

Canadian export of Artichoke seeds to Nepal

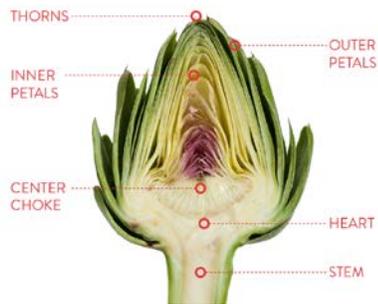
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PRODUCT DESCRIPTION AND CULTIVATION:

A Globe artichoke or just artichoke (*Cynara Scolymus*) is a vegetable which belongs to the Asteraceae family and Cynara genus, and the plant that it grows on is perennial that can be alive for 5 years at most in regions with mild winters. (Donatella, Vincenzo, Sabrina, Pasquale, Giulio, Antonino & Gabriella, 2012; Wiley, n.d.; “Growing Artichokes,” n.d.). Various countries in the world grow and consume artichokes as a vegetable, and it has a long history of serving humans as an excellent type of medicine and food (Donatella et al., 2012). Italy, Spain and France are the top producers of artichokes and many other countries worldwide (Donatella et al., 2012). Artichokes are in fact immature flower buds before blooming that grow on a thistle plant originally cultivated in the Mediterranean region (Hein, 2014). The height of the plant is between two and five feet, and the number of artichokes on the plant can range from 12 to 36 feet (Hein, 2014). The edible sections of the plant are the base of the leaves and hearts of the buds, and those parts can be stored in fresh, frozen, and canned states (Hein, 2014; Donatella et al, 2012). In addition, artichokes possess a variety of nutrients that are essential to human health, such as flavonoids, phenolic acids, caffeic acids (Donatella et al., 2012). They also contain abundant fiber, minerals and vitamin C, A, D, E, K, B, thiamin, riboflavin, niacin, folate, as well as minerals such as calcium iron, zinc, sodium, potassium, manganese, and phosphorus (“Health Benefits of Artichokes,” n.d.). Therefore, artichokes are very beneficial for our health due to a wide range of nutrients. Right now, farmers can raise artichokes in Canada, and a company called Top Tomato Foods in Markham, Ontario was responsible for 20 acres of artichokes in 2014 (Hein, 2014). The address of the company is 2931 19th Avenue, Markham, Ontario, Canada, its

postal code is L6C 1L7, and the telephone number is 905-887-8954 (Dom, 2016). In fact, it was not easy to raise artichokes in Ontario due to the climate since artichokes adapt to the Mediterranean climate the best, and the staff are still refining the entire process (Hein, 2014). Firstly, staff begin by planting seeds of the artichokes in late February in a greenhouse (Hein, 2014). Five weeks later after they germinate, staff move them outdoors to harden them off, the temperature slightly above zero outside at that time is very similar to the temperature in the Mediterranean region in winter, and this step actually triggers the vernalization process and causes the plants into dormancy (Hein, 2014). The period should be at least two weeks at an environment below 10 degrees Celsius but above the freezing temperature, because frosts can damage seeds (Rhoades, 2016). The final step is to plant them in the field until they are ready to flower (Hein, 2014), with the harvesting period at the first week of August (Hein, 2014). Artichokes grow well under full sunlight or partial shade regions (“Growing Artichokes”, n.d.). The soil type they require is fertile and well drained, so that sand or loam soil is the best (“Growing Artichokes”, n.d.). Likewise, artichokes cannot tolerate drought in summers, and too much water in soil in winters (“Growing Artichokes”, n.d.). In fact, the addition of compost into soil can enhance the capacity of soil to keep water in summer and drain well in winter (“Growing Artichokes”, n.d.). The climate that is most suitable for artichokes is mild winters, and cool, foggy summers, and autumn is the best planting season in areas with humid, subtropical and frost-free climate (“Growing Artichokes”, n.d.). Artichokes plants cannot stay in extremely cold environments, which is a reason about why the assistance of greenhouses is essential to grow them here (“All About Artichokes”, 2016). Besides that, during their growing period, farmers need to use a liquid fertilizer such as Bonnie Herb & Vegetable Plant Food, and they need to keep the soil moist (“Growing Artichokes,” n.d.). They can also spray a liquid fertilizer high in potassium such as potash fertilizer every two weeks to stimulate the formation of flower buds (“Growing Artichokes,” n.d.). In general, all the fertilizers applied should contain balanced amounts of potassium, nitrogen, and phosphorus (How to Fertilize Artichokes, n.d.). Furthermore, farmers should keep artichoke beds free of weeds by giving the soil a thick mulch at first, which is an organic material made of either grass clippings, straw, aged manure or a combination of these (“Growing Artichokes,” n.d.). When buds begin

