

Export of Hazelnut Saplings to Nepal

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Introduction

Hazelnuts are a type of nut commonly eaten as a snack around Canada, harvested for both its sweet taste and its high nutritional content. The cob of a hazelnut is oval in shape, dense in texture, with a hard fibrous husk. They can be eaten raw, but may also be roasted to enhance its flavour. Hazelnuts, like many other nuts, are rich in oil, which can be used as an inexpensive alternative for cooking oil. They are harvested from hazelnut trees over the summer annually, when they reach a brown colour unlike the unripe green. The trees take about 2 years to grow, reaching full maturity at 4 years, and can live up to 80 years. An average hazelnut tree can produce approximately 20 pounds of nuts (Earthgen, 2016) at about \$1.4 USD per pound (NASS, 2015). With the addition of hazelnut saplings to the Nepalese community, both Canada and Nepal can be benefitted.

Hazelnuts are not only a great cash crop for their commercial values, but are also very nutritious and can be eaten as a staple food. With a high content of unsaturated fatty acids, not only are the nuts filling, but they are also great for use as cooking oils. They also contain many bioactive macronutrients as well as essential micronutrients necessary for the functioning of human bodies. Filled with protein and dietary fibre, these nuts can help reduce cholesterol and provide an inexpensive alternative to the nutrients found in many meat products. They can be eaten quickly but with proper storage, can be kept for a long time without decay (Ros, 2010).

Not only are hazelnuts great for nutrient intake, their trees can also benefit their surrounding environment. They don't require as much water as most other perennial plants, conserving much of the water supply and saving the associated input of labour. Due to their higher rate of photosynthesis compared to the average tree and a large root system which increases access to organic soil matter, they have a substantially high carbon intake, and consequently, act like a carbon sink. Furthermore, they do not require tilling which is often a cause of soil damage due to erosion. As a result, they are more or less an ideal plant for the environment, as well reduce manual labour and eliminate the need of tilling equipment.

Hazelnut trees are best grown by large bodies of water to minimize any impact cold weather may bring. Some varieties are more cold-sensitive than others, but all should be treated with care when the weather is cold. Preferably, they are best grown in moist or sandy loam soil with well fertilized land, although heavier soils could also be used should no loam soil be available. A soil pH of 6 to 7 would be best. If the pH of the soil is too acidic, treating with lime powder can reduce acidity of the land. As with most plants with a shallow root system, the soil needs to be aerated well or it may risk flooding the roots and end up damaging the trees. One of the best ways to plant the trees such that roots would have minimized damage is by adding perforated tiles belowground below the roots, which would allow for proper and quick drainage of water and prevent flooding damage (OMAFRA, 2016).

To prevent air damage of hazelnut trees, planting at higher altitudes with a small slope would prevent frost pockets and allow the trees to be well aired. A canopy or shelter would also be beneficial to hazelnuts to block heavy, damaging winds, as well as regulate wind pollination of hazelnuts. If a canopy or shelter is not available, planting a variety of tall trees around the plantation such as spruces would allow for adequate natural wind protection (OMAFRA 2016).

Trees are to be planted in early spring so that they can root themselves into the soil for adequate nutrient and water intake, and begin to grow once out of dormancy. They can be planted with a basic handheld tree spade, which is a shovel-like tool that can properly deposit the tree and its surrounding soil into a desired pre-dug hole for the tree. If the soil is not moist enough upon planting, water the trees after planting. If available, organic mulch would be a good addition to prevent weed outbreaks, to keep the soil moist, and to allow for more earthworms in improving soil conditions. Ground cover plants could also be planted to prevent pests from damaging hazelnuts before harvest, as well as weeds from harming the tree. The nuts can be gathered on the ground during harvest, after they are fully mature. Hazelnuts are to be stored in a cool, dry storage room at low humidity, and free from precipitation and pest damages, to ensure that the nuts do not grow mould (OMAFRA, 2016).

To keep the orchard of hazelnut trees well aerated, a good irrigation system would be greatly beneficial in preventing damage to the roots. A drip irrigation system is best for hazelnuts, being comparatively inexpensive and simple to handle. For an orchard of 20 acres with 108 trees per acre, a drip irrigation system would cost from \$1,000 to \$3,000 (Julian et al, 2008). This

system may not be affordable to all, thus it is likely that the irrigation system would be used by a community rather than a single family. Alternatively, the system can be self-installed to cut back on labour costs by about \$500. The cost of labour to manage the orchard, including the removal of weeds, tending of the trees, and harvesting of nuts, would be about 2 Nepalese rupees per day, per person. Fertilizer may be added, however due to hazelnut trees being self-regulating, many nutrients in the tree can be re-used, thus the need to purchase fertilizer is little to none, unless the soil has been proven to be quite poor in nutrients. In that case, fertilizer is priced at approximately \$200 per 20 acres, depending on the type of fertilizer and its usage (Julian et al 2008).

