

Stevia rebaudiana in the form of a calorie-free sweetener as a
Canadian Export to Nepal

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Product Information

Stevia rebaudiana, or more commonly known as *stevia*, is a plant that possesses a sweet flavour thanks to the glycosides present within the plant (Pawar et al. 2013). More specifically, it is the stevioside and rebaudiosideA that are responsible for the sugary flavour, and these are found primarily in the leaf of the *stevia* plant (Pawar et al. 2013). *Stevia rebaudiana* and *S. phlebopylla* are the only *stevia* plants that contain steviol glycosides (Lemus-Mondaca et al. 2012). *Stevia* has been known to be much sweeter than sugar cane; up to 30 times more sweet (Klotter 2001). *Stevia* has also been thought to be 200 times sweeter than sucrose sugar (Ibrahim et al. 2008).

Stevia is native to the countries Paraguay and Brazil, both of which exist on the South American continent, but today *stevia* plants are not restricted to South America and can be found on many different continents and in different climates (Lemus-Mondaca et al. 2012). In warmer climates, *stevia* can be grown as a perennial, and in the cooler climates it must be grown as an annual (Xu et al 2013). As a perennial plant, a *stevia* plant can live for 5-7 years (Ibrahim et al. 2008). When a *stevia* plant has matured and is ready for harvest, the leaves are processed to extract the sugary goodness. *Stevia* as a sweetener has a diverse number of uses, including, but not restricted to: the sweetening of teas, baking, frozen deserts, sugary drinks (like sodas), yogurt, snacks, and as an alternative sugar substitute for people with diabetes mellitus (Lemus-Mondaca et al. 2012).

Japanese studies have concluded that steviol glycosides do not pose any risks to human health or have any toxic effects (Klotter 2001). People have been using *stevia* for over 1500 years and have never reported that the ingestion of *stevia* has negative effects

on the human (or animal) body (Singh et al. 2005). Unlike regular sugar, *stevia* sweeteners do not promote tooth decay, and are low in calories or are calorie free (Ibrahim et al. 2008).

There are several businesses in Canada that sell *Stevia rebaudiana* seeds. One of such companies is “Stevia Canada/JG Group”. Stevia Canada sells 1g of *stevia* seeds for \$149.99CDN, and 100g of *stevia* seeds for \$4200CDN (Life Just Got A Whole Lot Sweeter n.d.). However, germination by *stevia* seeds is not usually successful, which is in part due to the infertility of the seeds (Singh et al. 2005). *Stevia* extracts are found in products, such as Truvia® calorie-free sweetener. Truvia® has different lines of *stevia* sweeteners such as Truvia® Sachets/Packets, Truvia® Spoonables, and Truvia® Baking Blends. This brand currently gets their *stevia* from local greenhouses, and adds erythritol crystals and natural flavours to their finished product (About Truvia® n.d.). Cargill Limited, the company that produces Truvia®, has approximately 142,000 employees from 65 different countries. 8000 of these employees are from Canada (Cargill Canada n.d.). Cargill Limited is based out of Winnipeg, Manitoba (Cargill Canada n.d.).

It is proposed that Canadian farmers grow *Stevia rebaudiana* crops after purchasing the seeds from Canadian companies, sell the yield to Cargill Limited where the leaves and stems of *stevia* plants will be manufactured into Truvia® products, and then exported to Nepal as a calorie free sweetener. The cost for *stevia* production in Ontario is currently unavailable, however *stevia* crops have a yield potential of 2,850 kg/ha (The Cultivation of Stevia n.d.). In Ontario, *stevia* is planted in mid May, and is harvested in mid to late September. *Stevia* must be harvested before the flowers develop (Singh et al. 2005). Post harvest, the leaves and stems of *stevia* plants are placed into

kilns where they are dried for 24-48 hours (The Cultivation of Stevia n.d.). The more time that *stevia* is spent drying, the amount of steviolosides that are present will decrease (Singh et al. 2005). Leaves and stems are then separated and packaged for further processing. From Ontario farms, packaged *stevia* can be shipped via train or truck to Cargill Limited headquarters in Winnipeg, Manitoba. It should be noted that growing *stevia* is not limited to agriculture in Ontario, and may be grown throughout Canada provided the appropriate growing conditions are met (Lemus-Mondaca et al. 2012). After the leaves and stems of *stevia* have been refined and processed into Truvia® products, it would be ready to be shipped to Nepal via an air carrier.

