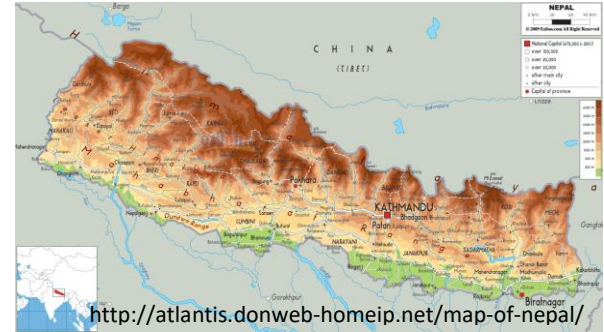


Assessment of Sugar Maple Saplings for Export to Nepal
Christena Jenkins-Giffen

Introduction

Nepal is located between India and China. There is a diverse climate in Nepal that can be categorized into five regions. These regions include, terai, siwalik, hill, middle mountain and high mountain regions. The terai, known as the



grain basket of Nepal, covers fourteen percent of the land (WEPA, n.d.). It is the warmest of the subtropical regions in Nepal and is very fertile (WEPA, n.d.). This is where most of the agricultural crops are cultivated (WEPA, n.d.). The siwalik region borders the terai region and covers thirteen percent of the land (WEPA, n.d.). The hill region covers twenty nine percent of the land (WEPA, n.d.). This region features steep slopes with narrow valleys (WEPA, n.d.). The temperature becomes cooler as the elevation increases here (WEPA, n.d.). The middle mountain region covers twenty percent of the land in Nepal, which also has cooler temperatures (WEPA, n.d.). For roughly five months of every year, temperatures go below freezing in this mountainous area (WEPA, n.d.). In the high mountains, the climate is alpine-tundra with snow present most of the year (WEPA, n.d.). Not much is grown in these more northern areas of Nepal (WEPA, n.d.).

Part I: In depth evaluation of Canadian Sugar Maple Saplings

Product Description



One of the most valued trees in North America is the sugar maple as it has excellent hard wood for many uses (World Book Inc., 2016). To help create jobs in Canada and help Nepal, the opportunities involved in the production of multipurpose Sugar Maple seedlings were explored for exporting. Nepal relies on forests for

various products such as leaves for livestock bedding and fodder, wood for fuel, and timber for building (Paudel, 2003). Sugar Maple trees, *Acer saccharum*, are great for making maple syrup but also produce ideal wood for making items like furniture and fuel (heat). Growing saplings for Nepal will generate more jobs in the nursery industry here. Canadian seeds from our native sugar maple trees will be used to produce the saplings. Because this species is native to Ontario, it is not difficult to grow and produce here.

Sugar maples are known to produce a lot of fallen leaves in the fall, this is ideal for Nepalese farmers so they can use the leaves for organic matter, livestock bedding and fodder (Cornell University, n.d.). The leaves can provide minute amounts of nutrients such as calcium (1.8%), potassium (0.8%), phosphorous (0.1%) and nitrogen (0.7%) back to the soil (Cornell University, n.d.). Sugar maples are good trees for Nepal because they also have a strong sprouting response to being cut and can handle heavy pruning (Cornell University, n.d.). As wood is being harvested, more shoots will be initiated quickly which can increase the replenish time for the forest resources.

Description where/how grown

In Southeastern Canada, the sugar maple tree is actually one of the most common deciduous trees found in forests (World Book Inc., 2016). The sugar maple is a fairly adaptable tree. It prefers to be grown in deep, moist well drained soils. This species is shade tolerant although it grows best in full sun. Sugar maples can grow up to 35m tall (World Book Inc., 2016). For the first thirty years, sugar maples usually grow about one foot in height annually (Cornell University, n.d.).

