

# **The Assessment of the Export Potential of Canadian Rosemary Seed Varieties to Nepal**

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The potential item of export to Nepal is Canadian rosemary seed varieties, in regards to the tourism industry. Canadian rosemary seed varieties is an export item that has high hopes of benefitting both of the countries involved. This paper was created in hopes to allow conclusions to be made on the potential of this product.

### **PART ONE: PRODUCT INFORMATION**

#### **Product Description:**

Rosemary is a flavourful herb grown in Canada. Rosemary's scientific name is *Rosmarinus officinalis* (Zilberg et al., 2010). Rosemary is native to mediterranean countries (Department of Agriculture, Forestry and Fisheries of the Republic of South Africa, 2009). Rosemary is an evergreen herb that can grow up to 1-2m tall. (DAFF, 2009). The plant consists of rough and slender branches, with green leaves (DAFF, 2009). The flowers are small and blue, containing essential oils within the sepals (DAFF, 2009). Rosemary is a herb that can be used as a fresh or dry product to give flavour to dishes that usually include beef, pork or chicken (The Ontario Seed Company, 2016). The rosemary plant is very useful in regards to the ability to use the leaves, stems and oils (DAFF, 2009). Rosemary is a warm season crop that can be harvested after 60 days of growth (OSC Seeds, 2016). *Rosmarinus officinalis* is very useful and diverse herb that can be used to give excellent flavour to dishes.

There is a specific variety of rosemary that could be used for the importation of Canadian rosemary seeds to Nepal. The particular item is known as Rosemary 3090 (OSC Seeds, 2016). Rosemary 3090 is an heirloom herb variety (OSC Seeds, 2016). Rosemary 3090 is a product offered by the Ontario Seed Company (OSC Seeds, 2016). The exact item of export is an heirloom herb variety sold by OSC Seeds, known as Rosemary 3090.



**Figure 1: Rosemary Plant.** Retrieved From: <http://pantrygardenherbs.com/files/2010/12/8-24-04-099.jpg>

### **Health Information:**

\_\_\_\_\_ Rosemary has many health benefits to those who consume the herb. Rosemary has been known to have been kept in households since ancient Greece and Rome (Tapsell et al., 2006). Hippocrates was also known to use rosemary to strengthen and improve memory (Tapsell et al., 2006). Rosemary and other herbs have also been known to be anticarcinogenic (Tapsell et al., 2006). Studies have shown that rosemary powder inhibits vivo binding of metabolites containing 7,12-dimethylbenzanthracene to mammary cells, concluding rosemary could inhibit the production of breast cancer shown in Table 1(Tapsell et al., 2006). Also concluded from the study, rosemary extract decreased the number of tumours by 50%, inhibited hyperplasia, tumour promotion, inflammation and carcinogenic enzyme activity. (Tapsell et al., 2006). In an additional study, rosemary also was found to be antibacterial, inhibiting and killing bacteria strains of E.coli and Gram-positive bacteria (Zilberg et al., 2010). Rosemary has been known to positively affect the consumer's health in very large and impactful ways.

**Table 1: Results From The Study Done By Tapsell et al..** Retrieved From: <http://search.proquest.com.subzero.lib.uoguelph.ca/docview/235713801/fulltextPDF/16898159503D45D1PQ/2?accountid=11233>