to appear, they need to remove the mulch and treat each plant with a 40-inch-thick layer of compost from the base of the plant extending out 12 inches (“Growing Artichokes,” n.d.). The average number of seeds from a gram of artichoke crop is between 7 and 8 seeds (Albert, n.d.). Since the area used to plant artichokes in Canada is very small, the company currently do not use any machineries to grow artichokes. Currently no companies other than Top Tomato Foods produces artichokes



Picture

reference:

<http://www.oceanmist.com/artichokes/anatomy-artichoke/>



Picture

reference:

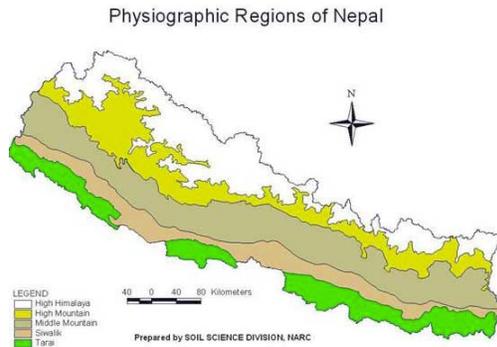
<http://www.seedsofeden.com/edible-plants-k8/how-to-grow-artichokes-from-seed-b157.html>

Vitamins	Proportions	Minerals	Proportions	Other Nutrients	Proportions
Vitamin C	20%	Magnesium	15%	Dietary Fiber	22%
Vitamin K	18%	Manganese	13%	Protein	7%
Folate (a Vitamin B type)	17%	Copper	12%	Carbohydrate	4%
Vitamin B6	6%	Potassium	11%	Calories	2%

BENEFITS TO CANADA: The main benefits to Canada are that the Top Tomato Foods Company can obtain a lot of revenue by exporting artichoke seeds to Nepal. Besides, the increase in demand of the seeds will require more Canadian workers to come to the company to cultivate artichokes. Therefore, it creates more working opportunities for unemployed people in Canada. Moreover, the export of artichokes may lead to greater number of high skilled workers in Nepal, and they can come to Canada to work, therefore these immigrants are a huge potential to boost Canada's economy. In the future, Canada can import some artichokes from Nepal because the climate here is not suitable to raise them, and the costs of cultivation in Canada are much greater than nations in the Mediterranean region. What's more? The export event is a great opportunity to enhance the relationship between these two nations, and the Nepal government may decide to export more local products that are rare in Canada

INTRODUCTION TO NEPAL: Nepal is a landlocked nation located between India and China, the shape of the country is trapezoidal, and its total area is 147,141 square kilometers (Chapagain, 2016). The length of the country is 800 kilometers and its width is 200 kilometers (Chapagain, 2016). There are about 28 million inhabitants living there. Besides, the country possesses eight of the fourteen highest peaks around the world, and Lord Buddha was born there (Chapagain, 2016). Moreover, tourists have the chance to ride on elephants and hike in hills (Chapagain, 2016). Overall, the economic development is very poor (Chapagain, 2016). For instance, according to the 2012

