

Timothy Seed: Promoting Canadian Agrifood Exports to Nepal

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Introduction

Agriculture is the act of farming, including cultivation of the land to grow crops and manage livestock with the goal of producing food, fabric and other products. Before agriculture, many civilisations depended on hunting and gathering wild plants and animals to feed on and survive, finding food was their main priority. History shows that around 9000 B.C. humans first started to domesticate plants and started the transition to a farming society (Lee & Robinson, 2013). Domestication is the act of selecting wild plants, based on their growing ability and edible or useful product, and animals, based on their temperament and breeding abilities, for human use. Many crops which we harvest today have evolved so much that we no longer resemble their wild ancestors that we domesticated because of genetic selection, choosing to reproduce with only the best crops resulting in a better yield.

ORIGINS AND PRIMARY REGIONS OF DIVERSITY OF AGRICULTURAL CROPS



Khoury CK, Achicanoy HA, Bjorkman AD, Navarro-Racines C, Guarino L, Flores-Palacios X, Engels JMM, Wiersema JH, Dempewolf H, Sotoelo S, Ramirez-Villegas J, Castañeda-Álvarez NP, Fowler C, Jarvis A, Rieseberg LH, and Struik PC (2016). Origins of food crops connect countries worldwide. Proc. R. Soc. B 283: 20160792. DOI: 10.1098/rspb.2016.0792.

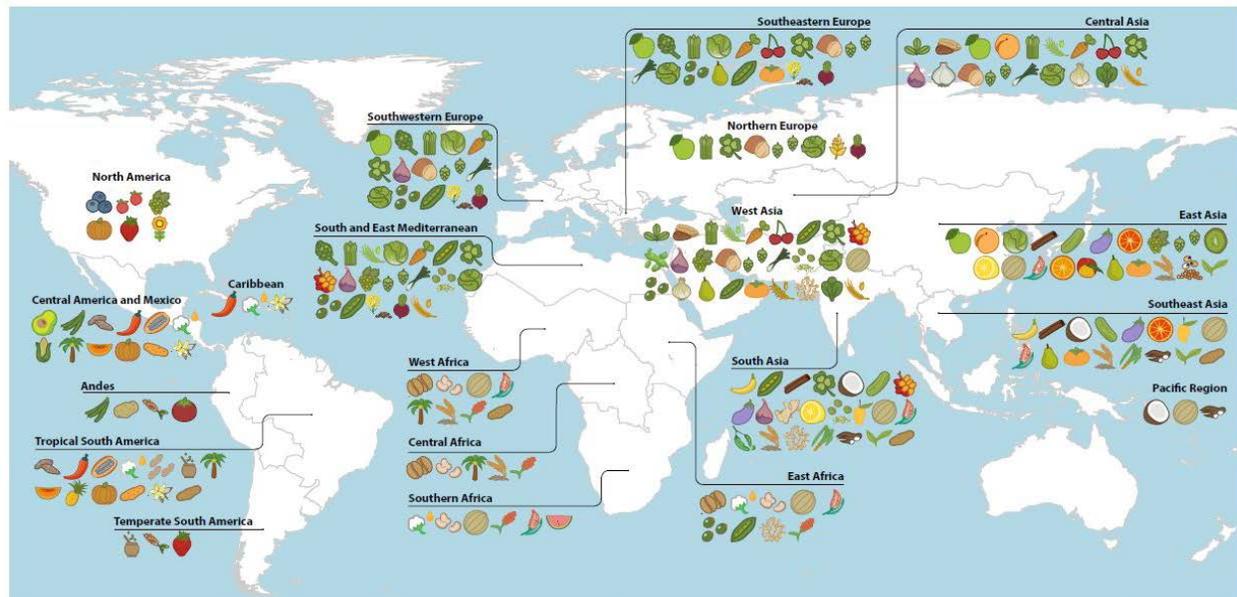


Figure 1: International Center for Tropical Agriculture <http://blog.ciat.cgiar.org/origin-of-crops/>

The process of plant and animal domestication happened all over the world; coffee was first domesticated in Africa, wheat in the Middle East, alfalfa in Central Asia, oriental rice in Southern Asia, potatoes in South America, Maize and cotton in Central America and sunflowers in Northern America (Harlan, 1971). In today's society, you can order a cup of coffee and a biscuit pretty much anywhere in the world. We are in an age where technology facilitates communication and travel, and crops that were once domesticated in a small region can be grown on an international scale. We have been introducing foreign crops to new countries for centuries, and thus creating a complex and diverse market for international agricultural trade.

