

Royalty Purple Podded Bean Seeds: Canadian Exports to Nepal

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Introduction to Nepal:

Nepal, a small, multi-ethnic, landlocked country found between China and India, consisting of around 29 million people (of which more than a million live in its capital city Kathmandu) (CIA, 2016). In terms of tourism, Nepal is known for being home to the Northern Himalayan mountains including the tallest peak, Mount Everest (FAO, 2016). These mountains make up one of three geographic regions, along with the Hill and Terai regions (Terai being the warmest, flattest and smallest of the land areas) (Chapagain Lecture, 2016). Largely due to the intense altitude differences in these regions, factors such as temperature, rainfall and soil type can vary largely from one end of the country to another (FAO, 2016). Most of Nepal's agricultural production utilizes the Terai regions, though some subsistence agriculture and pastoralism take place into the hill regions, as well as transhumant pastoralism in the colder, less vegetative Mountain region (Chapagain Lecture, 2016). The major food staples of Nepal are rice, maize, and various other grains (FAO, 2016). However, many crops are unable to grow in the higher altitudes due to colder temperatures, soil erosion and poor transport infrastructure (CIA, 2016).

Despite, having a rich and diverse culture and beautiful landscape, Nepal has high levels of poverty (1/4 of people falling beneath the poverty line) and can be considered one of the least developed countries in the world (CIA, 2016). Plagued with poor nutrition, food deficit regions, environmental degradation many people depend on increasingly fragile subsistence farming practices to survive (FAO, 2016). Food insecurity can be linked to more than 30% of young children being underweight, and the general impoverishment of the people (CIA, 2016). To make matters worse, in April of 2015 Nepal experienced a massive earthquake, measuring 7.8 on the Richter scale, followed by many serious aftershocks. The impacts of the earthquakes were catastrophic, with casualties well into the thousands as well as the widespread destruction of infrastructure. Agricultural systems were also affected as many crops, tools and machinery were lost, severely hurting the food system and those dependent upon it (CIA, 2016).

Product Description:

The Royalty Purple Podded bean is a variety of *Phaseolus vulgaris*. L (a kind of common bean) (Yeager & Meader, 1957; CGIAR, 2016). Beans a kind of legume are known for their ability to fix nitrogen in the soil via a symbiotic relationship with bacteria housed in nodules attached to the plant's root system (Frame, 2005). They are considered to be a rich source of protein, oil, and many B vitamins (thiamine, riboflavin, and nicotinic acid for instance) (FAO, 2016). They are also noted to be a good supplementary crop for many cereal crops as they compensate for the missing essential amino acid lysine in cereal grains while the cereals, in turn, provide the needed amino acids cysteine and methionine needed in human diets (FAO, 2016).

Beans grow in soils with a pH between 5.5-7 and between 16–18 °C at night and 22–26 °C in the day (though the Royalty Purple Podded variety was developed to grow in colder temperatures and soils) (Yeager & Meader, 1957; FAO, 2015). They prefer full sun conditions, however, cannot handle temperatures above 35°C, thus are better suited for the Nepalese hillside regions in lieu of the more tropical Terai (FAO, 2015).



The Royalty Purple Podded bean (above)
https://www.anniesannuals.com/signs/b%20-%20c/images/bean_royalty.jpg

The Royalty Purple Podded bean was first developed in the 1950s in the state of New Hampshire (Yeager & Meader, 1957). The variety most notable feature is its bright purple pod found to be a source of anthocyanins (Okonkwo & Clayberg, 1984). These Anthocyanins have been linked in health research with antioxidant capacities and increased protection against many diseases (Lila, 2004). This plant pigment breaks down when boiled causing the beans to turn green, but they can also be eaten raw if the anthocyanins are desired for consumption (The Incredible Seed Company, 2016).

The variety has one of the shortest maturation periods, spanning 55 days, which yields an abundant supply of six-inch beans (The Incredible Seed Company, 2016)

While many Canadian seed companies produce this variety of legume or those that are quite similar, the Incredible Seed Company based in Nova Scotia, Canada was chosen after

considering the cost, variety, and production location. Other companies also offer a good selection of bean varieties though often at a higher price (see Table. 1). The Incredible Seed Company sells their seeds in packets of 50 for 2.75\$CDN or 225.40 Nepalese Rupees. The seeds are an organic, open-pollinated and heirloom variety, allowing for seeds to be saved and reused in following years (The Incredible Seed Company).

