Canadian Export to Nepal Assessment: Meadow Bromegrass Seeds

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Part 1: Product Info

Product Introduction

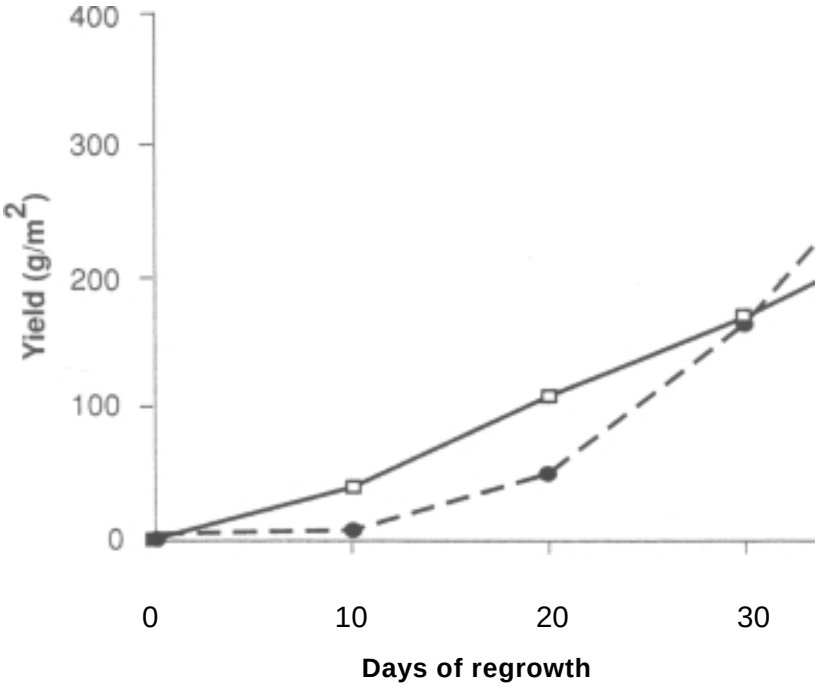
Nepal's sloping terrace farms cover approximately 28.8% of its total landmass, and 75% of its population is employed in agriculture (CIA World Factbook, 2015). Therefore, it's clear that benefits to Nepalese farmers would raise the country's economy and provide more food for the people of Nepal and their families (CIA World Factbook, 2015). However, Nepal has a special set of challenges that must be addressed when considering a product to introduce to the market and sell in Nepal. With the large amounts of soil erosion due to, earthquakes and mudslides, steep terrain and cold climates of the upper mountain ranges of Nepal require a plant which could prevent further erosion and boost Nepal's GDP. Meadow Bromegrass (*Bromus riparius* Rehm.) has many beneficial adaptations and would fulfill many of Nepal's needs (Gov. of Saskatchewan, 1998). In Canada, Meadow Brome is used as a forage crop for pasture but with exports to Nepal, it could become a large cash crop benefiting both countries with the production of one seed.

Meadow Bromegrass

Meadow Bromegrass fits the forage crop specifications that Nepal requires perfectly, and would make an excellent niche product for the Hill to Mountain regions of Nepal. Meadow Brome grows best in cooler temperatures, and is able to withstand sod damage up to –18 C, with a high frost tolerance, allowing it to thrive in

colder climate regions (Knowles, 1996). This grass provides a great forage crop and can be mixed with other legumes for more cover; it would take approximately 12-20 lbs. of seed to cover an acre of mono cultured Meadow Bromesgrass (Speare Seeds, 2015). If inn a mix or not, Meadow Brome is known to have extremely fast regrowth rates, as shown in **Table 1,** compared to its closest Canadian competitor, Smooth Bromegrass, it is clearly superior I the early stages of growth (Knowles, 1996). The Meadow variety of Bromegrass has a growth rate of approximately 20 days after grazing, most of which happens in the early growing stages of the grass (Knowles, 1996). Referring to **Table 2**, Meadow Bromegrass has a high level of nutrients providing ruminant animals with high calorie forage feed in order to gain weight, shown in comparison with Smooth Bromegrass (Knowles, 1996).

Table 1: Regrowth Rates of Meadow vs. Smooth Bromegrass



Cumulative dry matter yield of meadow bromegrass and smooth bromegrass in greenhouse tests, Lacombe, Alta (Knowles, 1996).