statistics, the unemployment rate among local residents was extremely high, at 46% (Chapagain, 2016). The GDP per capita was merely \$656 US (Chapagain, 2016). In addition, the rate of infant mortality was 32 per 1000 people, and the life expectancy on average was only 69 years old (Chapagain, 2016). Besides, the country had a pretty high fertility rate, at 3.4 children per woman. (Chapagain, 2016). Likewise, only a small proportion of inhabitants were lucky enough to have access to oil; however, only people in urban areas could acquire it. (Chapagain, 2016). There was also no health care insurance coverage among all Nepal citizens. (Chapagain, 2016). These facts clearly indicate that how poor local residents are compared to most western countries. Furthermore, across the entire territory of Nepal, only 28% of the land was for agriculture with an area of 3.1 million hectares in 2012, and more than 705 of the population was involved in the agriculture sector, which made up 38% of the total GDP (Chapagain, 2016). In addition, a large variety of landforms exist in Nepal including Himalaya, high hills/mountains, mid hills, siwalik/foot hills and Terai, mountains and hilly areas occupy the majority of the territory (Chapagain, 2016). Due to those abundant landforms, a wide range of landscapes, altitudes, topographies and temperatures exist in Nepal (Chapagain, 2016). Moreover, the Terai region is the most suitable for growing crops such as paddy, the main crop in the Terai area. (Chapagain, 2016). Furthermore, the major farming practice in mountain regions is nomadic farming, which implies moving to various places during different seasons in search for food, water and grazing lands (Chapagain, 2016). However, over 99% of the land in those areas cannot produce any crops (Chapagain, 2016). In hilly areas, traditional or subsistence farming is the most prevalent management practice, and farmers there do not use many chemicals, tools and improved seeds (Chapagain, 2016). Besides, farmers only have the opportunity to utilize tractors, harvesters and chemical fertilizers in the Terai region, and there is a rising trend of applying them as time progresses (Chapagain, 2016). Among all the cultivated crops, millets, wheat, maize and paddy are the main crops, and the crop with the highest yields belong to paddy (Chapagain, 2016).



Picture reference:

<https://courselink.uoguelph.ca/d2l/le/content/443268/viewContent/1445125/View>

BENEFITS TO NEPAL:

The major reason to export this crop is that there are a large variety of health benefits to Nepalese consumers. For example, the leaf extract of artichokes is anti-oxidative, effective at killing bacteria, so that it can prevent many diseases caused by bacterial infections (Salem, Affes, Ksoudo, Phouibi, Sahnoun, Hammami and Zeghal,,2015). Besides, leaves and heads of artichokes are enriched in polyphenolic compounds that are the caffeic acid derivatives, including the caffeolyquinic acid derivatives (Salem et al., 2015). The 5-O-caffeolyquinic acid (chlorogenic acid) 1, 5-O-dicaffeolquinic acid and 3,4-O-dicaffeolyquinin are examples of caffeolyquinic acid derivatives contained in leaf extract of artichokes (Salem et al., 2015). Moreover, the contents in leaves have the effect of inhibiting the synthesis of lipids, and thereby reducing the amount of lipids in our bodies (Salem et al., 2015). Some components in leaves also protect livers by avoiding lipid peroxidation from happening on liver tissue's cell membranes, so that it helps to maintain livers to function well (Salem et al., 2015). Moreover, Cynarin and silymarin, which are two antioxidants in artichokes, have the ability to raise overall health of livers by lowering and getting rid of the existence of toxins accumulated in our livers and bodies ("Health Benefits of Artichokes," n.d.). Scientists have demonstrated that these antioxidants assist in fixing damaged liver cells and therefore, trigger the cells' redevelopment, and the speed of regenerating livers in humans is extremely slow ("Health Benefits of Artichokes," n.d.). Besides, compounds in leaves such as cynarin may avoid the presence of deposits in arteries (Salem et al., 2015). In addition, Studies showed that luteolin was one of the compounds in artichoke leaves

