

Heather Gibson
AGR1110
November 24th, 2014

Canadian Export Project to Nepal – Crownvetch

Introduction:

In Nepal, approximately 81% of the population is involved in agriculture including 71% that are subsistence farmers (Bardsley & Thomas, 2005). Subsistence farmers are people who grow just enough food to feed themselves and their families, and anything left is sold to make a small profit to continue growing their own food and surviving on their own the next year (Bardsley & Thomas, 2005). These families are in jeopardy due to the massive and critical problem of erosion in Nepal. In this paper, the simple solution of using the cover crop crownvetch will be discussed and analyzed. Crownvetch will be described for all of its uses and benefits as well as the benefits to the participating nations if this cover crop were to be exported from Canada to Nepal. These benefits include increased business for small Canadian seed companies, and increase in available employment in Canada. For Nepal, some benefits would include less soil nutrient loss in valuable farmland, more stable hillsides, as well as safer living areas for the Nepalese people as erosion or unstable slopes lead to devastating mudslides causing hundreds of deaths each year (“Mint”, 2014). Various companies who carry this product such as the Ontario Seed Company will be described and the total cost of buying, shipping and planting will be analyzed. Shipping options and routes will also be discussed. Overall, the purpose of this paper is to contribute to helping the Nepalese farmers and their families, helping the agriculture sector of Nepal, and discussing what Canada can do to aid in the development of this country in need.

Part 1

Product Description:

The crownvetch plant, *Coronilla varia* L., is a legume plant that is used most often as a cover crop to prevent soil erosion (Gustine & Moyer, 1990). It originated in central and southern Europe and North Africa but is now a reoccurring plant in the Mediterranean and North America. It can grow to approximately 1 metre in height with a dense canopy containing mostly leaves but also fragrant flowers ranging from white to dark purple in colour (Gustine & Moyer, 1990). This perennial grows well on

any sort of landscape, including steep slopes, and it can also grow in full sunlight without repercussions (Ontario Seed Company [OSC Seeds], 2014). Crownvetch is specifically good at restoring hills that are difficult to maintain. It requires no special tending such as fertilizing, mowing, or weeding since the thick foliage prevents weeds from growing amongst it (OSC Seeds, 2014). Furthermore, crownvetch thrives where other legumes cannot because it can grow in soil that has limited fertility as well as in wet conditions. This legume can also last for decades (Gustine & Moyer, 1990). What makes crownvetch such a great cover crop for preventing erosion is that its roots form a very complex branching network that grows deep into the soil, holding it in place. However, even though this plant is sturdy, it has a very long germination period of about 6 months and does not create full coverage until 2 or 3 years later (Gustine & Moyer, 1990). Furthermore, it can be used as a forage for ruminant livestock such as cattle, goats, and sheep but not for non-ruminants since the crop contains several aliphatic nitro compounds which are toxic to non-ruminants (Moyer & Gustine, 1984). These compounds are degraded in ruminant digestion and do not affect them (Moyer & Gustine, 1984). It also provides shelter for small wildlife which would promote a diverse ecosystem (Gustine & Moyer, 1990).

The Company:

One of the Canadian seed companies that carry crownvetch seeds is OSC Seeds. OSC Seeds sells the perennial seeds along with annual ryegrass seeds which help the crownvetch establish itself (OSC Seeds, 2014). This company has been 100% Canadian and family owned since the late 1800s when they were established as a small store in Waterloo, Ontario. It is now a fifth generation family company. Its retail store is still located in Waterloo, Ontario and has a large packing facility in Kitchener, Ontario. OSC seeds do not grow their own seeds in Canada, they purchase their seeds from all over the world, and then package them in the OSC facilities in Kitchener, Ontario and distribute them from a 140,000 square foot central distribution warehouse which is also located in Kitchener, Ontario. All their seeds are packaged by machine, although some specific seeds are counted