Table. 1

Company & Location	Variety	Description	Cost	Contact Information
The Incredible Seeds Company, RR1 Pleasantville, NS, B0R 1G0	Royalty Purple Pod (Bush)	Originally, New Hampshire bred, better cold tolerance, yields in 55 days. Organic, heirloom, open-pollinated seeds.	\$2.75 per 50 seed packet	Phone: 1-888-851-6620 Website: http://incredibleseeds.ca/
Salt Spring Seeds, 255 Toynbee Rd, Salt Spring Island, BC V8K 2W1	Trionfo Violetto (Pole)	Italian, organic, heirloom, all season, grow up to 8 feet, producing sweet purple-podded beans.	\$3.75 per 30 seed packet	Phone: 250-537-5269 Email: dan@saltspringseeds.com Website: https://www.saltspringseeds.com/
The Cottage Gardener,	Royal Burgundy	Developed from Royalty	\$3.49 per 50 seed	Phone: 905-786-2388 Email:

4199 Gilmore Rd., RR#1, Newtonville ON, L0A 1J0	Bean (Snap Bean)	Purple Pod variety, cold resistant, long growing season, grows many deep purple pods.	packet	heirlooms@cottagegardener.com Website: http://www.cottagegardener.com/
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Product Inputs and Costs:

The Canadian small-scale seed production industry is one focused on environmental sustainability and often depends on family farms to produce and save their seeds (Salt Spring Seeds, 2016; The Cottage Gardner, 2016). No machinery is required for the growing of the purple podded bean seed varieties as they are harvested by hand. Some vertical structures such as sticks, fences or poles can be used to support the pole bean varieties, but other inputs (such as synthetic fertilizers) are not required as most of the family-run producers grow organically (The Cottage Gardner, 2016). The Incredible Seed Company sells its Royalty Purple Podded bean seeds in packets of 50 seeds for 2.75\$ CDN or approximately 225 Nepalese Rupees.

Shipping and Exportation Process:

While most small-scale seed producers do have international shipping options, many of these companies do not ship in bulk. With fixed international rates ranging between 15\$CDN for 1 packet to 30\$ for a few packets, it is more cost effective to transport the seeds through a third party shipping company if seeking to buy more than a few packets (Jason, 2016; The Incredible Seed Company, 2016). Using the company Airfreightforwarding an air transport method, the costs are greater but are fixed for large brackets. For instance, if 2 bean seeds equate to approximately 1g then for 1 kg one can get 2000 seeds or 40 seed packets. For instance, costs are fixed with this method of transport when shipping from Halifax, Canada to Kathmandu, Nepal within the bracket of 1-9kg at 304.62\$CDN. If assuming the exportation of the most seeds for this range, one can ship 360 packets (40 packets x 9 kg = 360 packets) for this price. Therefore, this form of shipping would increase the price of each packet by 0.84 cents CDN (304.62\$/360 packets = 0.84) Bringing the price of one packet of 50 seeds to at least 3.6\$ CDN or 295.39 Nepalese rupees.

The overall shipping cost would likely be too expensive for the average Nepalese farmer, so there would have to be some intermediary players at work. One actor, to buy the seeds from the producer and have them boxed and given to the third party shipping company. Another actor in Nepal would be useful to help distribute the seed packets from Kathmandu to various rural areas and collect the payments from the farmers. An agricultural extension worker or an organized co-op system could fill this role.

Canada has long had a good trade relationship with Nepal thus aiding the flow of trade. Nonetheless, the large-scale exportation of foreign plant material to Nepal requires a phytosanitary certificate dated 30 days or less before its arrival in Nepal (MAF Biosecurity Authority, 2011; Government of Nepal, 2012). A phytosanitary import permit is also required. Small scale shipments are not accounted for in the regulations (MAF Biosecurity Authority, 2011). The procurement of this certification is done through the Canadian Food Inspection Agency (CFIA) (Government of Canada, 2016). The permit to import must be given by the importing country (in this case Nepal) allowing the agri-food products into the country provided they meet the phytosanitary requirements (Government of Canada, 2016).

Canadian Industry Information and Potential:

Many Canadian companies in areas of production and transportation could benefit from the exportation of these bean seeds. Canada is currently seen as a top producer, processor, and exporter of exceptional seed on international markets (Government of Canada, 2016). Seed exports contribute around 5.61 billion dollars of economic gains to the Canadian economy as well as providing more than 57,000 jobs. These exports, as well as their economic value, has only increased in recent years incentivizing further research and development. The diversity of climates and rich sources of quality soil provides Canadian producers the ability to develop and grow a wide range of crops (The Government of Canada, 2016).

The scale of operation for Canadian seed producers varies greatly and while large scale companies are more recognized for their contribution to the industry, there remain many opportunities for small-scale producers as well. For instance, The Incredible Seed Company is a small-scale enterprise that sources its seed from the Maritime region (The Incredible Seed Company, 2016). This region which lacks a lot of the industry opportunities of central Canada or the West Coast reports some of the lowest employment rates nationwide (Statistic Canada,

2016). For example, Nova Scotia has an employment rate of 56.2% a significant difference to the country average at 61.1% (Statistic Canada, 2016). Improved trade offers these companies the opportunity to expand their business as well as benefiting secondary industries through an increased demand for storage facilities and international transport. The headquarters for the shipping company A1 Freight Forwarding are in Toronto, Canada and therefore benefit by connection to the shipment of these seeds (A1 Freight Forwarding, 2016).