During harvest, storage of the nuts is very important to keep them in good condition. Hazelnuts outside of their husks at room temperature (25°C) can last for about a few weeks before they begin to turn rancid. To store them such that they would last long after harvest is vital. Firstly, the nuts must be cleaned by hand to remove debris. Next, they are dried to remove excess moisture content through the use of a homemade box dryer. A cool, dry place is preferred as a final storage, at a temperature below 10°C (OMAFRA, 2016).

Cost of Production

The total costs of planting hazelnut trees would indicate that the first few years of planting would result in a severe deficit, as the trees would not be fully mature thus would not be able to produce hazelnuts until the second year, only maturing at four years of age. Table 1 below shows a breakdown of revenue and costs of the average hazelnut tree grown in Canada in 2015. Some costs are variable, such as fertilizers and irrigation systems. Some, however, are

BARE ROOT HAZELNUTS							
Year	Yield (%)	Revenue (\$)	Variable Costs	Fixed Costs	Total Costs	Profit	Accumulated Profit
Pre-Plant	0	0	-3690	-295	-3985	-3985	-3985
Planting	0	0	-7912	-667	-8579	-8579	-12564
2	0	0	-4201	-645	-4846	-4846	-17410
3	30	3153	-5454	-946	-6400	-3247	-20657
4	50	5256	-5652	-965	-6617	-1361	-22018
5	60	6307	-5683	-963	-6646	-339	-22357
6	70	7358	-5557	-963	-6520	838	-21519
7	80	8409	-5248	-963	-6211	2198	-19321
8	90	9460	-4919	-963	-5882	3578	-15743
9	95	9986	-4566	-963	-5529	4457	-11286
10	100	10512	-4188	-963	-5151	5361	-5925

Table 1

fixed costs, for example for land taxes as well as cost of labour, which must be prepared to create the orchard.

Looking solely at the accumulated profit, cultivating hazelnuts would not be a profitable enterprise. The break-even point between profit and costs begin at the seventh year, with the pre-plant and planting years costing the most. This would be difficult to overcome without a grant or loan by the government, and with climate and other variables, may instead create a heavy deficit without yield. If the saplings were to be pre-purchased from Earthgen, an Ontario company known for featuring its EMIPP technology (Early Maturity Inducement Plant Process), there is a higher chance of survivability, greater root mass, larger foliage thus having greater hazelnut production at a faster rate, which would then increase the chances of gaining more profit faster, as seen in Table 2.

EARTHGEN EMIPP HAZELNUTS							
Year	Yield (%)	Revenue (\$)	Variable Costs	Fixed Costs	Total Costs	Profit	Accumulated Profit
Pre-Plant	0	0	-3665	-295	-3960	-3960	-3985
Planting	0	0	-7245	-667	-7912	-7912	-11897
2	20	2628	-3557	-644	-4201	-1573	-13470
3	60	7884	-4748	-706	-5454	2430	-11040
4	100	13140	-4927	-725	-5652	7488	-3552
5	100	13140	-4943	-740	-5683	7457	3905
6	100	13140	-5557	-963	-6520	6620	10525
7	100	13140	-5248	-963	-6211	6929	17454
8	100	13140	-4919	-963	-5882	7258	24712
9	100	13140	-4566	-963	-5529	7611	32323
10	100	13140	-4188	-963	-5151	7989	40312

or community start gaining more revenue ^{Table 2} hazelnuts sold. This is due to the increased foliage and bigger root mass, which would allow for a more successful plant that can grow more seeds. Though the years prior to the yield still inevitably are a large deficit, it is now faster and easier to gain back the amount of money spent purchasing and growing the trees. The Earthgen trees start at a price of \$30 per 30 gallon tree (Earthgen 2016), thus a 20 acre field with 108 trees per acre would cost over 50 thousand. Applying for a loan or grant may allow for the large sum to be paid such that the farmers could afford to tend to the orchard and be able to deal with unexpected circumstances, as well as purchase cover crops to control pest or weed invasions. Alternatively, a small number of trees can be purchased at one time, than the pollinated hazelnuts can be planted and raised locally, rather than the much heavier burden for a larger farm.