individually by a counting machine and then packaged by a separate packaging machine. Most of the vegetable seeds that OSC carries are packaged in number of seeds per gram and the bulk purchases are sold specifically by weight. The crownvetch seeds are sold at \$39.99 CAD (3,514.78 in Nepalese Rupees) for the combo package of 500g of crownvetch and 500g of ryegrass but can also be purchased in bulk if specially arranged with the company . This 500 grams of crownvetch seed and 500 grams of ryegrass seed will cover an area of about 2000 square feet. If a very large area is to be covered, it is best to sow at approximately 22 kilograms per hectare. A catalog of all OSC Seeds' products can be found on their website at oscseeds.com including crownvetch in their wildflower section with the code number 8320. A hard copy of the catalog can be ordered online as well at no charge. OSC Seeds can also be contacted through email at seeds@oscseeds.com as well as through telephone at 519-886-0557. Furthermore, since OSC Seeds purchases their seeds from around the world, crownvetch seeds could be shipped all year round due to the various locations and climates of where the crownvetch is produced meaning that this product does not have any restrictions due to seasonality (OSC Seeds, 2014).

Health and Nutritional Information:

Crownvetch was originally labeled as a poor forage for farm animals but more recently it has been deemed as a good forage when fed as hay or grazed (Burns & Cope, 1974). It consists of 21.7% crude protein and 22.2% crude fibre (Reynolds, Jackson, Lindahl & Henson, 1967). In an experiment involving the digestibility of crownvetch in sheep, it was found that the crude protein is 65.6% and the crude fibre is 46.2% digestible which is similar, but slightly less than the digestibility of alfalfa forage (Reynolds et al., 1967). As previously mentioned, this only applies to ruminant animals as it is toxic to non-ruminants (Moyer & Gustine, 1984).

Benefits to Canada:

Canada and Nepal have had diplomatic relations since 1965 (Government of Canada, 2013).

Nepal has an Embassy in Toronto, ON and in Victoria, BC and Canada has established the High Commission of Canada in New Delhi, India (Government of Canada, 2013). Over the past 40 years, Canada has invested about \$470 million CAD in Nepal and directly supports large and small programs and projects throughout the developing country. This shows how much Canada supports Nepal and how committed they are to help build a stable democratic society (Government of Canada, 2013). This product is not directly produced in Canada but rather is packaged and sold in Canada by OSC Seeds (OSC Seeds, 2014). This allows for crownvetch to be supplied without the concerns of seasonality as the seeds are coming from different countries (OSC Seeds, 2014). Furthermore, there are many seed companies that carry a variety of options for cover crops in Canada (Ontario Ministry of Agriculture, Food and Rural Affairs [OMAFRA], 2013). Not as many carry crownvetch specifically but enough that there is a good number of options to buy from. In Table 1, a list of a few of the companies that carry crownvetch and/or suitable replacement cover crops are shown. Since there are a few Canadian companies that carry crownvetch, the options for shipping to Nepal from Canada could come from any of these companies (OMAFRA, 2013). Furthermore, these companies, however big or small they are, would receive an increase in business due to the new market available to them in Nepal.

Table 1: Canadian Companies That Carry Crownvetch

Company Name	Contact Information	Seeds Available
Maple Seed Inc. (Peter Craig)	tel: (705) 324-6273 or 1-800-461-7645 fax: (705) 324-1803	Vetch: hairy, cicer milk, crown Ryegrass: annual, perennial Variety of clovers, variety of grasses
Simcoe District Co-op (Scott Collins)	tel: (705) 726-6531 or 1-888-513-1111 fax: (705) 737-3435 e-mail: elmvale@simcoeco-op.com	Crownvetch Red Clover Rye: winter, annual
Speare Seeds (Murray MacRitchie, Scott Bowman)	tel: (519) 338-3840 fax: (519) 338-2510 e-mail: www.speareseeds.ca	Crownvetch Red Clover Variety of vetch Ryegrass

<http://www.omafra.gov.on.ca/english/crops/resource/covercrp.htm>

Competing products:

Considering that Canada is very far away from Nepal, there is competition with various cover crop seed companies that exist in closer countries such as India and China. These products do not require the same long-distance shipping that Canadian products resulting in a higher price for Canadian products. Some of these companies are summarized in Table 2. The Indian company Nadampadom Rubber Estate is the biggest competition to Canadian seed companies exporting to Nepal as their seeds are approximately \$27 cheaper than OSC Seeds' crownvetch seeds. However, the rate of \$39.99 for OSC Seeds' crownvetch seeds includes 500g of ryegrass to aid in the germination of the crownvetch (OSC Seeds, 2014). This is not absolutely required for crownvetch to grow. Further inquires to OSC Seeds are required in order to find out the possibilities of purchasing the crownvetch seeds on their own and what the price of that would be. Overall, there was not enough competition found in the cover crop business in India and China to suggest that a Canadian product could not thrive in Nepal.

Table 2: Competing Indian Companies

Company Name	Location/Contact Information	Product	Prices (CAN)
Nadampadom Rubber Estate	Thrissur, Kerala, India e-mail: info@covercrops.org Web: covercrops.org	Various cover crops: Javanica, Calopogonium, Mucunabracteata etc.	\$53.94 - \$61.81/kg (Alibaba.com)
Greenind Trades	Ernakulam, Kerala, India tel: 91-484-2680381 Contact through Alibaba.com	Various cover crops: Mucuna Bracteata, Pueraria javanica,	unknown

Part 2

Nepal Description:

Nepal is a small, landlocked country located in between China and India (Dodds, 2008). It is one of the poorest countries in world with about 40% of its 28 million people living under the poverty line. Its location on the south side of the Himalayas and the resulting environmental issues from deforestation does not help the Nepalese people who mainly rely on subsistence agriculture (Dodds,

2008). Nepal is also ranked as having one of the lowest human development indexes by the United Nations Human Development Report (Khadka, 1998). Furthermore, the main energy source in Nepal is fuelwood which accounts for 68% of their total energy consumption (Sharma, 1996). This dependence on trees causes the serious lack of forest cover on hillsides. These bare hillsides, and the extreme monsoon rain combined with the delicate and steep terrain leads to dangerous landslides and serious erosion problems (Sharma, 1996). During the monsoon season, Nepal receives approximately 80% of

it's total annual rainfall within the span of 4 months from May to September concentrated more in the southern most part of the country (Burbank et al., 2012). This annual rainfall is depicted in Figure 1. These heavy amounts of rain result in erosion rates of approximately 2mm/yr in the south farmland but less, approximately 0.1mm/yr,

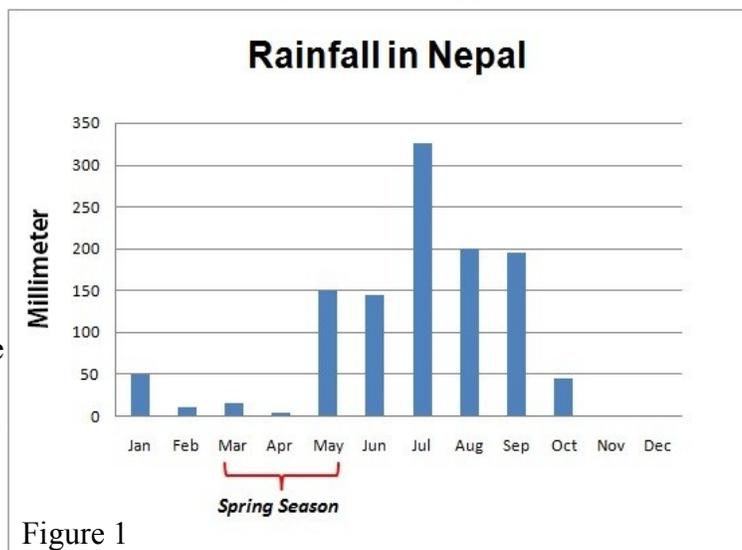


Figure 1

<https://advancedadventures.files.wordpress.com/2014/01/rainfall-in-nepal-chart.jpg>

in the north since a lot of the rain falls as snow (about 40%) (Burbank et al., 2012). For these reasons, Nepal desperately needs assistance to control the problem of erosion, specifically since it affects so much valuable farmland.