### 3 Summary of evidence for health effects of herbs and spices on cancer

Study	Design	Tissue/organism	Bioactive agent/ source	Dose	Measurement	Outcome
Volate et al <sup>44</sup>	In-vitro animal study	Colon of 235 male F344 rats	Quercetin, curcumin, rutin, silymarin, whole ginseng mixture	50–15000 ppm	Aberrant crypt foci suppression and effects of test compounds on evoking apoptosis	Test compounds significantly suppressed aberrant crypt foci at different most effective concentrations. All test compounds except silymarin induced apoptosis, with quercetin being the most potent.
Chuang et al <sup>45</sup>	In-vitro animal study	Diethylnitrosamine (DEN)-induced liver inflammation and hyperplasia in rats	Curcumin (turmeric)	200 mg/kg or 600 mg/kg	Oncogenic activity by immunoblotting analysis	Curcumin strongly inhibited DEN-mediated increased expression of oncogenic p21 <sup>ras</sup> and p53 proteins in liver tissues of rats, the expression of proliferating cell nuclear antigen, cyclin E and p34 <sup>cdc2</sup> , but not Cdk2 or cyclin D1 and DEN-induced increase of transcriptional factor NFκB. However, curcumin did not affect DEN-induced c-Jun and c-Fos expression.
Chuang et al <sup>46</sup>	In-vivo animal study	C3H/HeN mice injected with N-diethylnitrosamine (DEN)	Curcumin (turmeric)	0.2% curcumin-containing diets	Intermediate biological markers by western blot, and incidence of hepatocellular carcinoma	81% reduction multiplicity and 62% reduction in incidence of hepatocellular carcinoma were observed. Curcumin-containing diet also reversed the increase in levels of p21 <sup>ras</sup> , PCNA and CDC2 proteins.
Dasgupta et al <sup>47</sup>	In-vivo animal study	Liver of Swiss albino mice	Basil-leaf extract	200 and 400 mg/kg body weight	Enzyme activities, lipid peroxidation	Basil-leaf extract was very effective in elevating antioxidant enzyme response by increasing significantly hepatic enzyme activities. Lipid peroxidation and lactate dehydrogenase activity were significantly decreased.
Vinda and Uma Devi <sup>48</sup>	In-vitro animal study	Human peripheral lymphocytes	Orientin and vicenin (Indian holy basil leaf)	6.25–20 μmoles/L	Micronucleus count	Both compounds showed significant antioxidant activity in vitro, and therefore give significant protection to human lymphocytes against the clastogenic effect of radiation at low, non-toxic concentrations.
Huang et al <sup>49</sup>	In-vivo animal study	Mouse skin	Rosemary	1.2 or 3.6 mg	Number of tumours per mouse	Number of tumours reduced by at least 50% in the treatment group. Rosemary also inhibited carcinogenic enzyme activity, inflammation, hyperplasia and tumour promotion.
Amagase et al <sup>50</sup>	In-vivo animal study	Mammary cell of 55-day-old rats	Rosemary extract	0.5% and 1% in diet	DNA adducts	Rosemary is effective in reducing the binding of 7,12-dimethylbenz[ <i>a</i> ]anthracene (DMBA) metabolites to rat mammary cell DNA.
Singletery et al <sup>51</sup>	In-vivo animal study	Mammary cell of female rats	Rosemary extract and carnosol and ursolic acid	0.5% in diet or 200 mg/kg	DNA adducts	Rosemary extract and carnosol groups exhibited significant decrease in the in-vivo formation of rat mammary DMBA-DNA adducts compared with controls. Carnosol is one constituent of rosemary that can prevent DMBA-induced DNA damage and tumour formation in rat mammary gland.
Huang et al <sup>52</sup>	In-vitro study	B16/F10 rat melanoma cells	Carnosol (rosemary)	Various concentrations	Antimetastatic potentials by soft agar assay, B16/F10 rat cell migration, metalloproteinase activity	Carnosol exhibited antimetastatic potential, dose independently inhibited B16/F10 cell migration and decreased activity of metalloproteinase. Inhibition of activation of transcription factors NFκB and c-Jun were also observed.

In other studies conducted, rosemary was also seen to have positive health effects. In the first study, rosemary extract was seen to improve endothelial dysfunction and in turn increase the serum plasminogen-activator-inhibitor-1 level (Tu, Moss-Pierce, Ford, & Jiang, 2013). It was also seen to increase weight gain and to lower cholesterol levels and fasting plasma glucose (Tu, Moss-Pierce, Ford, & Jiang, 2013). In the second study done by Tapsell et.al. shown in Table 1, rosemary was also seen to help alleviate flatulent dyspepsia and to calm headaches caused by gastrointestinal problems (2006). Rosemary has also been used to combat rheumatism (Tapsell et al., 2006). Rosemary helps to ease the symptoms of joint pain and muscle pain (Tapsell et al., 2006). It was also concluded that rosemary can be used as an antiseptic that inhibits growth and reproduction of bacteria and helps with peripheral vision (Tapsell et al., 2006). Rosemary has been recognized, and will continue to be recognized, for the herb's abilities to positively influence our health.

### **Production and Storage Conditions of Product:**

Rosemary has simple requirements, in regards to the production and storage of the herb. Rosemary is an annual crop that grows best in properly drained soil with a pH of around 6-7.5 (Ontario Ministry of Agriculture Food & Rural Areas, 2012). Rosemary grows optimally in temperatures higher than 18 degrees Celsius and is not frost tolerant (OMAFRA, 2012). Rosemary is harvested by hand, at a young age to be used as a fresh product, or, harvested at a later time for a product that will be dried (DAFF, 2009). When ready for harvest, rosemary can be dried at temperatures less than 40 degrees Celsius (OMAFRA, 2012). Rosemary can be stored at the temperature of 0 degrees Celsius with more than 95% humidity, for no more than 3 weeks (OMAFRA, 2012). When the production of rosemary contains slightly acidic and properly drained soil, warm temperatures, proper harvest and storage, the resulting product will be of a high quality.