Benefits to Canada

Earthgen, stemming from Canada, would benefit from this exchange. Through promoting its trees further and allowing for greater outreach of its exclusively offered technology, EMIPP, the increased hazelnut production would make hazelnuts globally more affordable as a result, reducing competition, yet still allow farmers to earn profit and their return of investment quickly. This showcase effect would attract others to notice the success of investing in Earthgen trees, an Ontario based company, with some enthusiasts taking prompt action. Following increased demand for the exclusive trees, Earthgen must respond to increased orders through expansion of business and an implementation of development plans to meet consumer needs. Therefore, a ripple effect would have started, allowing for a rapid business growth with more job opportunities. Simply experienced employees would no longer be sufficient and new, inexperienced hires would likely handle the large amount of work. Should the company invest in development of varieties in the types of hazelnut trees, the effect would have an even bigger boost to the economy, and the company may need to train and organize employees for varieties that may require more care. New positions and professionals associated with new development plans would be generated, such as advisors to access farmland and soil for consumers, choice of hazelnut varieties, and professionals who offer services in feasibility studies and preparing business proposals for consumers who intend to start an orchard.

References

- Arbor Day Foundation. (2016). *The Promise of Sustainable Agriculture*. Retrieved from <https://www.arborday.org/programs/hazelnuts/consortium/agriculture.cfm>
- Earthgen. (2016). *Earthgen*. Available from <http://www.earthgen.ca/>
- Julian, J. W., Olsen, J. L., Seavert, C. F. (2008). *Orchard Economics: The Costs and Returns of Establishing and Producing Hazelnuts in the Willamette Valley*. Retrieved from <http://arec.oregonstate.edu/oaeb/files/pdf/EM8748-E.pdf>
- Leuty T., Galic D., Bailey P., Dale A., Currie E., Filotas M. (2012 February). *Hazelnuts in Ontario*. Retrieved from <http://www.omafra.gov.on.ca/english/crops/facts/12-011.htm>

NASS. (2016). *2015 State Agriculture Overview*. Retrieved from https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=oregon

Ros, E. (2010). Health Benefits of Nut Consumption. *Nutrients*, 2(7). Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3257681/>

Part 2

Market Opportunities

Nepal does already have some hazelnut production; however it is not a staple crop and have only recently been incorporated into their program. As a result, it is unclear how well hazelnuts could be received by the Nepalese community, however it is predicted to go over well (Everything Organic Nursery 2016). At present time, there is little competition in hazelnut production or sales in Nepal, with few producers actively selling their nuts. The average nuts in Nepal cost about 1,500 rupees per kg, with farmers claiming the increase in price was due to transportation issues, including the price of diesel and a difficulty of crossing the border to export to other countries. Some have stated that they have been rejected at the border and could not export the nuts, yet transportation costs still apply (Ekantipur, 2015). One way to avoid this would be to offer support in exportation, including acquiring proper and acceptable documentation for exportation. Farmers should be encouraged to ensure they have buyers before transporting the crops, rather than looking for buyers with their crops. Alternatively, selling locally should be encouraged as that would minimize transportation costs and likely eliminate the need to handle complex documentation, thus ensure fewer expenses and gain more profit. A lowered transportation cost may also be achieved if farmers understand and deliver a larger amount of nuts at a time. The saved costs may be reflected in lowering the selling price that further promotes their business as well as having more satisfied consumers who would then recommend the nuts and allow for more consumers.

Transport

To deliver Earthgen hazelnut trees to Nepal, a series of steps must be followed. First, all the required permits and documentations are gathered, including the Nepal custom import declaration form, letter of authority for clearing agents to act on behalf of the importer, Proforma Invoice, certificate of insurance policy, Foreign Exchange Declaration Form of Nepal Rastra Bank, certified copy of L/C, company registration certificate, VAT/PAN registration certificate, and permission from Plant Quarantine Section of Department of Agriculture for import of plants

(Neffa, 2016). After gathering required documents, the year-old saplings must then be sent by truck from Dunnsville, Ontario where they had been grown, to the port of Halifax, in Nova Scotia, where they would be transported by ship to the port of Calcutta, India. Once cleared for import with documentation, the saplings are sent by truck to the Himalayan Mountains, where they would be received by the consumer, currently Himalayan Organic Farm Nepal, to begin planting. This process is best done in early spring while trees are still dormant. This would take approximately 3 days before arrival at destination. Each trip could carry around twenty to thirty saplings, depending on the size of the truck.