Transportation Logistics:

Since Nepal is landlocked, there are no sea ports for shipments to go directly from Canada to Nepal. This means multiple steps would have to be taken to get the seeds there. First of all, OSC Seeds has a packing facility and a distribution warehouse located at 77 Wellington Street, Kitchener, Ontario (OSC Seeds, 2014). The crownvetch seeds would be packaged and mailed from this location. At the present time, OSC Seeds only ships to Canadian addresses, contact was attempted to determine if shipping to Nepal was possible but no response could be given at this time. If the seeds were to be

shipped from Canada, they would most likely travel by truck from the distribution warehouse in Kitchener, Ontario to Lester B. Pearson Airport in Toronto, Ontario. The seeds would then travel through Air Canada from Toronto, to Heathrow Airport in London, England as shown in Figure 2. Then take a connecting cargo flight with Jet Airways from there to Indira Gandhi International Airport in New Delhi, India as shown in Figure 3 (Air Canada Cargo, 2014). From New Delhi, the seeds would travel by truck to central Nepal.

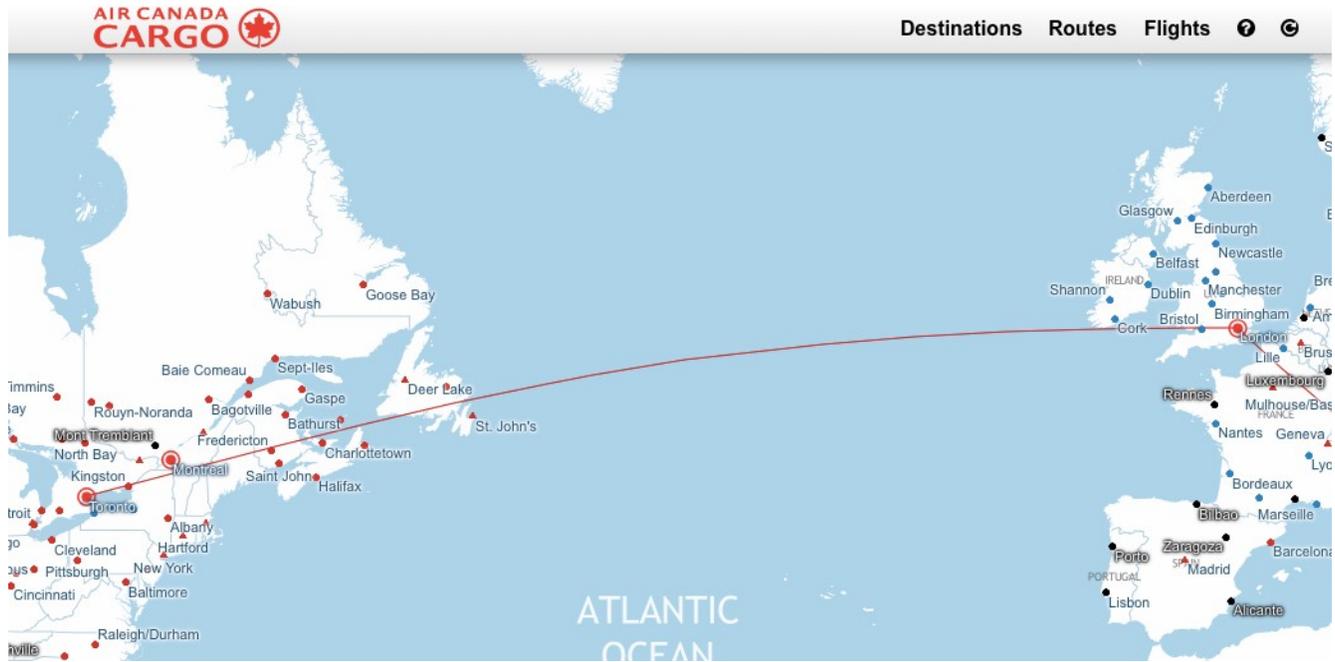


Figure 2

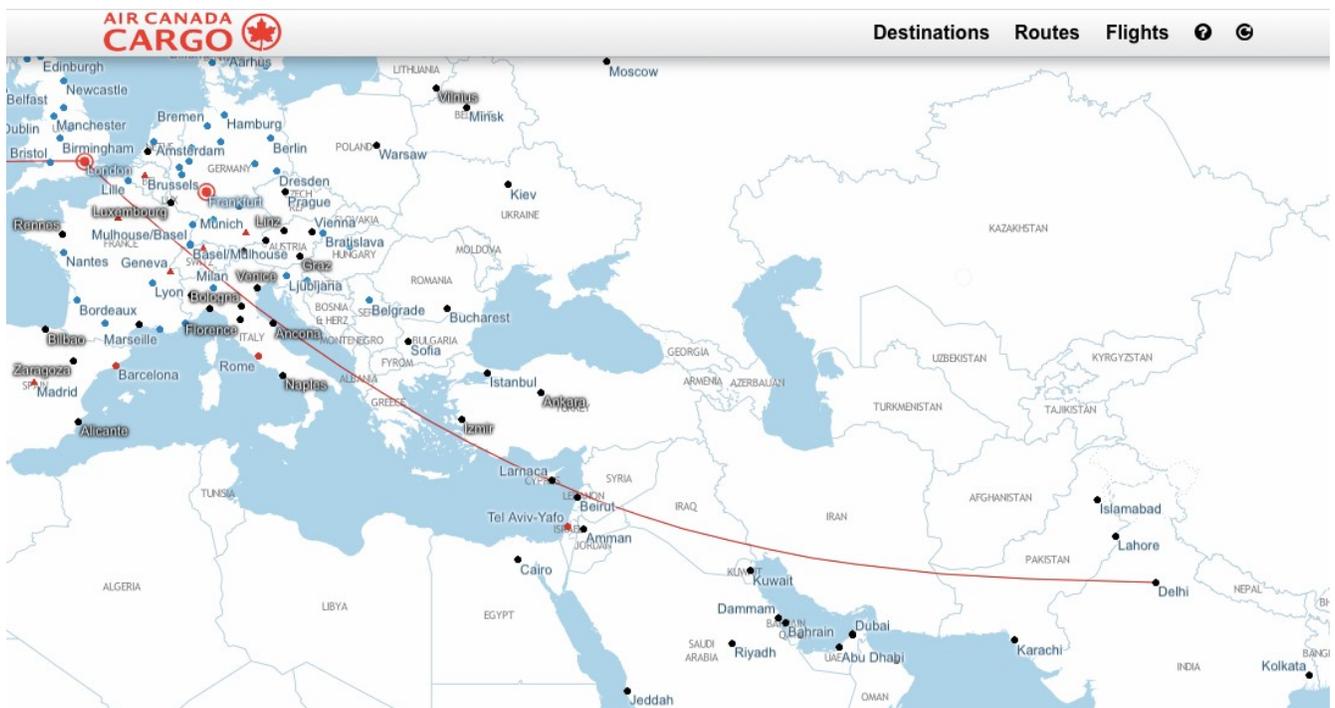


Figure 3

After arriving in India, the Indian transportation company called DTDC (Door-to-Door Courier) would be an option to truck the seeds to Nepal. In Kathmandu, the capital city of Nepal, there is a company called Misu Trading that specializes in importing goods to sell to the Nepalese people (Misu Trading, 2014). This company would be the most ideal option to sell the crownvetch seeds to the Nepalese as they are a company based on supplying what the consumers need. This company can be contacted by e-mail at misu@misutrading.com or by phone at 00977-1-4218764 (Misu Trading, 2014).

Storage:

In terms of storage, seeds do fairly well. One downside is that seeds lose moisture the older they get and this can affect how well they grow (OSC Seeds, 2014). However good storage involves more than just loading the seeds into a container and leaving them there (Christensen & Meronuck, 1986). Insects, mites, and rodents can be very destructive to stored seeds as well as moulds and fungi (Christensen & Meronuck, 1986). Since the seeds from OSC Seeds are prepackaged in Canada, these issues will be avoided when shipping as special shipping containers, such as refrigerated or heated, are not required for the crownvetch seeds (OSC Seeds, 2014).