### **The Benefits to Canada:**

The importation of Canadian rosemary seed varieties to Nepal is very beneficial to Canada. Primarily, it would provide jobs to people within the production and distribution of the seeds. Secondly, the importation will create a lasting trade partner for years to come. Thirdly, it would allow the Canadian economy to flourish as it would allow Canadian businesses to sell a product that is in demand in another country at a profit. The exportation of Canadian rosemary seed varieties would provide jobs to Canadians, create a lasting trade partner and allow the Canadian economy to flourish.

### **Market Opportunity:**

There is a large market opportunity for rosemary seeds. The current exports from Nepal do not include rosemary as seen in Table 2 (Rawal, 2016). This allows for a market opportunity for greenhouse owners and operators, creating a profit. The market opportunity gives rise to a profit to be made through the use of the herb in food dishes within the tourism industry. This is a very important practice as the tourism industry is very important in Nepal, creating a large necessity to please the tourists to allow for repeat business. The market opportunity for Canadian rosemary seed varieties in Nepal, allows all participants to benefit.

Plant	Quantity (kgs)	Value (Rs.)
<i>Acorus calamus</i>	5,777	109,000
<i>Asparagus racemosus</i>	78,450	909,000
<i>Bergenia ligulata</i>	49,773	669,000
<i>Cinnamomum tamala</i>	129,371	1,132,000
<i>Lycopodium clavatum</i>	17,057	149,000
<i>Orchis</i> spp. (Gamdol)	921	17,000
<i>Picrorhiza scrophularaeflora</i>	43,050	548,000
<i>Rubia cordifolia</i>	22,147	225,000
<i>Rheum emodi</i>	5,906	36,000
<i>Swertia chirata</i>	125,205	1,854,000
<i>Terminalia</i> spp.	1,150	8,000
<i>Nigella sativa</i>	33,307	165,000
Grand Total:	512,114	5,821,000

**Table 2: Herbs Currently Grown in Nepal.** Retrieved From: <http://www.fao.org/docrep/x5336e/x5336e0j.htm>

**Canadian Companies Involved:**

There are two Canadian companies that would be involved with the exportation of Canadian rosemary seed varieties to Nepal. The Canadian company that would provide the Rosemary 3090 seeds, is the Ontario Seed Company (OSC Seeds, 2016). The Ontario Seed Company is located in Kitchener, ON and can be reached by telephone at (519) 886-0557 (OSC Seeds, 2016). The second company, providing the shipment to Nepal is A1 Freight Forwarding Inc. (<http://www.a1freightforwarding.com>). A1 Freight Forwarding Inc. is located in Maple, ON and inquiries can be directed to the logistics manager - Katherine Sergeeva, through contact on their website K. Sergeeva, personal communication, November 28, 2016) Canadian companies would greatly benefit the exportation of Canadian rosemary seed varieties to Nepal.

**Compare and Contrast Products From Canada:**

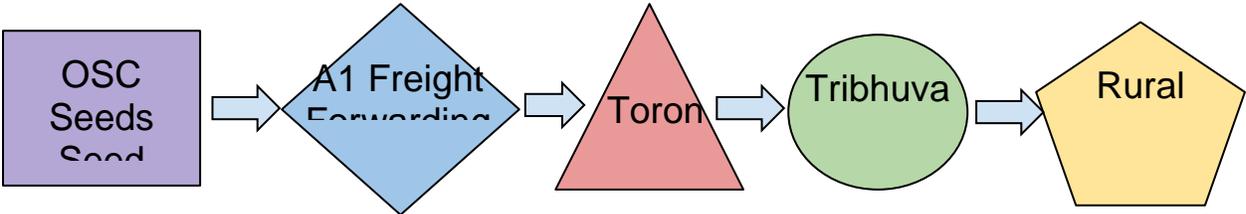
Company:	OSC Seeds	Competitor 1: Richters Herbs	Competitor 2: West Coast Seeds
Location in Canada:	Waterloo, Ontario	Goodwood, Ontario	Delta, British Columbia