Table 2: Liveweight gains of Cattle on Forage

	Daily liveweight gains (kg/ha)	
Grazing period	Meadow bromegrass	Smooth bromegrass
June 15-July 14	6.9	6.7
July 14-August 11	3.5	3.5
August 11-September 18	3.7	2.9
September 18-October 5	1.4	0.3
Total (kg/ha)	458	404

Liveweight gains of comparable groups of heifers grazing meadow bromegrass and smooth bromegrass, Melfort, Sask., 1987 (Knowles, 1996).

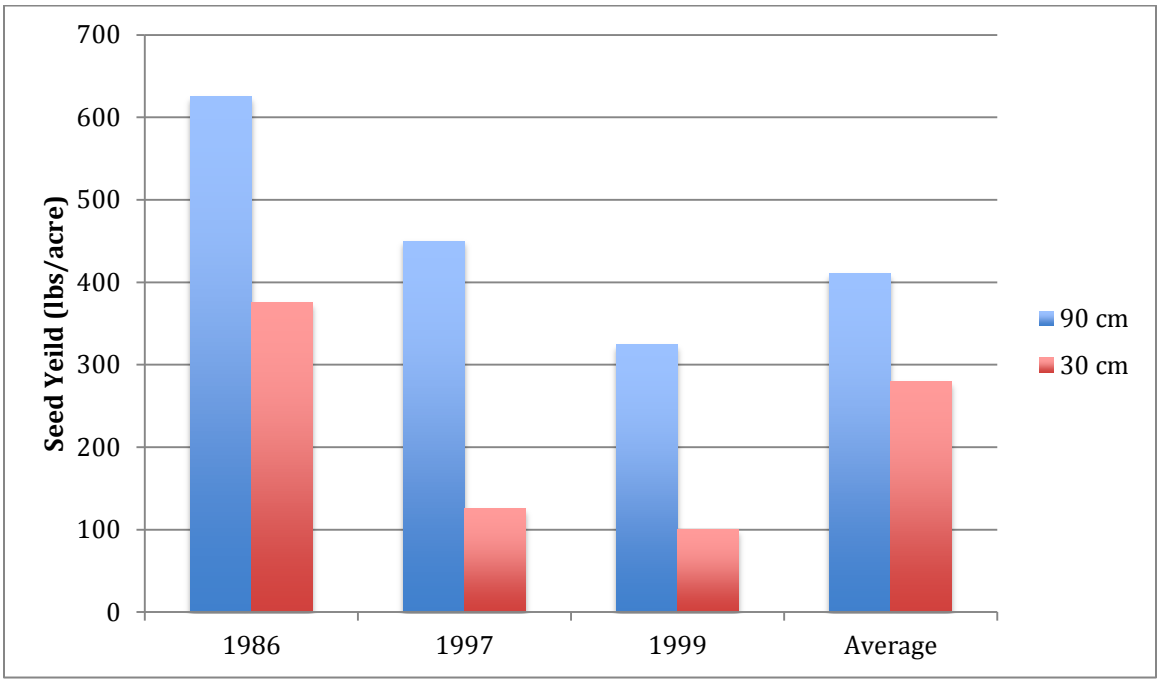
Meadow Bromegrass also has an extensive root system and is fairly drought tolerant, allowing this grass to provide erosion control in drier climates (Government of Saskatchewan, 1998). This prevents soil nutrient loss for farmers dealing with erosion. All Bromegrass varieties will do better as mixed forage with other short season grasses or legumes to provide abundant forage all year round (Speare Seeds, 2015). This grass has potential to be used as hay as well as forage, and should be harvested in late summer to be used in the late fall – winter season. Meadow Brome has a seed yield of approximately 400 kg/ha (Gov. of Saskatchewan, 1998). Therefore, Meadow Bromegrass is a cold climate, fast growing grass that can provide hay and forage almost all year round, with an added positive trait of preventing erosion. However, it may not be as drought tolerant as other grasses and has a lower seed count when harvested than some of its relatives like Smooth Bromegrass (Knowles, 1996).