Customers:

This product would be best suited for farmers with severe erosion problems on their land as well as communities that suffer from eroding river banks or frequent mudslides. Single farmers who have the money to spare could purchase these crownvetch seeds to help maintain their land and prolong the life of the soil. Communities could pool their money to afford these crownvetch seeds in large quantities in order to cover larger problem areas resulting in a safer living area for the entire community.

Benefits to Nepal:

Some of the benefits that Nepal would receive from using the cover crop crownvetch would be that less nutrients would be lost from the soil. A process called leaching occurs when there is too much water on farmland. Leaching is when nutrients in the soil are displaced by water and moved away from the farmland where the plants cannot use them (Major, Steiner, Downie & Lehmann, 2009). This usually occurs on slopes where rain water hits the soil and immediately runs off down the slope or when water sits in pools on farmland (Major, et al., 2009). This could be avoided by the use of cover crops such as crownvetch since the water would hit the leaves first instead of hitting the ground, preventing the water from hitting the ground with a force hard enough to displace to the soil. Furthermore, another benefit that Nepal would experience would be more stable hillsides leading to reduced chance of mudslides and landslides. Since a lot of the hillsides have been left bare from deforestation, most of the land is unstable due to heavy rains and winds that batter it ever summer (Sharma, 1996). Mudslides similar to that in

Nepal have occurred in Vancouver, Canada in 2010 when they received almost 70mm of rain in one day (Calgary Herald, 2010). In terms of the needs of different economic levels of people in Nepal, erosion affects everyone, including future generations, but some people more than others. Farmers



Figure 4 <http://floodlist.com/asia/8-flood-deaths-nepal>

who rely on their land in order to feed their families are directly affected by erosion since it is the land that they physically live on that is being eroded away. In Figure 4, a village near the eroding Mahakali river bank in June 2013 in Nepal is shown with houses perched on the edge. These villages are no longer safe due to the problem of erosion and families have been forced to relocate.

Import/Export Documentation Required:

According to the Canadian Seed Trade Association, (2014), Canadian seeds can be exported using the Organization for Economic Co-operation and Development (OECD) seed scheme. This allows Agri-Food Canada to certify the Canadian seeds according to the standards of the importing country (CSTA, 2014).

Future Studies:

Unfortunately, some information could not be found on a few topics. Future studies on this export should include further inquiries into specific production costs and labour costs within the seed packaging company OSC Seeds. Contact was attempted but no response was given to the specific cost to run seed packing and counting machines as well as how many people are employed with OSC Seeds. Also, the exact cost to ship from Canada to Nepal cannot be determined yet as it is unknown what the cost of ground transportation is in Nepal.

Conclusion:

In conclusion, this crownvetch product has good potential in Nepal. It is a very hardy plant that can survive in extremely wet or dry conditions much like the seasons in Nepal and it will thrive for decades without any tending (Gustine & Moyer, 1990). It would also thrive because it is able to survive in low-fertility soil such as the often nutrient-leached soil in Nepal (Gustine & Moyer, 1990). From the Canadian company OSC Seeds, enough seed to cover 2000 square feet can be purchased for \$39.99 CAN or 3,514.78 in Nepalese Rupees. This could be purchased by a single farmer or by a community to help fix a large area that is affecting a large amount of people. Furthermore, there are no direct flights from Canada to Nepal however the path that the seeds would take would be from Toronto to London, England to New Delhi, India and finally by truck to Nepal and no special storage container would be required on this journey (OSC Seeds, 2014). This product has the potential to be productive

in the Nepalese market since it is not too expensive however it could be for very poor farmers. A solution to this would be for a co-operative of farmers to pool their money in order to purchase the cover crop. Finally, the possible benefits for Nepal if this cover crop is used would drastically affect the landscape, farmland, and villages. The life of farmland would be prolonged and the nutrients present in the soil will not be lost. Most importantly, Nepal will have a more stable, safer environment for future generations of farmers.

