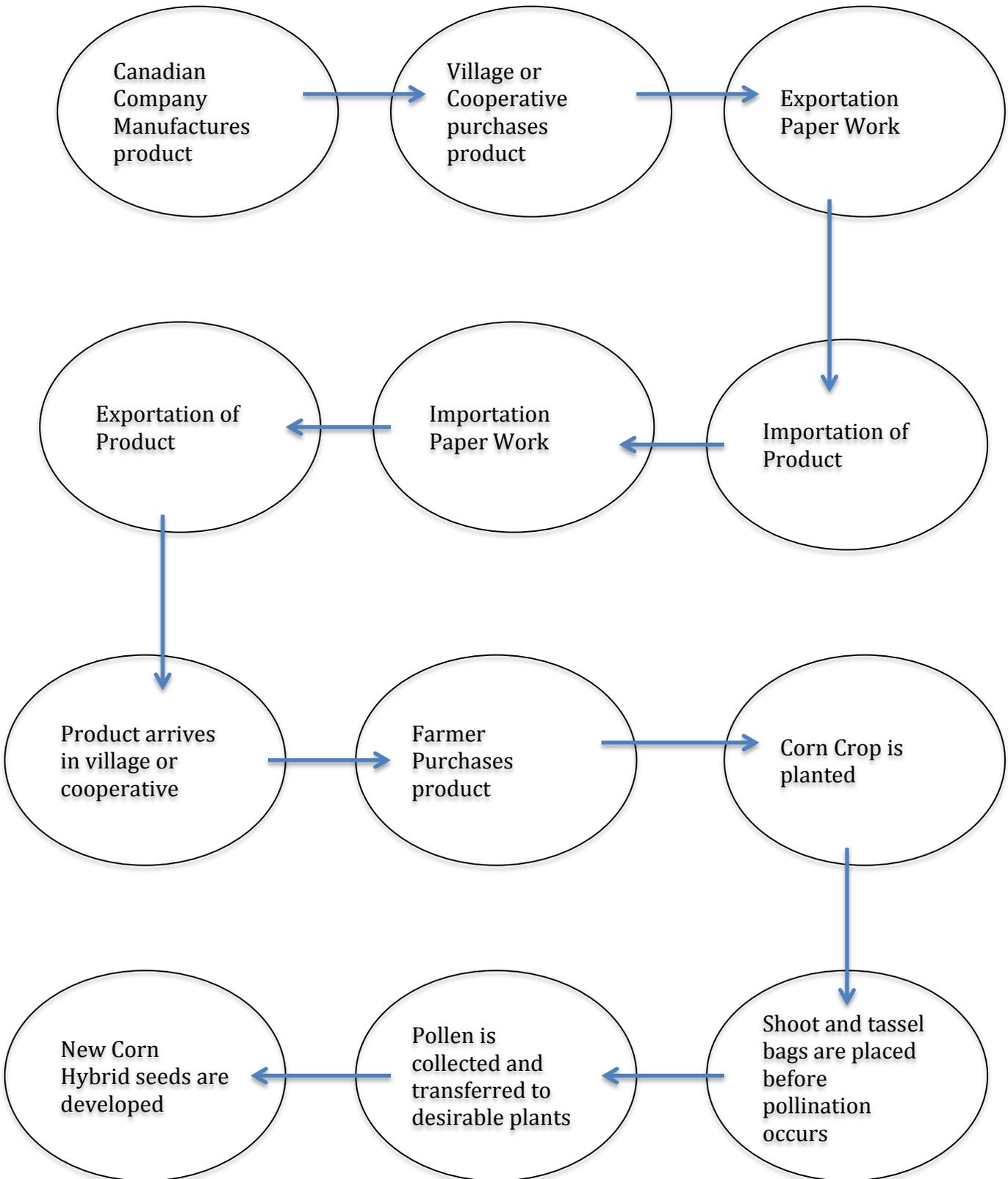
Another recommendation for the exportation of shoot and tassel bags from Canada would be to have an education program or training day for farmers within Nepal before implementing

the use of shoot and tassel bags. With proper education there would be an increase in productivity and successfulness of the crosses.

A third recommendation for the exportation of shoot and tassel bags to Nepal would be to develop and implement a joint research group between Nepal researchers and Canadian researchers. This would be to monitor the development of new varieties and potentially create a corn hybrid that is suitable for the climate conditions within Western Canada. This would be beneficial to both Canada and Nepal due to the continuously increasing population to combat the greater need for food that will arise from the increase in population.

Appendix 1

Transportation From Canada to a Nepal Farmer (Simple Version):



Appendix 1.1**Comparison of International Products and Prices:**

Company	Location	Product	Amount of Product	Price (CAD)
Uline.com	Canada	Plastic Bags	2000/package	\$53/package
Indiamart.com	India	Plastic Bags	UNKNOWN	UNKNOWN
Quill.com – owned by Staples	United States	Plastic Bags	2000/package	\$ 35.99
Alibaba.com	China	Plastic Bags	10000/package	\$2000/package
Atlantic Packaging	Canada	Paper Bags	500/package	\$8/Package
Indiamart.com	India	Paper Bags	UNKNOWN	UNKNOWN
Quill.com- owned by Staples	United States	Paper Bags	25/pack	\$4.99 (on sale right now – regular – \$8.99)
Alibaba.com	China	Paper Bags	500/package	\$200/package

Appendix 1.2**Potential Contact Information:**

Contact Name	Company	Location	Contact Information
Silvia Fish	Atlantic Packaging	Toronto, ON, Canada	416-297-2233
Robert Wrona	Atlas Paper Bag	Toronto, ON, Canada	416 - 293 - 2125 ext. 315
Uline call representative – Karam Lai is the Canadian Branch Manager	Uline Packaging Products	Toronto, ON, Canada	1-800-295-5510 – call representative

References:

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Tiwari, T., Virk, D. and Sinclair, F. (2008). Rapid gains in yield and adoption of new maize varieties for complex hillside environments through farmer participation. *Field Crops Research*, 111:137 – 143.

UPS Shipping Costs. (2014) UPS Canada. Accessed October 27th, 2014. Retrieved from: https://wwwapps.ups.com/ctc/request?loc=en_CA&appId=fctc

Wrona, R., personal communication from Atlas Paper Bag, e-mail correspondence, November 19th, 2014. Contact Number: 416 - 293 - 2125 ext. 315.