The sugar maples are native to Canada so they can be grown and produced in most Canadian nurseries. The seeds are planted fairly close to encourage straight tall growth and makes efficient use of the land; Zimmerman's Nursery uses a planting density of roughly 50 saplings per square foot since they will only be grown there for 2 years (Zimmermann, 2016). After 2 years of growth the saplings will be about 2ft in height and ready for exporting (Zimmermann, 2016). At this size they are ideal for shipping, they fit in a 2ft box and are fairly light (Zimmermann, 2016). This reduces the shipping costs as it is based on the size and weight of the boxes (Zimmermann, 2016). The sugar maple can be exported as saplings to Nepal where the farmers can plant and cultivate them

Labour Considerations

Operating expenses for all nurseries combined is around \$605.7 million in Canada, in which the labour costs made up most of the expense, amounting to 37.1% of the overall operating expense (Statistics Canada, 2016). In the past year, 13 152 nursery jobs have been filled in Canada, this number is lower than in previous years by roughly 3.4% (Statistics Canada, 2016). As a result, labour cost have also been lowered to \$225 million Canada wide (Statistics Canada, 2016). With seasonal and year round labour costs considered, the gross annual payroll amounts to \$255 014 592 (Statistics Canada, 2016). This is a lot of money that Canadians can earn working in the nursery industry.

In all of Canada, there was a total of about 1 332 nurseries operating in 2015, which covers around 42 493 acres of land (Statistics Canada, 2016). Not all of the land is used for field production directly, although most of the acres (35 376) are (Statistics Canada, 2016). The number of field grown tree seedlings grown in nurseries across Canada is estimated to be around

38 853 558 seedlings in 2015 (Statistics Canada, 2016). With the export idea of sugar maple seedlings to Nepal, this number would increase by a little to sell to Nepal.

Benefits to Canada

Although the benefits to Canada are not as large as the benefits to Nepal, they are still important to consider. This product is entirely produced in Canada unlike other products which may require parts from other countries. Nurseries in Canada generate a fair amount of revenue, for example, in 2015, \$712.6 million was made in nursery sales and resales, this was an increase of 3.5% from 2014 (Statistics Canada, 2015). By

exporting seedlings to Nepal, more seeds will need to

be planted to produce the seedlings, although this

won't be a huge amount, it will still generate more

income and create more jobs in Canada.



<http://freshersplane.com/news/9-increase-in-jobs-availability-in-2015-a-good-year-for-job-seekers/>

Environmental sustainability in growing/ manufacturing in Canada

Producing more sugar maple seedlings will have a positive impact on Canada environmentally. These seedlings will be grown for 2-3 years where they will be producing oxygen and absorbing air polluting in the area. More trees being planted and keeping the soil covered will be beneficial.

Market Opportunity

Selling sugar maple saplings for planting in the hill regions of Nepal to a community forestry group is a great opportunity for Canada and Nepal (Paudel, 2003). There are been no signs of other countries exporting sugar maples saplings into Nepal so far based off of

Alibaba.com. This means that Canada can be first to market with these seedlings. Nepal has many uses for deciduous trees and could use the environmentally friendly product.

PART II- Export potential to Nepal

Transportation logistics



<http://www.a1freightforwarding.com/>

this way, but it helps reduce chances of any disease transmission (Zimmermann, 2016). They can last 1 week in transport, although it doesn't usually take that long in transit (Zimmermann, 2016).

Zimmermann's Nursery Ltd. uses FedEx to deliver saplings, as they can transport the saplings quickly which is important (Zimmermann, 2016). The saplings are transported dormant (no leaves) and bare root (Zimmermann, 2016). Not only are they lighter

Using A1 Freight Forwarding air freight for transportation from Toronto, Ontario to Kathmandu in Nepal, the cost to ship 60 seedlings in one box is \$229.62 CAD. Below, in table 1, is a breakdown of the shipping fees and total cost to send 60 seedlings in 1 box, measuring 4 x 25 x 25 inches from Toronto to Katmandu in Nepal. Since the seedlings will be shipped bare root and dormant with no leaves, the seedlings are very light and are not as tender for shipping. The A1 Freight Forwarding quote chart did not accept entries of less than 1 lb. per box. A study showed that sugar maple saplings weighed less than 100 grams after 3 growing seasons including the leaf/root weight and were under 60cm in height (Carl et al. n.d.). This is how the box size of 4 x 25 x 25 inches was determined and the weight to ship was estimated.