To keep the trees in optimal condition during shipping, the roots are to be bundled in a “root ball”, in which the dirt would be packed tightly with the roots in the shape of a ball. A wet canopy would be wrapped around the root ball so that drying does not occur. The whole tree is to be kept in shade, preferably in an enclosed space to protect from direct sunlight or high temperatures. The farmers should be ready to plant the saplings the day that they arrive to ensure that any damage is minimized and the trees are restored to their natural living conditions as soon as possible. The roots should be allowed to spread naturally in a horizontal fashion, not bunched downward, which can lead to death. Weeds should be removed prior to planting to ensure that each tree has enough required nutrients (Natural).

Benefit to Nepal

The introduction of hazelnuts to Nepal would also be greatly beneficial. Without much competition due to a lack of hazelnut suppliers, the price of hazelnuts would initially vary based on the farm’s desire such that the nuts can be priced at a moderate rate that would keep consumers satisfied with good profit to retailers. As more orchards grow hazelnut trees and the crop becomes popular to local communities, the price will be more stabilized and determined by the market under demand and supply rule. Once the hardship of reaching the break-even point is over, the financial pressure on farmers with a large loan will ease. At this point, the annual nut production at a more affordable cost will secure income of the nut farmers, and therefore will be more adapted to the market. On the other hand, average Nepalese with increased consumption of nutrient-rich hazelnuts may lessen needs for other foods. Many may even switch to hazelnut oil to reduce time spent cooking. A new hazelnut plantation could increase local job opportunities. From daily tasks such as weeding and watering, to seasonal ones such as fertilizing and

harvesting, to other employees who are required to keep the entire plantation running smoothly and ensure the overall health of the trees, the plantation would grow successfully.

Export Potential

Hazelnuts have a strong export potential. Since they are only newly introduced to Nepal, a country in which people eat nuts as a staple food, they may become an additional nutritious alternative as one of the country's most popular food. While expenses are high in the first few years, the amount can typically be paid back by the sixth year, and since the trees are hardy and last for many years under good conditions, they would provide farmers a steady income. Those expenses may be problematic for a farmer, thus provision of a loan or grant would be required to start a hazelnut farm. Another problem that may be faced would be the inability for hazelnut trees to grow well in soil, needing irrigation. To overcome this, an irrigation system must be planned and set up prior to the arrival of hazelnuts, and some foliage such as cover crops may be necessary to redirect water content. Insects and other pests may pose a problem during harvest. An inexpensive measure that can be implemented to prevent against pests would be to plant some trap crops to attract pests elsewhere. Other pests can be deterred by natural pest predators, for example cats against field mice and squirrels that may be interested in eating the nuts.

Conclusion

Overall, the introduction of hazelnuts into Nepal from Canada would benefit both countries. Canadian citizens interested in agriculture may find job opportunities in hazelnut nurseries in Earthgen. Import of hazelnuts at a low price from Canada would benefit Nepalese looking for an inexpensive food. Nepalese citizens can enjoy an inexpensive yet nutritious food. The importer of the hazelnuts, Organic Farm Nepal, may profit greatly from the income generated from the nuts, as well as for their own meals. Others looking for jobs in Nepal may be able to help keep the trees in good condition. While there are still many hurdles to overcome, the recommendations suggested may aid past them and allow for a strong, successful plantation of hazelnut trees.

References

Agriculture in Nepal. (2016). *Agriculture in Nepal*. Available from <http://www.agricultureinnepal.com/>

Bashyal, Suman. (2015). *Prices of dry fruits jump*. Retrieved from <http://kathmandupost.ekantipur.com/news/2015-11-09/prices-of-fry-fruits-jump.html>

Earthgen. (2016). *Earthgen*. Available from <http://www.earthgen.ca/>

Nepal Freight Forwarders Association. (2016). *Nepal Freight Forwarder's Association*. Available from <http://neffa.org.np/>

The Montana Department of Natural Resources and Conservation. (n.d.) *Seedling Handling, Planting and Care Guide*. Retrieved from <http://dnrc.mt.gov/divisions/forestry/forestry-assistance/conservation-seedling-nursery/seedling-handling-planting-and-care-guide>