Benefits to Canada

Meadow Bromegrass is an under used pasture grass in Ontario, and is mainly seeded in the Southern Prairie Provence's (Gov. of Ontario, 2006). However, there are

many who produce it for market in Canada and it is recommended for pasture forage (Gov. of Saskatchewan, 1998). This grass is a long lived perennial, with fast regrowth potential making it the perfect low maintenance forage for farms with lots of free grazing land, the same application would not work for feed lot set ups (Gov. of Saskatchewan, 1998). This being said Meadow Bromegrass also has the potential to be a hay product, but with lower yield than alfalfa or timothy, it would be a by-product that the farmer could use them selves or sell locally (Gov. of Saskatchewan, 1998). Meadow Brome is ready to harvest approximately 30 days after flowering, and rows should be planted approximately 90 cm apart, refer to **Table 3**, for the best yield in Canadian climates (Gov. of Saskatchewan, 1998).

Table 3 : Seed Yield per lbs. in Relation to Row Spacing



A representation of the productivity of Meadow Brome in relation to row spacing (Gov. of Saskatchewan, 1998)

By opening new markets within Canada and in other countries, specifically Nepal this will create the demand for new jobs to farm Meadow Bromegrass more intensively than it is being produced currently (Gov. of Ontario, 2006). If Meadow Brome were also placed within fair trade agreements, it would allow other countries easier access to the product and in turn creating many new markets opportunities.

Shipping via Hamilton Port

A benefit of Meadow Bromegrass being native to Canada is that it can be shipped directly from Ontario, instead of having to be transported across North America. The local Meadow Brome can be shipped via cargo barges out of the Hamilton Port directly to Indian (Hamilton Port Authority, 2015). The Hamilton Port stimulates Ontario's economy by promoting trade internationally and within Canada its self. The harbour generates roughly 300 million dollars in investments per year, and not only has 1600 workers on site at the port, but creates many more jobs at its 130 tenant business and warehouses within Canada (Hamilton Port Authority, 2015). By shipping out of Hamilton, the shipping can be done directly by Canadian's instead of a middleman company, creating more long-term jobs shipping to Eastern Asia and transporting seed.

Part 2: Potential Benefits to Nepal

Introduction to Nepal

Nepal is a small Southern Asian country, land locked in between China and India. The population of Nepal is just over 31 million, approximately the same as Canada but with a much higher population density (World Fact Book, 2014). Nepal has roughly 28% of its land dedicated to agriculture, most of which is located in the hill regions of Nepal

(World Factbook, 2014). Nepal is located directly over Indo-Australian and Asian plates, creating many earthquakes and mudslides annually (Gov. of Nepal, 2015). To help restore the soil nutrients that is lost due to erosion every year, Nepal needs a anti erosion system in the Hill regions to aid in growing it agriculture industry from subsistence farming to market value products (Eckholm, 1975).