<https://www.prairiemoon.com/plants/bare-root/trees-shrubs-vines/acer-saccharum-sugar-maple.html>

Table 1: Breakdown of Weight for A1 Freight Forwarding for a 12lbs. box 4 x 25 x 25 inches

Air Freight Rate	\$6.20 CAD/ kg
Actual Weight	5.44 kg
Volume Weight	6.83 kg
Chargeable Weight	6.83 kg

(A1 Freight Forwarding Quote, 2016)

The actual weight of the box is 1.4 kg (3lbs.) less than the chargeable weight, this means if Nepal was looking for a larger investment, more seedlings could be shipped for the same price. Five seedlings is equivalent of about one pound of shipping weight, meaning roughly 15 more seedlings can be shipped for the same price of sending 60 seedlings to Nepal. Looking at the breakdown of the cost in table 2, it is evident that the price of the actual air freight versus the processing and screening fees is much less. If Nepal was interested in having a larger investment, it would be cheaper to send more seedlings at once than to ship another small amount later on as the flat fees will remain the same.

Table 2: Breakdown of Cost for A1 Freight Forwarding for a 12lbs. box 4 x 25 x 25 inches

Air Freight	\$ 59.62 CAD
Terminal and Screening Fee	\$ 95.00 CAD
Processing Fee	\$ 75.00 CAD
TOTAL	\$229.62 CAD

(A1 Freight Forwarding Quote, 2016)

Once the seedlings arrive in Katmandu, Nepal, the seedlings can be transported to an area near by the capital for planting in the hill region of Nepal. The hill regions is not too far for

transporting the seedlings to an open area where they can be planted immediately at the time of arrival. This region is also a good location to plant the trees for their ecological services, helping against soil erosion (Brown and Shrestha, 2000). In addition, the closeness to a where people live is ideal for community farming making the resources close for easier access.

Storage/refrigeration from post-harvest to market

Trees must be planted as soon as possible after being taking out of the cold storage to prevent drying out and death (Zimmerman, 2016). In cold storage, however, the saplings can last 1-3 months and the cold storage helps deal with rabbits and mice that like to eat the sugar maples (Zimmermann, 2016). The A1 freight forwarding planes have cool areas in which the seedlings can be kept while being shipped, although the time it would take to fly to Nepal it is likely unnecessary (A1 freight forwarding, 2016).

Cost analysis

Sugar maple seedlings would cost roughly \$ 1.00 CAD each which is not overly expensive for Nepal (Zimmermann, 2016). If Nepal order 60 sugar maple seedlings, that would be \$ 60.00 CAD plus the shipping costs of \$229.62 CAD, totaling \$289.62 CAD. For Nepal, the cost would be 2 3691.41 Nepalese rupees with the exchange rate. This is quite expensive, however with the help of government program funding and the costs being split by all community forest users, this could be an achievable endeavor. The Nepalese will be supplied with the important resources of the forest used for sustaining their farm and livelihoods, and potentially with extra income as the forest matures.

Although the production of maple syrup is expensive, it is also an expensive product to purchase, making it worth the processing costs. For example, in Canada, Maples products last

year had a gross value of about \$357 988 (Statistics Canada, 2015). There are many maple products produced today, 8 908 of which were expressed as syrup in 2015 (Statistics Canada, 2015). After a mere ten years, the Nepalese could begin to harvest syrup and have an additional source of income.

Needs and Benefits to Nepal

Nepal would benefit from the products produced by the trees and the positive environmental impact. Sugar maples are useful for more than just lumber and better air quality. Having the saplings will increase jobs for the Nepalese people with the need for planting, maintaining and harvesting the sap and wood. Once the trees are mature and sap is collected, a processing business could be started in Nepal to create the syrup. These saplings equal more businesses involving wood work and food processing.

Soil degradation is a large issue in Nepal, mainly caused by soil erosion, especially in the hillier regions in Nepal (Shrestha, 2015). It has been recorded that 240 million cubic meters of top soil is lost annually, this equates to a loss of 0.6-1.46 mm of the existing topsoil lost yearly due to natural and human causes (Shrestha, 2015). Some causes include, water and wind erosion, earthquakes, and deforestation through over use for fuel (Shrestha, 2015).