World trade in agriculture helped the development of many countries with agricultural advances, allowing for farmers to produce commercially. When farmers are capable of feeding a much larger population and engage in commercial trade, it allows for other people to buy food instead of having to cultivate it themselves. This allows the possibility of a diversity of refined jobs which all contribute to a developed society. But there is still developing countries where farming is the most popular career. In most cases, the agriculture in these countries is very different than that of developed countries, since they rely on subsistence farming. Subsistence farming is self-sufficient agriculture, where the farmer concentrates on growing enough to feed their family with very little or none left over product to sell or trade (Lee & Robinson, 2013).

Canada is a North American developed country where the farmers focus on making a profit in commercial agriculture, whereas Nepal is a developing country in Asia with a majority population is subsistence farmers. Even though these two countries couldn't be further apart, it is possible for them to participate in international trade, and they have been doing so for many years now (Trade and Development Canada, 2013). But there is always the opportunity for new trade relations in order to help facilitate to farming in Nepal as well as further developing the economy in both countries.

Timothy grass is a cool season forage grass which makes for great feed and fodder for livestock and it is grown in North American and Europe (Berg et al. 1996). This paper will explore and evaluate the possibility to initiate trade of timothy seed from Canada to Nepal.

Section 1

In order to properly evaluate the trading of timothy seed, we must first inform ourselves of the product and the benefits this trade agreement can bring the Canada.



Figure III: A look at timothy grass



Figure III: Map of Canada with the Canadian flag

Description of the Product

Phleum pretense, more commonly known as timothy, is a perennial grass that is used as a nutritious and easily consumed hay, either on its own or in mixes, for cattle, sheep and horses (Berg et al. 1996). The grass is native to Europe and was introduced to North American in the mid-1800s (Rose, 1976). The crop is highly tolerant to flooding and is known for its sustainability in cold environments, timothy can even grow in sandy soils (Rose, 1976). The timothy seeds are quite small which can cause some difficulty while planting such as calibrating the seed drill and obtaining proper seed depth, but that is a small problem compared to the success in timothy yield here in Canada, with long-term yield ranging from 150 up to 600 kilograms per hectare (Alberta Agriculture and Forestry, 2004). Seeding can be done in mid spring and harvesting timothy can be done in early to mid-August, the grass is easily dehulled, and a conventional grain combine is most suitable (Berg et al. 1996). There is no excessive

requirements or costs to grow timothy compared to other forage grasses, the biggest factor is its environment, needing moist and humid soil.

Table 1: The nutritional parameters of timothy grass (Minson et al. 1964)

Nutritional parameters of timothy grass										
Form of timothy grass	Dry matter (%)	Crude protein (%DM)	Acid detergent Fiber (%DM)	Neutral Detergent fiber (%DM)	Sugar (%DM)	Gross energy (MJ/kg DM)	Minerals (g/kg DM)			
							calcium	Phosphorous	Potassium	Sodium
Fresh timothy	27	13.8	34.2	62.2	10.8	18.2	1.4	2	21.2	0.1
Timothy hay	88	9.1	37.8	65.4	11.5	18.1	3.3	2.1	20.2	0.1
Timothy silage	30.8	13.9	36.9	56.2	7.9	18.2	3	2.8	29.2	0.3

Benefits of timothy grass

The bunchgrass thrives in cool and moist climates, such as many areas in Canada (Alberta Agriculture and Forestry, 2004). It can grow in well in dense sandy soils which are usually considered undesirable for agriculture. Timothy hay is very high in fiber, making it a great feed for livestock (Minson et al. 1964). The price of timothy seed is low in comparison to other forages grasses. Timothy has a large harvesting available time frame of about three weeks when the grass is golden at the head base, it is also easily hulled (MFSA, 2016). The seed is planted at a shallow depth of about 1cm, and one acre only requires 1-2lbs of seed (MFSA, 2016).