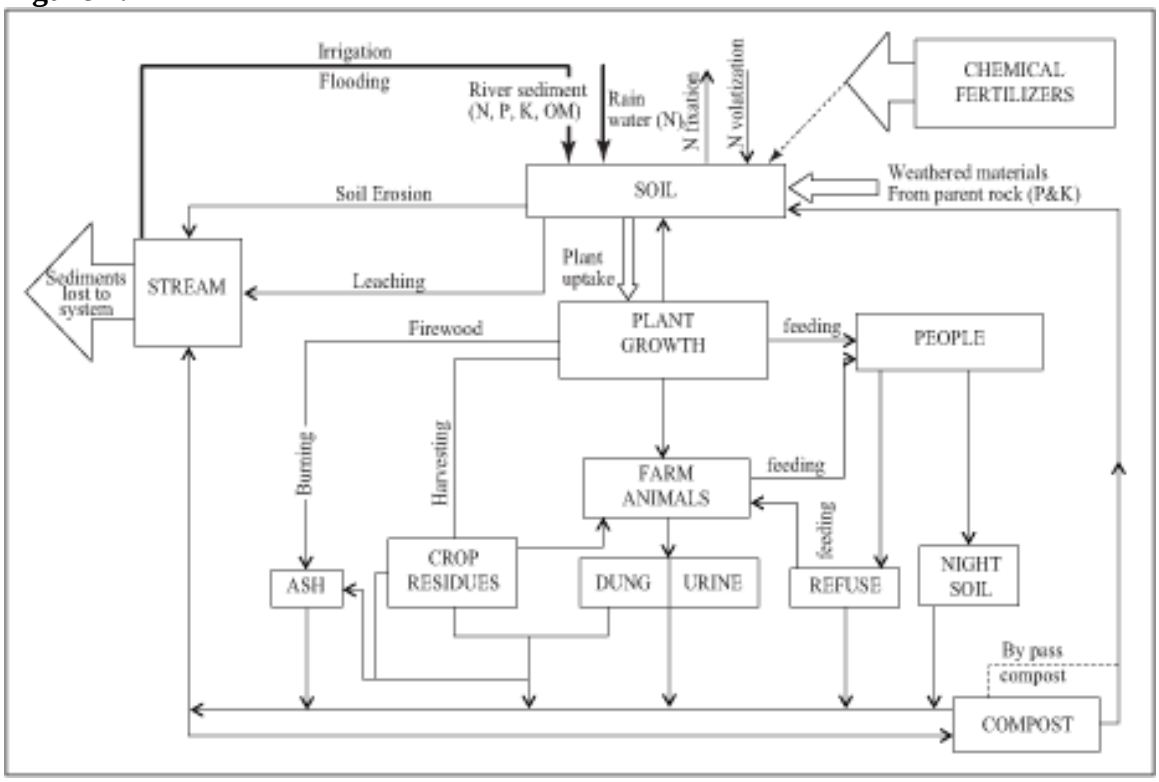
Soil Nutrient Loss

Meadow Bromegrass contains all the traits to be the perfect niche product for the Hill to Mountain regions of Nepal, however it does have local competition, found in locally grown barley and buckwheat. Firstly, once established Meadow Bromegrass will generate disposable income for Nepalese farmers and raise the country's GDP. It can also aid in reducing many of the environmental stressors of Nepal's agriculture industry like soil nutrient loss due to erosion and growing hardy grasses in the cooler hill climates (Zemenchik et al, 1996). An increase of agriculture and deforestation within high elevations has been directly linked to environmental degradation via soil loss (Eckholm, 1975). It is this soil and nutrient loss which puts local subsistence farmer at risk, as they rely on their local crop as a means of feeding themselves and income, proving the addition of Meadow Brome will have positive effects with in Nepal (Brown, 1981). A study conducted by the, Department of Earth Sciences, from the University of Southern California and the University of Cambridge, suggests that the erosion rate with in the Hill region of Nepal, specifically the Likhu Khola region, were found to be 0.71-2.0 mm/yr^{-1}, per hectare, with a total of 40% of which were in agriculture areas (A. J. West et al, 2014).

Erosion Control

Meadow Bromegrass has tillering roots and an expanded rhizome and when planted, holds the soil compactly together, preventing soil loss during heavy rains and high winds (Zemenchik, 1996). It was proven in a study published in, Agronomy Journals, when planting Bromegrass in areas with heavy rainfall, only 11 mg/ha of top soil loss occurred, compare to forage grasses like alfalfa which can have up to 10 times that amount with only 12-17% run off (Zemenchik, 1996).

Figure 2:



This flow chart demonstrates the components of nutrient flow with in the Nepalese farming system. As demonstrated much of this is lost within water run off, an estimated 32 tons/ha (Shrestha *et al.* 2005). Provided by *Soil Science Division, Nepal Agricultural Research Council (NARC).*

With the advantage of the Meadow Bromegrass preventing large-scale erosion, in

combination with terrace farming within the mountain region the soil nutrient loss can be reduced an in turn will increase Nepalese crop yields and increase soil nutrients. This will in turn provide Nepalese farmers with more viable crop to sell at to local market increasing the countries GDP, as well as the excess Bromegrass being sold as hay to feed the local ruminants.

Importance of Large Ruminants

Meadow Bromegrass in Nepal would produce many secondary benefits besides increasing the countries GDP and preventing soil erosion. Nepalese farmers in the high to mid Hill regions can also use the Meadow Brome as forage or hay for their large live stock animals, since it is not a cereal grain to be consumed by humans. In the Hill to Mountain regions of Nepal, many large ruminants are housed including yak, cattle, churls, horses, donkeys, mule and buffalo are used (Joshi, 1992). Since a large portion of the population is Hindu, roughly 81.3%, most of the ruminants are used for labour or milking purposes instead of for consumption (CIA World Fact Book, 2014). It has been estimated that the by products from large ruminants like meat, milk and hide contribute to 28% of Nepal's agricultural GDP and 93% od manual labour is preformed with large ruminants (Joshi, 1992). Refer to **Table 4**; most live stock animals are used in the hill and mountain regions, where most common forage and hay feeds like alfalfa and hay are much harder to grow (Joshi, 1992).

Table 4: Household income and labour utilization pattern in Nepal.