that could restrict cholesterol synthesis, and thereby leading to lower levels of cholesterol and avoiding deposits in arteries (Salem et al., 2015). More importantly, people whose blood contained higher concentrations of cholesterol appeared to have more significant reduction in its levels after they intake the extract from artichoke leaves (Salem et al., 2015). For instance, during a study on 300 subjects, a 12% decrease in serum cholesterol and a 13% drop in serum triglycerides happened in their bodies (Salem et al., 2015). In fact, there are actually two ways that artichoke leaves control the cholesterol metabolism by both raising its breakdown rate into bile salts. Increasing bile production and its flow assist in removing bile salts can significantly lower the levels of cholesterol, and directly restrict cholesterol production inside livers (Salem et al., 2015). Furthermore, a study indicated that liquid from artichoke leaves may indirectly inhibit the enzyme HMG CoA-reductase, a key enzyme involved in synthesizing cholesterol (Salem et al., 2015). Thus, since the contents from leaves prevented stimulation of HMG coA-reductase, which depends on insulin levels but did not actually alter the amount of insulin, it is possible that the liquid can indirectly inhibit that enzyme (Salem et al., 2015). Therefore, artichokes are very effective at maintaining cardiovascular health and eliminating cardiovascular diseases. Statistics show that Cardiovascular diseases are currently prevailing in Nepal, and have become a major health issue (Vaidya, 2011). However, the nation does not have an effective system to deal with them due to poor economic development and inadequate resources (Vaidya, 2011). Coronary heart disease is a major type of cardiovascular diseases, about six percent of citizens suffered from that it in an eastern Nepalese town during a study, and at cardiac hospital located in the capital city of Kathmandu, between 2001 and 2008, the quantity of patients doubled every subsequent year (Vaidya, 2011). In addition, during another study on 417 patients, who experienced liver or bile duct diseases, and most of them got symptoms including bellyache, constipation, appetite loss and nausea. However, after doctors treated them with the liquid, 85% of them felt much better (Salem et al., 2015). More surprisingly, some powerful polyphenol-type antioxidants in artichokes have the function of treating and avoiding prostate cancer, breast cancer, and leukemia (Salem et al., 2015). Studies have concluded that rutin, quercetin, and Gallic acid existed in the leaves lead to apoptosis (cell death) and constrain the growth of cancer cells, and even leukemia cells (Salem et

al., 2015). In fact, a research showed that various phytochemicals in artichokes are capable of preventing the secretion cancer agents, thereby constraining angiogenesis, a situation that promotes cancer growth (Salem et al., 2015). In fact, cancers such as cervical cancer is one of the most common types of cancer suffered by women in Nepal, and women with this cancer have a high mortality rate (Gyenwali, Khanal, Raude, Amatrya and Pariyar, 2014). Actually, it is a major disease that considerably affect women worldwide and has an incidence rate of 32 every 100,000 people every year, and 21.0% of total female cancers in Nepal annually belong to cervical cancer (Gyenwali et al., 2014). Furthermore, cynarin included in the leaves not only reduces the amount of cholesterol, but also enhances digestive health because cynarin triggers bile production, which leads to fat digestion and absorption of vitamins from people's diets (Salem et al., 2015). People who suffered from Bowel syndrome and dyspepsia that are digestion issues, experienced obvious improvement when researchers treated them with liquid from artichoke leaves (Salem et al., 2015). In addition, caffeoylquinic acids in the liquid can act as a type of HIV inhibitor (Salem et al., 2015). Thus, doctors can apply the liquid from leaves as a new way to remedy HIV (Salem et al., 2015). Moreover, a study discovered that chlorogenic acid was a useful inhibitor located in the hepatic-glucose-6-phosphatase system because it controls and maintains blood glucose levels in the blood, and the amount of glucose produced by livers (Salem et al., 2015). The livers of patients with non-insulin-dependent diabetes often produce glucose at unusual high rates (Salem et al., 2015). More importantly, artichokes possess the function of maintaining the health of pregnant women so that they can have healthy, normal children, because artichokes contain a large amount of folic acid that avoids neural tube defects from happening in babies ("Health Benefits of Artichokes," n.d.). During the process of neural tube closure in vitro, it needs some amount of folic acid to function normally, so that it is a necessary component in diets of pregnant women ("Health Benefits of Artichokes," n.d.). Therefore, artichokes can be very effective at lowering infant mortality rates in Nepal. Besides, minerals in artichokes including magnesium, phosphorus and manganese are basic components to raise the health of bones by increasing their densities, thus they can considerably reduce the probability of having osteoporosis on many local residents ("Health Benefits of Artichokes," n.d.). Magnesium also assists in the synthesis of protein