Disadvantages of timothy grass

Timothy must be planted in a weed free field, weed management can be done pre-harvest and post-harvest with the help of common herbicides (Alberta Agriculture and Forestry, 2004).

Timothy grass is not adapted to saline soils, and has a very low success rate when planted more than 3cm deep (MFSA, 2016).

Exporting from Canada

The country of Canada can also profit from new trade deals, since they boost the economy. The company Brett Young distributes many grass seeds around the world from Manitoba, Canada (R. Mabon, personal communication, November 4th, 2016). Increasing their exports would expand their company and produce more Canadian jobs. They already distribute timothy seeds to China and would be willing to look into expanding their relations with Nepal (R. Mabon, personal communication, November 4th, 2016).

Northern Advantage

Canada can profit immensely from international trade with timothy seed because it is one of the highest winter resistant crops, with much greater ice tolerance than wheat (Andrews & Gudleifsson, 1983). This will now give Canada the opportunity to compete to be a main supplier and distributor of timothy seed with countries that rule the distribution market, like the United States, for most crops who require a longer growing season, like soybeans (Lee & Robinson, 2013).

New Market Advantage

It is a good idea to start exporting Timothy from Canada to Nepal because currently Canadian timothy seed exports go to the US and Europe, there is not yet a market connect North America and Asia (Alberta Agriculture and Forestry, 2004). There are no documented traces of timothy being grown in Nepal to date. Canada can profit from this immensely sine there is the opportunity for a trade agreement with no competition and will open opportunities to create a market for not only Nepal but its surrounding countries as well. Also, since it is a new market, there is nothing but growing potential, hence making the trade of timothy seed a smart investment for Canadian companies.