Direct and Indirect Benefits to Nepal

Some of the direct benefits of planting sugar maple saplings in Nepal include, fuel, fodder, wood, bedding for animals, compost, and maple syrup (Thoms, 2008). Important ecological services are an indirect benefit of planting sugar maple saplings in Nepal, which reduces soil erosion and increases soil fertility (Thoms, 2008). Another indirect benefit of planting these seedlings is the potential social interaction, which comes with forming a

community forest, and a chance for developing more skills (Thoms, 2008). These trees will also be able to generate some income for the users of the community forest through excess timber and the eventual production of syrup (Thoms, 2008). Another indirect, but very important benefit of planting these trees is the positive impact it has on the Nepalese women who are in the user group along with the poor (Government of Nepal, 2016). This gives them an opportunity to develop skills, generate an income and socialize (Thoms, 2008).

Environmental Benefits to Nepal

In Nepal, there are some environmental issues to be addressed. Deforestation, especially in the middle mountains of Nepal, is a large issue that has a domino effect (Brown and Shrestha, 2000). With less trees, there are more issues with soil erosion, habitat loss, contaminated water, and air pollution (New World Encyclopedia, 2014). From 200-2005, the deforestation rate was around 1.4% per year (New World Encyclopedia, 2014). That means Nepal lost 7% of their forests in five years (New World Encyclopedia, 2014).

To combat this issue, Nepal can plant more trees, such as the sugar maples, which also provide an economic benefit. Planting sugar maples could be an economical way to restore forests in Nepal, while producing products to sell. Trees in general help clean the air through carbon sequestration (Gale, et al., 2013). They can help with environmental issues such as flooding, erosion, and habitat loss in Nepal (Gale, et al., 2013).

Canadian Nursery

Zimmermann's Nursery Ltd., located in Strathroy, Ontario is an example of a local nursery that could potentially supply sugar maple seedlings for export into Nepal.

Contact Information:

Tony and Tina Zimmermann: Zimmermann's Nursery Ltd.	Email: zimmermanns.nurseryltd@gmail.com
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To produce, 1000 saplings, for example, for export to Nepal, they would need to hire more employees and increase production. This will create more jobs and generate more revenue. If a large company that already mass produced the trees was used, they would likely already have the capacity to do so and it would not have the same potential for creating more jobs in Ontario.

Community Forests



<http://voices.nationalgeographic.com/2015/04/17/women-lead-on-conservation-in-nepal/>

The society in Nepal is positively impacted by community forests (Paudel, 2003). Community forests strive to provide the basic needs of the users, which includes the supply of wood for heat and timber, while maintaining a sustainable system (Paudel, 2003). The

middle hills region of Nepal is where most of the present community forests are located (Thoms, 2008). Forests in Nepal are very important for many aspects of life, ranging from fodder, bedding, compost and particularly essential as a heat source for cooking (Thoms, 2008). If the forests are healthy and growing well, then there is an opportunity for improving the quality of life for many Nepalese involved in community forests (Thoms, 2008). Many products required and used by the Nepalese are found and provided by forests to accomplish daily tasks (Paudel, 2003).

Uses for Livestock

There is a strong connection between agriculture and forests in Nepal as the forest benefits livestock in many ways (Thoms, 2008). Animals can consume the leaves of the trees as fodder during periods of dry weather when other forages are scarce, without taking away from the fields' organic matter by using crop residues as feed (Brown and Shrestha, 2000). Because livestock is very important for labour, food and manure as fertilizer, forests are essential for helping support the livestock which benefit the quality of life for the Nepalese (Thoms, 2008).

Maple Syrup

In regards to maple syrup production, it is a costly process which also has high rewards when sold. In Canada and the US, maple syrup is a huge industry with a multimillion dollar revenue (World Book Inc., 2016). The process of turning sap into syrup requires a lot of sap as roughly forty gallons of sap is required to produce one gallon of syrup (World Book Inc., 2016). This is part of why maple syrup is so expensive to buy.

