

Vertical Planting Bags for Nepal

Emily Robins

Section 105

AGR*1110

November 29, 2016

PART 1: PRODUCT INFORMATION

Vertical Farming

Over the past years, sustainability and food security has been brought to attention (Besthorn, 2012). With rising temperatures, climate change, and disasters such as earthquakes and floods, there has been problems concerning the carrying capacity (Besthorn, 2012). The United Nations Food and Agriculture Organization (UNFAO) decided that the largest problem that the population is facing is:

“the problem of insuring safe, adequate, timely, and affordable food for a growing and increasing hungry population” (UNFAO, 2011)

For 30 years in the 1900's, crop yields and food production increased throughout the world, which resulted in positive feedback in global hunger, but there was negative feedback concerning the use of fertilizers and the issue of crop irrigation (Besthorn, 2012). Due to the use of fertilizers in fields, it has resulted in land degradation, a decrease in yields, and an increase in food prices. The demand for food has increased dramatically due to these issues and has a negative impact on undeveloped countries, such as Nepal.

Recently, a new technology, vertical farming, has been a method used for urban agriculture. This technology has been shown to increase the production of food, food security, and creates a sustainable way to farm in an urban setting (Besthorn, 2012). Vertical farming can use tall buildings, and greenhouses to produce crops such as fruits and vegetables. Despommier recommended that with the proper use of the technology and skill, “a vertical farm can produce the equivalent of 4 to 6 soil-based acres” (Besthorn, 2012). This type of farming uses a smaller amount of water, do not require as much human labour, and the crops are not as susceptible to crop diseases. The crops that are produced from vertical farms are created for an urban

population to minimize the transportation required from the producer to consumer, and therefore be more environmentally friendly (Besthorn, 2012).

Product Description

AI's flower pouches are bags that can be hung on the wall to grow flowers, fruits, and vegetables (A.M.A Plastics, 2016). The pouch provides the plants protection from UV rays, and are designed to last for the whole growing season. The bags are produced in Kingsville, Ontario



by a company called A.M.A Plastics (A.M.A Plastics, 2016). A.M.A Plastics have been in the horticulture, hydroponic, nursery, and agriculture markets since 1982 and “are one of the biggest suppliers of plug trays in Canada” (A.M.A Plastics, 2016).

There are currently 17 permanent

<http://www.amaplas.com>

full-time and part-time employees working for A.M.A Plastics (Raizada, MN (2016) Personal communication by email (ama@amaplas.com). Date: Oct 18, 2016).

In order to grow plants in the pouches, pre-moistened grower mix is recommended to fill the pouch, and the seeds of the plants are inserted through the slits on the side (A.M.A Plastics, 2016). The pouches are required to be watered daily, and fed with fertilizer each week (A.M.A Plastics, 2016).

The vertical planting bags can be ordered online via <http://www.amaplas.com>.

Cornelia S. Bradt is the managing director of sales and administration. Her contact email is

cbradt@amaplas.com or pricing inquiries can be discussed over the phone by calling 519-322-1358 (A.M.A. Plastics, 2016).

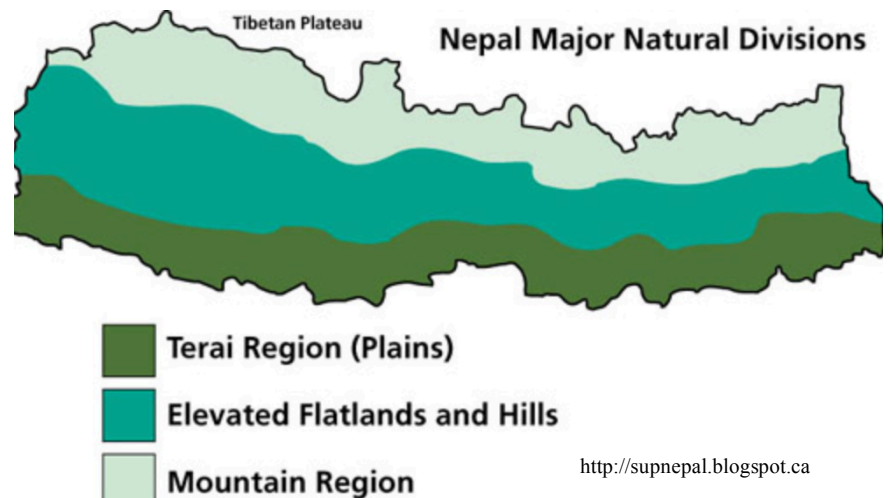
Benefits to Canada

If A.M.A Plastics exports Al's Flower Pouches to Nepal, it will benefit the company in a positive way. Exporting to Nepal will result in a growth in the company and exporting nations. Currently, A.M.A. Plastics sells their products to Canada and the United States, but by selling products to Nepalese companies, they will be able to expand their customers globally. Benefits of exporting include a gain for the workers, which may include an increase in wages for current employees, as well as more job opportunities for future employees (Bernard et al., 1997). Companies that export will increase in productivity. With more demand of products, the products will need to be produced and processed in order for fill orders and send out shipments (Bernard et al., 1997).

PART 2: EXPORT POTENTIAL TO NEPAL

Geography of Nepal

Nepal is located in Asia, between China and India. The country is divided into 3 main regions. The Terai region is on the south side, and it borders India. Many of the crops produced in Nepal are grown in this region. This region is 23 percent of the total area of Nepal. In 2005 and 2006, the eastern part of the Terai region was



under a shortage of rainfall, which caused a decrease in crop production (Malla, 2008). The Terai region is where many of cereal crops can be grown due to the warm, tropical-like climate (Sharma, n.d.).