Product Name:	Rosemary 3090	Rosemary	Rosemary Seeds
Cost:	\$15.95 / packet of 2 grams	\$15.00 / gram	\$12.99 / 2 gram quantity
Germination:	Low	Moderate	Low

**Table 3: Comparison of 3 Different Canadian Seed Companies That Carry Rosemary**  
Retrieved From: (oscseeds.com, richters.com, westcoastseeds.com)

There are several items of contrast between the different Canadian seed suppliers. Primarily, Competitor 1 had the seed with the highest seed germination containing a germination level of moderate, opposed to the other companies which had low germination (Table 3). Competitor 3 was the least expensive for a 2 gram quantity of seed costing \$12.99 vs \$15.95 for a 2 gram quantity from OSC Seeds and a total amount of \$30.00 for a 2 gram quantity from Competitor 1 (Table 3). The company used in the potential exportation has neither the best cost nor the highest germination (Table 3). The results show the appropriate seed quantity of 2 grams from Competitor 2, is the best option for the Nepalese to buy from, as it is the least expensive quantity of seeds.

**Transportation Logistics:**



**Figure 2: Transportation Chain from Canada to Nepal**

There are multiple steps to transport the product from Canada to Nepal. First, the seeds would be transported from the OSC Seeds distribution warehouse to the A1 Freight Forwarding Inc. warehouse by truck (K. Sergeeva, personal communication, November 28, 2016). Next, the crates of seeds would be transported from the A1 Freight Forwarding Inc warehouse in Toronto, to Toronto Pearson Airport, and flown by the airline with the best rate during shipping (K. Sergeeva, personal communication, November 28, 2016). When the seeds get to the airport, the

seeds would be shipped by the airline that has the best shipping rate, to Nepal (K. Sergeeva, personal communication, November 28, 2016). After the flight, the crates would arrive to the Tribhuvan International airport in Kathmandu, Nepal (K. Sergeeva, personal communication, November 28, 2016). The seeds would then be shipped by train to less populated areas in Nepal. To end the cycle, when the train reaches the designated location, a truck would be used to bring the seed directly to the Nepalese greenhouses in the farming communities. The seed would travel a relatively simple pathway from Canada, straight to the capital city of Nepal where the seeds would be transported further in smaller transportation to the designated areas.

### **A1 Freight Forwarding Shipment Cost:**

The shipment to Nepal is very cost efficient. The cost for 2 crates with dimensions of 45cm x 60cm x 45cm with less than one pound of weight within, is \$364.71 CAD with the A1 Freight company by air to Kathmandu, Nepal (“Freight Shipping Costs,” n.d.). The shipment from Canada to Nepal is very profitable for both countries.

### **Import/ Export Documentation:**

There are multiple regulations in set by both countries for exporting and importing seeds. In order for us to export the seeds, Organization for Economic Co-operation and Development (OECD) tags would have to be attached to the seeds (“Authorized Exporter Program,” 2015). Then the sample seed lots would be taken to test for the germination and purity and issue according to the International Seed Testing Association Rules (“Authorized Exporter Program,” 2015). The seeds would also have to be tested, analyzed, sampled and inspected in Nepal due to the Seeds Act in Nepal (The Government of Nepal, 2013). Ideally the seeds would then be distributed by the packages in the crates to local greenhouse operations. There is a long process in whom the seed would be provided by, shipped by and distributed by while following the rules and regulations set by both countries.

## **PART TWO: CRITICAL ANALYSIS OF POTENTIAL BENEFITS TO NEPAL**

### **Introduction to Nepal:**

Nepal is truly a country to discover. Nepal is located within south-central Asia (Central Intelligence Agency, 2016). Nepal is an interlocked country facing China to their north border and facing India to their south border (CIA, 2016). The currency of Nepal is the Nepalese rupee (CIA, 2016). Nepal is an interlocked country located in south-central Asia with the currency of Nepalese rupees.

Nepal, the land of diversity. The main religion of Nepal is Hinduism (CIA, 2016). Nepal has a current population of just over 29 million and a GDP per capita of 2500 US in 2015 (CIA, 2016). Within Nepal, there are three topological

regions (CIA, 2016). The first region accounts for around 23% of total land and consists of plains, known as the Terai region (CIA, 2016). The second region accounts for around 42% of total land and consists of terraces, known as the hill region (CIA, 2016). The third region accounts for around 35% of total land and consists of cold and steep terrain, known as the mountain region (CIA, 2016). Nepal is a country with a population of 29 million, a main religion of Hinduism, a GDP of 2500 US and is divided up into 3 topological regions.