Section 2

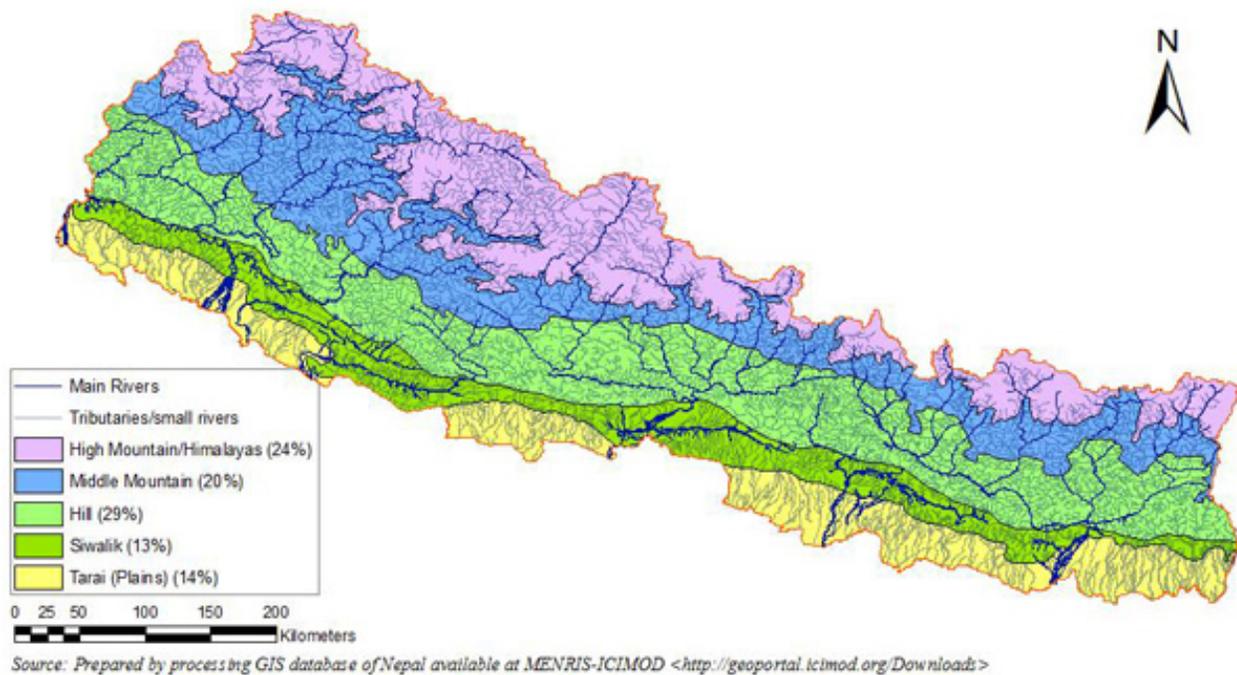


Figure IV: Map of Nepal showing the different regions.

The opportunities that timothy grass will present to the farming people of Nepal, as well as their trade regulations must be taken into consideration when evaluation the possibility of trade.

Farming in Nepal

The Nepalese population is more than 70% farmers and the country has a very diverse climate which results in a variety of agricultural practices. The three Nepal geographical regions are the Himalayas comprised of mountains in the North-Eastern part of the country with colder temperatures and sandy soils, the Mid Hills region and the Terai region in the South-Western part of the country where there are grass lands with a more tropical temperature (APROSC, 1990). About 11% of the land in Nepal is grasslands, most of which are found in the hills region (Pariyar, 1998). Since Hinduism is the most popular religion, cattle is used mostly for dairy production and labour, not for meat. Water buffalo and goats are also common livestock found on Nepalese farms (Pariyar, 1998). There are many livestock feeds grown in Nepal such as wheat, millet, rice grain and legume forages (Redding et al. 2012). These feeds vary in nutritional value and their averages are demonstrated in *Table 2*.

Table 2: Nutritional parameters of livestock feeds in Nepal (Redding et al. 2012)

Table 2 Nutritional parameters of selected feeds collected from farms surveyed in Kaski district, Nepal

	Dry matter (%)	Crude protein (% DM)	Acid detergent fiber (% DM)	Neutral detergent fiber (% DM)	Sugar (% DM)	Total digestible nutrients (% DM)	Minerals (% DM)			
							Ca ²⁺	P	K ⁺	Na ⁺
Wheat bran	86.6	18.3	12.6	37.1	7.1	75.4	0.11	0.97	1.50	0.01
Millet flour	88.1	10.3	11.4	13.6	2.7	90.8	0.43	0.39	0.82	0.009
Rice bran	89.5	14.2	12.9	22.7	7.8	99.2	0.07	1.98	1.91	0.01
Commercial concentrate	84.2	22.2	9.4	19.8	14.9	73.0	0.70	0.97	2.42	0.50
Grass pasture	89.7	7.8	42.5	76.3	3.3	55.8	0.67	0.09	1.43	0.01
Legume forage	89.3	25.5	30.5	38.9	3.4	57.7	1.79	0.41	4.91	0.02

When comparing the timothy hay from *table 1* and the grass pasture from *table 2* we see that timothy also has a high fiber content, but is also higher in protein and sugar than their average grass.

Benefits to the People of Nepal

Timothy will be a useful grass to the Nepalese farmers because it will thrive in their moist climate and will be easier to plant than other hay grasses. Nepal is known to have a long monsoon season, with heavy rainfall from June to September (Bhattarai & Vetaas, 2003). This much precipitation will drown out many varieties of grasses for hay, but will be ideal for timothy. Since the grass can be grown during the monsoon season, there will be less stress about storing the grass because that will be done during the dryer season. A large portion of Nepalese farmers do not have access to the farming technology that we have here in Canada, and there is still a lot of planting done manually. Because of the small seed size of the timothy plant and its shallow seed depth requirement, which is not favorable for machine planting, it will be beneficial to those who have to plant the crop by hand (Alberta Agriculture and Forestry, 2004). The light weight and size of the seed will allow an individual to carry more seeds with them, completing a larger portion of the field in one planting session.