In the spring, when freezing nights and warm days occur, sap can be harvested from sugar maple trees with the use of spouts and buckets or small pipelines inserted into the trunk (World Book Inc., 2016). Of the two methods of extraction, the pipeline system is more cost effective as it requires less labour and time, and it collects more sap (World Book Inc., 2016). The window for harvesting sugar maple sap is about three to six weeks or as long as the freezing nights and warm day's cycle continues and the buds are not open on the tree (World Book Inc., 2016). After the sap is collected, it must be boiled down to allow for the evaporation of water (World Book Inc., 2016). Once the sap reaches 219°F, it can be removed from heat and is now considered syrup (World Book Inc., 2016). It is possible to boil past the syrup stage to

create other products out of the sap like maple sugar, maple taffy and maple butter (World Book Inc., 2016).

Marketing Opportunity

There are many uses and applications of tree products in Nepal, and the Nepalese heavily rely on forest products for their livelihood (Paudel, 2003). Households in Nepal are forest dependent with more than 80% of Nepal's energy source provided by wood (Thoms, 2008). Importing sugar maple saplings for planting in the hill regions of Nepal to start a community forestry group is a great opportunity for Nepal. The sugar maple saplings would be ideal for selling to community forest users. The seedlings will be more affordable when splitting the costs among the group instead of one grower. The trees can provide an income for the Nepalese women involved in the community forest groups along with the poor (Government of Nepal, 2016). The community forest users can sell the excess timber and other forest products not used by their family to have more income for things like farm improvements (Thoms, 2008).

A special attribute associated with sugar maples is the production of sweet sap. After about ten years of growth, the trees with at least a six inch trunk diameter will be large enough to harvest sap for processing (Davenport and Staats, 1998). Unlike other tree species, sugar maples will be able to generate income in a shorter time period than trees planted for timber alone (Treeplantation.com, 2000). In Canada, \$14 500 to \$28 500 per acre in the 30th year of production, is earned as gross revenue through the sale of maple syrup (Treeplantation.com, 2000). This gross revenue per acre continues to rise as the years of production continue (Treeplantation.com, 2000). The Nepalese could process maple sap into syrup and get a premium price for their product like Canada.

Documents required

There are different regulations for importing to other countries and different import permits (Zimmermann, 2016). For example, to export saplings into England, nursery stock must be inspected a year in advance and a phytosanitary certificate is required before exporting (Zimmermann, 2016). An inspector from Agriculture Canada will come and look at the soil and the plants for any potential diseases or pests and say what needs to be done to meet regulations (Zimmermann, 2016). To ship to the USA, however, it is not a requirement for the saplings to be inspected a year in advance like in England (Zimmermann, 2016).

Loan/grants

In Nepal, there is a community forestry program which already helps roughly 1.45 million households which is equivalent to thirty five percent of the population (Government of Nepal, 2016). This program could help fund a new community forest in the hill region of Nepal. There are other export funds which can be used to help pay for this export product in Canada.

Global competition

Many species of trees could be exported into Nepal for environmental services, but sugar maples are well known for their high sugar content sap and hard wood. Sugar maples specifically are found in US and Canada (Gale, et al., 2013). For this reason, the US would be the biggest competitor in exporting trees. Because Canada has cooler temperatures and warm temperatures, the trees would be better suited for Nepal's varying climate, as the US has more heat and less cool temperatures.

Not all types of trees will be best suited for the uses of the Nepalese. For example, coniferous trees such as spruces, are not ideal for feeding livestock like deciduous leaves. In

addition, needles off of coniferous trees are known to alter the pH of soil over time with extended use, acidifying the soil (Brown and Shrestha, 2000).

Concluding thoughts

Starting another community forest with sugar maple seedlings may be a good way to improve the quality of life for the Nepalese through various direct and indirect benefits including wood and ecological services (Thoms, 2008). This product could help Canada also with jobs and stimulate more income with increased trade. The market may be small in Nepal, but sugar maple seedlings could potentially be marketed to other third world countries.

For instance, a trial run in Nepal would be beneficial to see the survival rates of the seedlings in the hill region. It may not be economical for Nepal to import seedlings if the survival rate is very low. Instead, Canadian sugar maple seeds could be imported and sown directly for germination in Nepal. This could improve the survival rate as the seedlings will have grown and adapted specifically to the Nepal environment and have no transplant shock (Zimmermann, 2016).

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