The tourism industry is a very important industry within Nepal. The tourism industry is one of the largest industries in Nepal (Banskota, 2012). The industry generates almost 50 thousand US dollar (CIA, 2016). The country is a hit to tourists due to Nepal containing 8 of the largest mountains in the world, religious temples, markets and much more (CIA, 2016). Studies have shown that 33% of people located in the more remote areas of Nepal had a main occupation in the tourism business and 22% of people had occupations that were in the agriculture and the tourism business (K.C. & Parajuli, 2014). The tourism industry generates almost 50 thousand US dollars providing jobs to the 33% of people in remote Nepal and 22% of people in

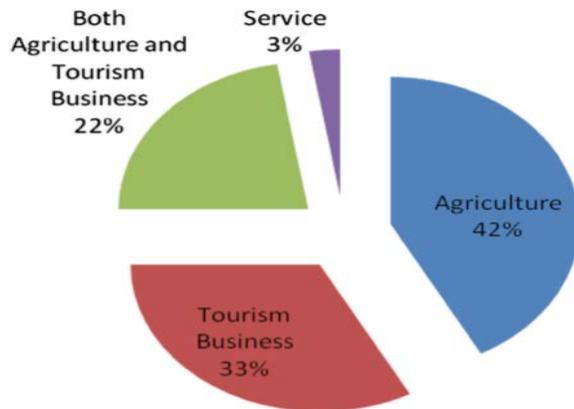


**Figure 3: The Country of Nepal.**

Retrieved From:

agriculture and tourism business, due to the beautiful mountains, religious temples and much more located within Nepal.

**Figure 4: The Related Occupations of Nepalese Located In Remote Areas.** Retrieved From: <http://search.proquest.com.subzero.lib.uoguelph.ca/docview/1563813036/42D5222C6D7E41A2PQ/4?accountid=11233>



**Benefits to Nepal:**

The importation of Canadian rosemary seed varieties to Nepal would be very beneficial to Nepal. Due to the fact that the tourism industry is a very large industry within Nepal, satisfying the tourists should be a main concern in order to create repeat business (Ministry of Foreign Affairs, 2015). This is especially important after the Earthquake of April 2015 caused the tourism industry to take a hit (CIA, 2016). By using the Canadian rosemary grown from seed in nepalese greenhouses, the tourists can be served dishes that are appealing to eat, enticing them to visit nepal in the future. The importation of Canadian rosemary seed varieties would also create jobs in the agricultural and culinary fields in regards to the production and use of the rosemary, boosting their economy. The importation of Canadian rosemary seed varieties to Nepal is favourable to the importing country due to the increase in content customers, the increase in the number of jobs available and the economic boost the importation provides.

**Contrast of Competitive Companies:**

Company	Canadian Rosemary Seed: OSC Seeds	Competitor 1: Shanghai Herbarry	Competitor 2: Shanghai Herbshow Bio -	Competitor 3: Nursery Live

		Biotechnology Co. Ltd.	Technology Co. Ltd.	
Location	Waterloo, Ontario, Canada	Shanghai, Mainland China	Shanghai, Mainland China	India
Product Name	Rosemary 3090	Top Quality Rosemary Seeds	Aromatic Grass Seed: Rosemary	Rosemary Seeds
Cost	\$15.95/packet of 2 grams	\$15-20/kg 1 kg minimum order	\$10-15/bag 10 bag minimum quantity (1kg)	2.46/ packet of 30 seeds
Seed Germination	Low Germination Percent N/A	80%	85%	N/A

**Table 4: The Comparison of the Canadian Company vs. Competing Companies From Other Countries.** Retrieved From: (oscseeds.com , alibaba.com, nurserylive.com)

There are multiple items of importance after the comparison and contrast between the different seed companies. The first item of comparison and contrast is cost. The Canadian company OSC Seeds, has the most economical cost for a small quantity of seeds while Competitor 1 had the most economical for a large quantity (Table 4). Another item of comparison is seed germination. Competitor 2 has the largest seed germination of the competing companies (Table 4). Competitor 1 is seen to be the best option for a large quantity of seed as it is a close and inexpensive option for the Nepalese (Table 4). Competitor 3 located in India, currently is not an option due to the trade issues between Nepal and India (Table 4). The largest problem with Competitor 1 is regarding the large amount of seed that would be bought. Especially for the start of the introduction of the seed, a very large quantity of seeds should not be bought. Two grams of rosemary seeds from OSC Seeds contains 16 800 seeds (OSC Seeds, 2016). The large quantity of seeds from Competitor 1 would be over 8 million seeds. This volume is not needed, nor manageable for an introduction of the herb variety. The comparison and contrast between competing products shows the first Competitor having the best seed cost for the quantity available, Competitor 2 having the highest seed germination, Competitor 3 not being a reasonable option OSC Seeds having and it also shows that OSC Seeds has the

appropriate seed quantity fit for the introduction in Nepal with due to the low prices for the low germination seed.