Importing into Nepal

To import timothy seed into Nepal from Canada, the seeds must first travel to India, since Nepal has fewer airports and a much more complex terrain making for large transportation difficult, whereas India is a more developed country and has many sea ports since the country is surrounded by water on three sides. Brett Young currently ships to China using ocean fleets, but

the method of transportation depends on the buyer and their priorities on time and cost (R. Mabon, personal communication, November 4th, 2016). India is a third party country that is necessary to do trade with Nepal because most Nepalese imports must first arrive in India and then travel to Nepal (International Monetary Fund, 2001).

Importing Procedures

To import crops to Nepal, the product must first be approved by Nepal's Plant Protection Act (Nepal Gazette, 2004). Since it would be best to import seeds so that the farmers can grow the crop themselves, there are few risks of pests. There is no local competing marking of timothy in Nepal already so it would not damage the pre-existing economy. For these reasons, it appears that timothy seed would easily be approved for importation into Nepal in the proper applications have been filled and the seeds pass sanitary inspections (Nepal Gazette, 2004).

Trade Relations

Nepal and Canada have already engaged in trade with a wide diversity of products and in 2013, the Indo-Canadian Business Chamber (ICBC) and the Federation of Nepalese Chambers of Commerce and Industry (FNCCI) signed a Memorandum of Understanding in order to establish the Canada-Nepal Business Executive Committee which has the objective to promote and encourage trade and business ties between the two countries by increasing interaction with Nepalese companies and Canadian companies based in India, a close neighbouring country to Nepal (Trade and development Canada, 2013).

Evaluation

Taking the information about timothy grass, including its optimal growing conditions and seed size, the effects of expanding the Canadian trade division of timothy and knowing what the grass can bring to the farming people of Nepal, we can now evaluate the product and check to see if this export is actually a good investment.

Costs to the Farmers

The cost to buy directly from Brett Young is \$1.75 per lb of seed, and to transport the seeds to China the cost would rise to around \$2.25 per lb (R. Mabon, Personal communication, November 4th, 2016). This cost is relatively low compared to the cost of other forage grasses like ryegrass which averages around \$3.00 per lb and wheatgrass, around \$5.00 per lb (NorthstarSeed, 2014). Also timothy seeds are quite small, with more than 1 200 000 seeds per

lb, meaning that only 3 lbs of seed are required for a one hectare field (NorthstarSeed, 2014). To get a more accurate estimation of the cost to the Nepalese farmers it would be appropriate to add some more to the price since there will probably be a distributor in Nepal looking to make a profit. There are currently more than 1300 registered seed distributors in Nepal (SEAN, 2014). Trade possibilities increase when dealing with a retailer instead of individual farmers because they probably have the means to store the seeds for a longer period of time, and will be able to supply to a full community, thus allowing them to buy in bigger bulks.

Importing from other Countries

Even though timothy grass does great in the Canadian environment, it is not the only country in which one can purchase timothy seed. China sells timothy for as low as \$1.05 per lot, including shipping (Alberta Agriculture and Forestry, 2004). New Zealand is also a closer country that has invested in timothy grass production but their prices won't compete.

Conclusion and recommendation

In summary, timothy seed would be a great addition to the Nepalese agricultural system because it is higher in protein and sugars than other grass forages while still containing impressive amounts of fiber. Timothy grass would be a good additive to livestock feed, but it is not appropriate to replace some of the other crops, like oats and wheat, since they have their own nutritional value to the feed. Timothy would be great in the climate of Nepal since their northern hill regions can get quite cool, and their soils are primarily made up of sandy soils because of the mountain runoff. The region of Nepal is also familiar with a wet monsoon season, which can destroy stored hay by mold and moisture but timothy grass can grow during that season and be stored during the dry season. The small and light weight seeds would require less labour when planting the field for the Nepalese farmers. Even though exporting from Canada would be great for the Canadian economy since it would help local business grow and create more jobs, dominate the market by distributing a crop ideal for the Canadian environment and be the first to invest in the trade of timothy with Nepal, it would be more beneficial for the Nepalese farmers and seed distributors to induce trade with closer countries, like China, for their cheaper prices.

More information and External Links

For information about purchasing timothy seed, contact the Brett Young Company at (800) 65-5015 or check their website at <http://www.brettyoung.ca/wholesale-forage-turf-seed>

To see other Canadian Export Ideas, see <http://saknepal.org/>

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