By encouraging *stevia* cultivation in Canada, this may help diversify Canadian crops. Since *stevia* would have to be grown as an annual, Canadian farmers would have to repurchase *stevia* seeds every year. Although costly to the farmers, this would aid the seed distributors greatly. Also, with *stevia* plants, the seeds are often infertile, which could potentially create a problem for Canadian farmers. *Stevia* is a fragile plant, and so extra care must be taken to prevent and control weed develop in crops of *stevia* (Singh et al. 2005). *Stevia* is fortunately resistant to most insect attacks because of its glycosides, which naturally ward off these pests (Singh et al. 2005). These plants cannot survive without a lot of water, and so it is crucial that farmers irrigate or supply these crops with plenty of water (Low Price Stevia Seeds n.d.)

Potential Benefits to Nepal

Nepal is a beautiful country located just south of China and north of India, with no surrounding bodies of water (Do et al. 2010). In 2004, 31% of Nepal's population was

considered to be in poverty (Do et al. 2010). Agriculture has been a major practice for the Nepalese. To help bring money to rural communities, Nepal promotes tourism. The diverse geography makes Nepal an intriguing and appealing destination for tourists (Bhattarai et al. 2005).

Trekking is one of the more popular tourist activities in Nepal (Nepal Government Portal n.d.). Women have set up teahouses in the mountainous regions to provide tea-trekking tourists a warm place to stay and provide them with the Nepalese custom of drinking tea (McMillan et al. 2011). These teahouses may benefit from *stevia* sweetener products, because this may enhance the tea drinking experience for tourists and the wealthy.

In 2013, there were 675 000 diabetic cases in Nepal, and that number is expected to rise to 1 328 000 by 2030 (Poudel 2014). This is a major issue for Nepal, especially since urban lifestyles within the country are more prevalent, thus leading to an increase in obesity and the associated health risks (Poudel 2014).

Since sugar is a staple in every home for cooking and baking, and there has been a rise in diabetes prevalence in Nepal, it might be a great idea to encourage the replacement of sugar with a *stevia* sweetener. *Stevia* sweeteners are a great alternative sugar substitute for people with diabetes mellitus (Lemus-Mondaca et al. 2012). By replacing sugar with a *stevia* sweetener like Truvia®, it would then making it easier for diabetic families to produce foods that are more appropriate for them to consume so that they can still enjoy eating their favourite treats without the constant worry of a blood sugar spike. Local restaurants and bakeries may experience prosperity by replacing regular sugar with a *stevia* sweetener to encourage diabetic customers to support their businesses. By creating

dishes that are targeted towards diabetic customers, these businesses might be able to expand their customer audiences, while also raising awareness for diabetes.

If Canada were to export *stevia* sweeteners in the form of Truvia®, there would have to be some persuasion and encouragement to the Nepalese people, especially to the poorer families, because there is a huge price difference when comparing regular sugar to that of Truvia® products. At a Walmart store in Guelph Ontario Canada, the price for a 900g bag of white sugar costs \$1.97 CDN, which would equal about 172 Nepalese rupees (not to mention added transportation and shipping costs). For a 270g container of Truvia® at the same Walmart store, the cost is \$6.97 CDN, which would be about 609 Nepalese rupees. As one can see, the regular white sugar costs significantly less and the consumer gets much more product, whereas the opposite can be said for a lesser amount of Truvia® at a higher cost. From the Truvia® website, however, it is noted that 1 teaspoon of Truvia® is equal to the same sweetness of 160 teaspoons of regular white sugar. Even though Truvia® is more expensive, the consumer would essentially be using less of the product than they would if they were using regular sugar. There would also have to be a lot of recipe adjustments if people were to substitute regular white sugar with a *stevia* sweetener.