References

- Air Canada Cargo. (n.d.). Ship small parcels, packages or large cargo. Retrieved from <http://www.aircanada.com/cargo/en/index.html>
- Alibaba.com. Find quality Manufacturers, Suppliers, Exporters, Importers, Buyers, Wholesalers, Products and Trade Leads from our award-winning International Trade Site. Import & Export on alibaba.com. (n.d.). Retrieved from <http://www.alibaba.com/>
- At least 53 killed in nepal floods and mudslides.(2014, Aug 16, 2014). *Mint*, pp. n/a.
- Bardsley, D., & Thomas, I. (2005). In situ agrobiodiversity conservation for regional development in nepal. *Geojournal*, 62(1-2), 27-39.
- Burbank, D. W., Bookhagen, B., Gabet, E. J., & Putkonen, J. (2012). Modern climate and erosion in the himalaya. *Comptes Rendus Geoscience*, 344(11-12), 610-626.
- Burns JC, Cope WA. 1974. Nutritive Value of Crownvetch Forage as Influenced by Structural Constituents and Phenolic and Tannin Compounds. *Agronomy Journal*, 66, p 195-200. Retrieved from <https://www-agronomy-org.subzero.lib.uoguelph.ca/publications/aj/abstracts/66/2/AJ0660020195>
- Dodds, K. (2008, 07; 2014/11). Nepal. 80, 12.
- Export, Innovate, Invest - The Canadian Trade Commissioner Service. (n.d.). *Site of the Canadian Trade Commissioner Service to help companies do business abroad: market studies, contacts abroad, services of our offices abroad.* Retrieved from <http://www.tradecommissioner.gc.ca/eng/offices-india.jsp>
- Government of Canada. (n.d.). *Canada-Nepal Relations*. Retrieved from http://www.canadainternational.gc.ca/india-inde/bilateral_relations_bilaterales/canada_nepal.aspx?lang=eng&menu_id=10
- Gustine, D. L., & Moyer, B. G. (1990). Crownvetch (*Coronilla varia* L.). In *Legumes and Oilseed Crops I* (pp. 341-354). Springer Berlin Heidelberg.
- Calgary Herald. Heavy rain causes mudslides, flooding on vancouver island. (2010, Sep 26, 2010). *Calgary Herald*, pp. A.7.
- Imports & Exports. (n.d.). *Canadian Seed Trade Association*. Retrieved from <http://cdnseed.org/international-trade/imports-exports/>
- Khadka N. (1998). Challenges to developing the economy of nepal. *Contemporary South Asia*, 7(2), 147-165.
- Major J, Steiner C, Downie A, Lehmann J. 2009. Biochar Effects on Nutrient Leaching. *Biochar for Environmental Management*. p 15.
- Misu Trading. (n.d.). Retrieved from <http://www.misutrading.com/index.php>

- Moyer BG, Gustine DL. 1984. Regeneration of *Coronilla varia* L. (crownvetch) plants from callus culture. *Journal of Plant Biotechnology*, 3, 143-148. Retrieved from <http://link.springer.com/article/10.1007/BF00033735>
- Nadampadom Rubber Estate. Cover Crops. (n.d.). Retrieved from <http://www.covercrops.org/index.php>
- OMAFRA. Cover Crop Seed Suppliers. (n.d.). Retrieved from <http://www.omafra.gov.on.ca/english/crops/resource/covercrp.htm>
- OSC Seeds. (n.d.). *Crownvetch*. Retrieved from <http://www.oscseeds.com/ecommerce/-ground--cover-seed/Crownvetch.htm>
- Reynolds PJ, Jackson C, Lindahl IL, Henson PR. 1967. Consumption and Digestibility of Crownvetch (*Coronilla varia* L.) Forage by Sheep. *Agronomy Journal*, 59, p 589-591. Retrieved from <https://dl.sciencesocieties.org/publications/aj/abstracts/59/6/AJ0590060589>
- Sharma, C. K. (1996). Overview of nepal's energy sources and environment. *Atmospheric Environment*, 30(15), 2717-2720.