### **Sales Cost:**

The sales cost would decrease over time during the implementation of rosemary into the herbs grown in Nepal. Primarily, the rosemary seed would be sold in bulk to greenhouses. After harvest, bulk amounts of dried or fresh rosemary would be sold to the hotels and restaurants to use in dishes. This would cause the overall cost to lower over a couple of years, due to the ability to successfully propagate rosemary from cuttings, allowing for fewer seeds to be bought. The sales cost would largely diminish over time, if the greenhouse owners and operators operate effectively and efficiently.

### **Purchaser of Product:**

The target audience to buy Canadian rosemary seed varieties to Nepal is greenhouse owners and operators. Greenhouse owners and operators are able to produce large quantities of rosemary at lower costs than the average citizen of Nepal. They are able to efficiently produce these large quantities, allowing for profit to be made when the product is sold to restaurants and hotels. Nepalese greenhouse owners and operators would be able to profit the largest from the importation of Canadian Rosemary seed varieties due to their cost-effective production strategies, allowing the owners and operators to be identified as the target audience.

### **Nepalese Hurt By This Product:**

\_\_\_\_\_ There are two types of people that could be hurt from the introduction of this product to Nepal. The first person to be hurt from the introduction are the owners and operators of greenhouses that are not willing to grow this herb. Due to the non-involvement, a profit for the owners and operators is not made. The second person that would be hurt from the introduction are restaurant and hotel owners and operators that do not use this herb. The owner and operators would decide to stay with their traditional ways of cooking - possibly not pleasing the tourists and also not capitalizing on potential profit. The Nepalese who run greenhouses and local restaurants and hotels would be hurt the largest, from not capitalizing on the clear business opportunity.

### **Unknowns:**

\_\_\_\_\_ There are multiple unknowns to the product. Primarily, there is an unknown towards if rosemary will actually help to make a difference in creating repeat business from tourists.

Secondly, there is an unknown with reference towards if tourists will enjoy the dishes that include rosemary. Thirdly, an unknown is apparent towards the interest from local greenhouses, restaurants and hotels in producing and using rosemary and the ability to successfully grow the herb to allow an increase in profit. The unknowns of the importation of Canadian rosemary seed varieties to Nepal include the occurrence of repeat business, the enjoyment of the dishes that include the product and the ability and desire of the greenhouses, to grow rosemary successfully in order to create a profit.

### **Potential Studies Required:**

\_\_\_\_\_ Studies are needed for the product. The export potential needs to be explored in similar situations to see if the proposed item of import will truly be beneficial to countries like Nepal. Secondly, transportation route from Canada to Nepal will need to be determined before the exportation of rosemary seeds. Thirdly, a more in depth analysis of the costs, is needed to see if the product will truly be beneficial. There are multiple crucial studies that need to be done in order to prove the worth of the product including the transportation route, overall costs and the import potential for Nepal, in hopes of visualising how the item will benefit the countries involved.

### **Critical Summary & Recommendations:**

\_\_\_\_\_ The Canadian rosemary seed variety known as Rosemary 3090 is a prominent item of potential export that will allow for monetary and crucial gain in the countries involved. Rosemary 3090 is a potential export from Canada that with a cost of \$15.95 Canadian for a 2 gram quantity of seed and also \$364.71 for the product to be shipped to Nepal. These costs are overshadowed by the benefits that the importation will give both countries. It will allow the economies of both countries to be boosted, it will create jobs for hardworking Canadians and Nepalese, increase the number of happy tourists in Nepal and most importantly, create a lasting trade partnership between the two countries. It is recommended that an appropriate quantity of seed is available for the exportation to Nepal, during the introduction of the product. It is also recommended that other Canadian herb varieties are further looked into, for potential importation of different Canadian seed to Nepal. Rosemary 3090 allows both countries to benefit enormously at a low expense, coming to a conclusion that more products of this kind are needed

to help Nepal and other countries in the similar situations, thrive and develop further as a country.

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