and enhance the efficiency of calcium absorption in bodies (“Health Benefits of Artichokes,” n.d.). Another beneficial effect is on brain functioning since artichokes can behave as a vasodilator that lets higher levels of oxygen to enter the brains, therefore they can function more efficiently (“Health Benefits of Artichokes,” n.d.). Moreover, phosphorus in artichokes is a crucial mineral in brain cells, without this nutrient, brains cannot work properly (“Health Benefits of Artichokes,” n.d.). In the Northwestern region of Nepal, 60% of children suffered from basic nutritional deficiencies, and the rate of suffering anemia among them was around 40% (Sharma, 2006). Surprisingly, artichokes contain crucial minerals including potassium, sodium, phosphorus, Vitamin C and iron (“Health Benefits of Artichokes,” n.d.). All these facts above imply that artichokes are excellent at handling diet-related illnesses and undernutrition. Overall, since there are a great variety of health benefits related to artichokes, the country will significantly spend less money on health care, so that the government can spend more money on other fields especially education, for instance, spending money on building schools and hiring experienced teachers. Due to a high number of residents in Nepal suffer from serious health issues, a large proportion of them simply cannot enter the workforce. Clearly, if more people are healthy enough to work, there will be a considerable reduction in unemployment rate. Likewise, a large percentage of local citizens with low levels of education implies that there is a significant shortage of high skilled workers. Therefore, if the general population is considerably healthier after they consume artichokes, certainly a greater number of workers and high skilled employees can dramatically improve the country’s economic status by increasing the quantity of outputs for exporting. Since the production of high technology products definitely require workers with great expertise, people who receive not much education obviously do not possess the skills to produce them, but highly educated workers are likely to have certain expertise to make high-tech items like i-pads, and the country can certainly export them at greater prices than simple products such as clothes. The exporting of more and greater quality of domestic products can considerably raise the nation’s economy by obtaining money to improve infrastructures.

TRANSPORTATION: The most convenient way of transporting artichoke seeds to Nepal is by air from Toronto in Canada to the capital city in Kathmandu. To prevent the seeds

from germinating and then dying during the process of transportation, the environment that they experience should be cool and low in moisture, at below 10 degrees Celsius and below 30% relative humidity, because artichoke seeds may germinate after two to three weeks at temperature around 20 degree Celsius and certain moisture (Rhoades, 2016). Nex, a courier company existed in many nations, is responsible for shipping services around the world. Each package must be lighter than 150 lbs (70kg) (Nex Worldwide Express, n.d.). It takes 2 to 3 business days to use the priority express, and 4 to 10 business days if choosing the economy service (Nex Worldwide Express, n.d). The shipping cost is about 50 Canadian dollars for a package at 0.05 lbs (Nex Worldwide Express, n.d) In general, the shipping service is very costly.

AREAS TO RAISE ARTICHOKE: After the seeds reach there, farmers from nearby farmlands will be the group of people who buy them first, then they will transport the seeds to nearby rural areas to seed and cultivate them, and finally and the artichoke produced from seeds will reach any local grocery stores. Doctors and other consumers are potential buyers because for doctors, they can extract liquid in artichoke leaves to serve as a medicine, and local residents can consume them as a very healthy vegetable. Since the ideal climate to grow artichokes is subtropical and humid climate or Mediterranean climate, and both climates exist at many areas in Nepal. For example, cities Kathmandu, Chautara and Bhimfedi. Thus, farmland around these cities should be ideal to raise artichokes, and the lowest mean lowest temperatures there in January are around 10 degrees Celsius. However, the highest average temperatures are above 15 degrees Celsius, which implies that farmers may need to put the seeds in fridges at temperatures a little above zero to let them experience the vernalization period. Overall, the summers are not too hot since the average temperatures in those cities at that time are approximately 24 degrees Celsius, the highest average temperatures in summers are lower than 30 degrees Celsius, and winters are mild, so that the temperatures in those areas should be suitable. Moreover, these areas have high rainfalls in summers and much lower rainfalls in winters in common, and in summers, the evaporation speed is much faster than winters. Thus, more rainfall in summers can keep the soil moist and artichokes will not die due to drought, and in winters, there will not be too much water in soil. Constant and relatively high moisture in soil is the best for this vegetable (Wiley, n.d). Thus, the climate helps to

maintain the moisture of soil relatively the same, but in summers, it may be higher than winters, which may affect the yields and quality of artichokes, but not much.