By exporting *stevia* to Nepal in the form of a calorie free sweetener such as Truvia®, there is a large target audience, because (almost) everyone uses sugar. If *stevia* was to be exported as an ingredient in a ready-made food or beverage (i.e. sodas, yogurt), the consumer audience becomes smaller. Most Nepalese families eat what they grow, and save their money for stuff that they need, instead of things that they want (Raja Khanal, pers. comm. October 2014). Yogurt and sodas are not necessities; they are products that

would be considered a luxury, and so these products may not appeal to the poorer class in Nepal and would have to be marketed towards the wealthier people who are able to afford to make a luxurious purchase. Also, not everyone likes yogurt or sodas, and so the consumer audience is even smaller still. With that said, one can see that by exporting *stevia* in the form of a calorie free sweetener, the consumer audience is much greater. By doing so, the Nepalese people have the option of incorporating it into foods that they already like.

Potential Problems

Stevia cultivation in Nepal is a relatively new practice (Shrestha 2013). Since the climate in Nepal is better suited for *stevia* plants, they do not have to grow *stevia* as an annual plant, but instead as a perennial. The *stevia* could then be used yearly for 5-7 years (Singh et al. 2005). Although there is limited information available in English, Palm Agrotech is a company in Nepal that produces aloe vera and *stevia* plants (Palm Agrotech Bio-Energy Nepal n.d.). This company sells *stevia* plants to prospective farmers that wish to grow *stevia* on their own. There are no given prices, and/or contact information that could be found for this company. By importing readymade *stevia* products to Nepal from Canada, this could potentially hurt the newly budding *stevia* practices, and companies like Palm Agrotech in Nepal. It would also seem more realistic to grow *stevia* in Nepal instead of Canada because of the climate. The Nepalese would only have to buy seeds once ever 5-7 years, whereas Canadians would have to repurchase *stevia* seeds yearly.

There are also businesses in China and India that grow, manufacture, and distribute *stevia* products (Klotter 2001). Herboveda is presently the largest private label *stevia* company in India, and produces a line of products that are very similar to that of

Truvia® (Herboveda India n.d.). The products are called “So Sweet™©”. The cost for a 250g package of So Sweet™© costs 400.00 Indian rupees, which is worth approximately 644.77 Nepalese rupees (About So Sweet n.d.).

TABLE 1: Comparing the costs of stevia sweeteners with different currencies (not including shipping costs).

Product Name	Canadian Dollar	Nepalese Rupee	Indian Rupee
Truvia® (270g)	6.97	609.00	
So Sweet™© (250g)		644.77	400.00

One can see from TABLE 1 that Truvia® is less costly for the Nepalese. However, with added shipping costs from Canada, the cost could potentially be much more, making Truvia® a lot more expensive than So Sweet™©.

Overall, exporting a Canadian *stevia* sweetener such as Truvia® could potentially have a huge audience in Nepal followed by success, but it may be costly for both countries. Perhaps Nepal would better benefit from importing *stevia* products from countries that are geographically closer to them, like India, so that they do not have to pay so much for shipping. Full-scale *stevia* production in Canada is certainly possible, but may not be very economical. For future research, more attention should be paid to transportation costs to have Canada export such products to countries like Nepal.

Depending on the success of *stevia* cultivation in Canada, Canada may choose to keep the *stevia* within the country, to encourage Canadians with diabetes to use *stevia* sweeteners as an alternative for regular sugar. As of 2011, there were 2.25 million Canadians that

had diabetes mellitus, and so one can see that Canada also has a problem concerning a diabetic increase (O'Reilly et al. 2011).

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