	Terai	Hill	Mountain
% cash income from livestock	9.7	19.7	21.2
Man days used for livestock	64	73	51

Hay and Forage Production

Meadow Bromegrass how ever is perfect for these areas and thrives in the wet and cool climates of these regions (Knowles, 1996). Meadow Brome also has extremely great forage potential, producing yields and fast regrowth rate within the early stages of growth (Brueland et al, 2003). Also with a high live weight gain, refer to **Table 1**, it is clear that even as a by-product Meadow Bromegrass can improve Nepal's GDP by producing forage for its large animal population, a key part to Nepal's agriculture industry (Knowles, 1996). One competitor that Meadow Brome has in Nepal is barley, another winter annual grain that provides erosion control (SARE.org, 2012). This grass is local to Nepal but is in direct completion with another cereal grain grown in the Terai region, wheat, which is not local to the region (d'Alpoim Guedes, 2014). Therefore the barley is usually consumed in the mountain to hill regions of Nepal (Joshi, 1992). However, this is a cereal grain consumed by humans not by animals, therefore it would not bring as many positive benefits to Nepal's GDP as introducing Meadow Brome would. Meadow Bromegrass is also superior to barley, due to it's longer growing season and high drought tolerance (Knowles, 1996), useful once the monsoon season in Nepal is over (Joshi, 1992). Therefore, it is clear that through the superior erosion control and influx of forage for labour animals, Nepal's agriculture industry would be improved with the addition of Meadow Bromegrass. In conjunction with the increase of extra forage and soil nutrients, Nepalese farmers can produce more food, creating more profit for the average house hold and in turn raising the countries GDP as a whole.

Export Potential

Cost Associated with Export for Canada

Shipping costs can vary from Canada to Nepal depending on the method of shipping and to which country it is shipped to, since it can't be directly shipped to Nepal because it is a land locked country (CIA World Factbook, 2014). The provider for the Meadow Bromegrass seeds would be Speare Seeds, a small Forage and Turf Company based Out of Harriston, Ontario. Speare seed quoted their seed to be around 5.50/ lbs. of seed or it can be sold in a mix made for the Nepal region with Birdsfoot trefoil (Speare Seeds, 2015). Since it takes only between 12-20 lbs. of seed per acre to plant Meadow Brome, it would cost approximately $70, including shipping, per farmer or 5537 Rs (Speare Seeds, 2015). With a GDP per capita of $ 2400 Canadian, it makes these seeds extremely accessible to farmers who would be interested about planting Meadow Brome (CIA World Factbook, 2014). The product can be shipped from Harriston, Ontario, to the Hamilton Port via truck (Hamilton Port Authority, 2015). The Hamilton Port generated approximately 1.5 Billion dollars towards Ontario's agriculture industry and is a cheap and efficient way to ship agro-products like seeds and fertilizers (Hamilton Port Authority, 2015). Once it reaches Calcutta, India from Canada, it would then have to be transported to Nepal via truck, since Nepal is land locked where it would reach Kathmandu (Speare Seeds, 2015). Once in Nepal, it can be distributed to local famers and seed store to then be farmed and sold in the Nepalese market.

Challenges of Exporting to Nepal

Some challenges that Canadians may face when exporting to Nepal is that there is competing plants like barley available in Nepal. This may deter some farmers from buying the Meadow Brome due to cheaper, local seed options. Therefore, to make sure Meadow Bromegrass is successful, it must be marketed to the public and the local Nepalese must be educated about its benefits (World Bank, 2013).

Future Studies

To make sure Meadow Bromegrass is appropriately established in Nepal, data will have be recorded and built upon specifically in the areas that are dealing with the erosion and those that are in colder climates. This is so it can track how useful Meadow Brome is at preventing erosion in the hill-mountain regions of Nepal and well as its yield and growth rate in the cold climates. If the grass is successful, more can be shipped to Nepal and Meadow Brome grass will be a staple in the terrace farming regions of Nepal.

To conclude, Meadow Bromegrass would create a well-suited niche product for the Hill to Mountain regions of Nepal. It will help reduce the large amounts of erosion occurring in Nepal, as well as have many positive benefits like proved clod growing forage for livestock. Producing this product will create many jobs both for farmers and shipping workers in Canada and provide Nepalese farmers with a new source of income. Therefore, it is a clear out come that Meadow Bromegrass should be exported out od Canada to Nepal, to benefit both countries with one powerful seed.

Word Count: 2604

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