PRICE ANALYSIS: Artichoke seeds in Canada are amazingly expensive. For instance, the price of 14 to 16 organic artichoke seeds in Canada is \$3.95 (William Dam Seeds, n.d.). The high costs of producing artichokes, including the spending on building greenhouses, heating are all factors contributing to this phenomenon. This may be a reason that explains why Canada does not grow many artichokes. Therefore, the export prices the seeds are very likely to hurt farmers and local residents, and many farmers will have to spend a portion of the money to purchase the seeds due to their high price. The high prices of seeds will doubtfully drive up the vegetable prices, or farmers will encounter significant losses, and they will stop the cultivation. Nevertheless, in the future, as farmers actively use more farmland to cultivate artichokes from seeds produced by previous artichoke crop, the yields will certainly increase, the rise in supply will cause prices to go down, and they will thus be affordable to more local consumers. Because there will be a large number of potential buyers, the company should export a great quantity of seeds to Nepal to let local consumers get access to this vegetable in the near future. Otherwise, it will take a long time to produce adequate artichokes and become a general vegetable in Nepal. Hence, the prices of artichoke seeds are likely to be too high for Nepalese farmers.

GLOBAL COPETITION: The table “Top Producers of Artichokes” indicates that Canada is not among the main countries to produce artichokes, the top nations are Egypt, Italy, Spain and Peru. Therefore, since the concentrated regions to grow artichokes are still around the Mediterranean Sea, artichokes seeds from those nations are definitely cheaper. The low quantity supplied of the seeds in Canada and high quantity demanded by Nepalese will even drive up the current prices if the company choose to export them. If the main producers export the seeds at much lower prices, local farmers will certainly decide not to buy the seeds from Canada. Overall, the prices are unrealistic to most of local farmers. Most of them are too poor.

Top Producers of Artichokes

Rank	Area	Production (\$1000)	(Int Production (MT))
1	Egypt	279,296	387,704
2	Italy	262,848	364,871
3	Spain	143,429	199,100
4	Peru	101,931	141,496
5	Argentina	76,361	106,000
6	China, mainland	55,469	77,000
7	Morocco	46,024	63,889
8	Algeria	38,653	53,657
9	United States of America	36,955	51,300
10	France	30,591	42,465

(Top 10 Artichoke Producing Countries, n.d.)

DOCUMENTATION AND CERTIFICATION:

The documentation that the company must acquire to begin transporting artichoke seeds is the phytosanitary certificate (Government of Canada, n.d.). It is a document made by the organization responsible for protecting plants of the exporting country to the importing country's organization in plant protection (Government of Canada, n.d.). The plants or any components from plants will get the certificate only if people have checked by following proper steps, and these plants do not carry any quarantine pests, and they follow the importing country's regulations on the quarantine pests (Government of Canada, n.d.). The company needs to acquire the certificate because pests may lead to significant losses to the importing nation when plants or plant components reach the destination (Government of Canada, n.d.). Furthermore, since there will be a considerable amount of costs as a result of the long route of transportation, a Canadian government loan program may be essential to initiate the project (Government of Canada, n.d.). An

Export Guarantee Program, which is a loan program that gives support to many firms, is responsible for letting financial institutions in Canada to give loans to companies in Canada prior to shipment of products, and 75% of loan value can then come from it (Government of Canada, n.d.). The reason for the loan programs is to reduce the export prices as the shipping costs are fairly high, so that it makes possible for some relatively wealthy local farmers to purchase them (Government of Canada, n.d.).

CONCLUSION AND RECOMMENDATION:

Exporting artichokes seeds from Canada to Nepal is not a good idea. The main reason is that their prices are too high, as well as the shipping costs. The output of artichokes in Canada is also considerably lower than other main producers. Moreover, the countries in the Mediterranean region are much closer to Nepal than Canada, which means there will be a high quantity of seeds available for exporting, and the costs of producing seeds are much lower because the climate is suitable, therefore, these nations should export artichoke seeds to Nepal because they are more affordable by Nepalese farmers. If the staff in the company can develop and grow artichoke varieties that can tolerate cold winters and adapt well to our climate, in the future, the costs and prices of artichokes will decline, since they do not need greenhouses to raise them.

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