Opportunities in Nepal:

This potential export offers many opportunities for Nepalese farmers in addition to Canadian companies. As the Royalty Purple variety has increased cold tolerance it is better suited for more upland vegetable farming (Yeager & Meader, 1957). Vegetable farming has been found in some studies to improve the socio-economic livelihoods, food security and social status of farmers (in particular, women and marginalized groups) (Tiwari et al., 2008). Beans are prolific producers and can be stored for long periods once dried (CGIAR, 2016). Many positive impacts of intercropping beans with cereal crops have also been observed by researchers. One study of a maize-bean intercropping system noted an increased nitrogen supply in the soil, the suppression of weeds and increased yields (Workayehu & Wortmann, 2011).

In regards to harvesting, the bright purple colour of the pods aid to increase ease in locating the ripe plant material. Green varieties can be more difficult to obtain as they are more likely to blend into the surrounding foliage. This is important as studies have illustrated that women bear the majority of labour burdens and that conservation farming methods that increased labour required to harvest and process were less sustainable in the long term (Halbrendt et al., 2014). The plant's foliage has the alternate use as feed for livestock (another key aspect of the agri-food industry and food security in Nepal) (Pariyar, 2006). The beans themselves are a great source of nutrition that could improve the diet and health of the farmers and their families (especially the subsistence farmers that grow them) (CGIAR, 2016). They can be consumed in a variety of ways, (raw, blanched, roasted, boiled, etc.) depending on the preference and needs of the consumer. As an heirloom, open pollinated seed variety the Royalty Purple bean seeds can be saved, dried and used again the next year (The Incredible Seed Company, 2016). Seed saving empowers farmers in a way lost with hybrid seeds (as the farmer must annually repurchase the

seeds). Reusing the seed also decreases the overall cost of the incorporation of the plant into the agricultural system as initial costs act as an investment to years of use.

To assist with this process both the Canadian and Nepalese governments offer different programs to promote agricultural trade relationships. Nepal has agricultural extension services that could be helpful in the distribution and encouragement to use new seed varieties with local growers (Government of Nepal, 2004). Nepal also has a Canadian trade commissioner service offering Canadian companies advice and insight into navigating the Nepalese market from a locally rooted perspective (Government of Canada, 2013). The Canadian government also has various programs and funds such as the Agrimarketing program (with branches aimed at medium and small scale Canadian producers) that assists agri-food producers to enter, compete and succeed in foreign markets (Government of Canada, 2016). They offer as much as 50,000\$ CDN through this program to qualifying Canadian exporters. Therefore, there are many economic, nutritional and social opportunities in this export venture.

Challenges:

While there are many opportunities for this potential export there remain many challenges as well. China while not supplying the Royalty Purple variety of bean seeds, does sell similar purple podded varieties. One kg of purple-red bean seed variety can be found on the global trade website Alibaba.com for 8.5\$USD or 934 Nepalese Rupees in comparison to the cost of Royalty Purple seeds from Canada which run about 110\$CDN or 9,005 Nepalese Rupees for 1 kg (though the marginal cost decreases with increased quantity shipped). China's proximity to Nepal decreases the cost of shipment and their mass production methods decrease the price of these substitutes. Small scale Canadian exporters can also be deterred by the reoccurring costs of phytosanitary certificates and import permits. Continuing that consideration of cost, importers in Nepal may outweigh the specific benefits of the Royalty Purple variety with the higher upfront cost and investment. Similarly, Nepal is known for its production of various pulses, (Lentil, Pigeon pea, etc.) legumes that also provide many of the general benefits that the Royalty Purple beans do (FAO, 2016). So even if the Canadian bean variety was successful it could infringe on the profits or prospective industry growth of these Nepalese producers.

Another concern is the capacity of Nepalese farmers to save their seeds. Bean seeds need to be kept dry to store properly, however, with Nepal's monsoon season this can prove difficult

(CIA, 2016). Many subsistence farmers lack adequate storage facilities making the benefits of heritage seeds less pronounced.

Improvement Potential & Recommendations:

More research needs to be done to test the capabilities of the Royalty Purple Podded bean variety. Information concerning the degree of cooler temperatures it can grow at, and if there are any impacts on yield as the growing temperature decreases. Also, research concerning its ability to grow in poorer soils and under other stresses would be useful in increasing demand for the product. Additionally, finding ways to reduce the fixed costs for Canadian producers and shipping companies, whether through better organization, cost sharing or technology advancement.

In conclusion, intercropping legumes is strongly recommended for Nepalese subsistence farmers and the utilization of a purple podded bean variety in these systems is encouraged. However, at this time the exportation of the Royalty Purple Podded bean seed variety of said from Canada to Nepal is not the most efficient or cost effective option. Nevertheless, this variety (with the aforementioned improvements) offers many future opportunities and benefits to both Canadian producers and Nepalese farmers.

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