The hill region is located between the Terai and mountain region. This region is the most urban region in Nepal, and it includes the capital, Kathmandu. The hill region accounts for 42 percent of the total area in Nepal (Malla, 2008). The climate in this region differs, which effects which crops can be grown in the different climates (Sharma, n.d.). In the mid-hills, there are tropical temperatures where fruits and potatoes are grown. In the high hills, the temperature is cooler, and the main crops that can be grown here are temperate fruits and potatoes. Some livestock such as sheep and goat are housed in the high hill area of the this region (Sharma, n.d.).

The mountain region is located on the border of China. This region has many mountains, which causes a lack of habitation and agriculture. This area represents 35 percent of the total area of Nepal (Malla, 2008).

Farming in Nepal

In Nepal, the most important crop that is produced is rice (Malla, 2008). Rice is produced in all three regions in Nepal, the most productive region being the Terai region. The mountain region produces an average of 1.7 to 2.0 tonnes per hectare, the hill produces an average of 1.6 to 2.3 tonnes per hectare, and the Terai region produces 2.6 to 2.9 tonnes per hectare. Compared to the surrounding countries, India and China, the production of rice in Nepal is significantly lower (Malla, 2008).

Other crops that are grown in Nepal include maize, lentils, and soybeans. Maize is grown in the hill region, and it covers approximately 80 percent of the land in that area. Lentils are grown in the western part of the country. In total, soybeans accounts for 7 percent of all legumes produced in Nepal (Malla, 2008).

Nepal's major agricultural trading partner is India, and secondary crops such as sugar, and ginger are exported there. Over the past 4 years, the production of sugar in Nepal increased by 250 percent, and the requirement for Nepal is being met by imports from India. Over the past 3 years, the demand for fresh ginger has increased, causing the earnings from exporting fresh ginger to India to double (Malla, 2008).

In Nepal, there is a major issue with loss of soil nutrients in the hill region (Tiwari, 2010). This loss is due to the decrease in using residue from crops, and manure. Applying manure results in a loss approximately 40 percent of essential nutrients such as

nitrogen, phosphorus, and potassium. The lack of available fertilizers, and high cost of fertilizers to farmers also results in loss of nutrients. From the study conducted, it concluded that by maintaining nutrient balance within the soil by applying fertilizers (Tiwari, 2010).

Export Potential to Nepal

The export potential of Al's Flower Pouches to Nepal is unknown. Although there has been success in Canada, it is unclear how successful the pouches will be once exported. In Nepal, they will be able to grow flowers, fruits, and vegetables, and will have success with the growing portion of the product because Canada and Nepal have similar climates (Weather Online, 2016). It is unknown what the demand for flowers, fruits, and vegetables will be to Nepalese consumers, but the demand may be higher for North American and European tourists visiting Nepal.

In Kenya, there are many local families using vertical planting bags which allows households to grow crops by using 20 to 40 planting bags along the sides of their houses (Gallaher, 2013). In Kenya, there is minimal space to grow crops, and by using vertical planting bags, kale and spinach are able to be grown. There have been previous studies that show that vertical planting bags have positive effect in Kenya because it increased the social capital between farmers. All farmers that produce crops in Kenya use soil that is contaminated, which can possibly be used to fill vertical planting bags. The soil and water that is available to farmers in Kenya may be contaminated with metals (Gallaher, 2013). The use of soil and water that is contaminated with metal has negative health effects such as cancer and neurological effects.

In this study, it was found that when farmers used contaminated soils, it had a greater effect of the metal uptake of the plant than water. From the kale harvested, the level of lead was higher than the limits set by the FAO and WHO (Gallaher, 2013).

Conclusions that can be made from this study is that soil that is not contaminated will need to be shipped to Nepal so the uncontaminated soil can be used in the vertical planting bags. This will ensure that the crops grown in the planting bags will not have traces of chemicals in them, and they will be safe for consumption.

Cost Analysis

AI's Flower Pouches are sold for 57 cents each, which is equivalent to 29.17 Indian rupees (Bank of Canada, 2016), and are sold in packages of 250 pouches. For a case of 250 pouches, the total is \$142.50, which is equivalent to 7292.73 Indian rupees (Bank of Canada, 2016). This is a very affordable price for Nepalese farmers, and if the shipment is divided amongst a community, it will be a low cost investment for them.

Although the bags are low cost, the recommended soil, seeds, and fertilizer will be an additional cost that Nepalese farmers will need. In Nepal, farmers have little knowledge about proper tillage and the management of nutrients in the soil to maintain sustainability (Pudasaini, 2015). This results in soil degradation, and the flower pouches would be more useful if the soil that was used was clean. Fertilizer is another product that Nepalese farmers would need in order to maintain proper soil nutrients. Fertilizer is not used often in Nepal due to the high cost, and the common fertilizer used is manure (Pudasaini, 2015).

Transportation Logistics

A.M.A. Plastics is located in Kingsville, Ontario (A.M.A. Plastics, 2016). To ship a package of 250 flower pouches from Kingsville, Ontario to Kathmandu, Nepal it costs \$521.12 (FedEx, 2016). The flower pouches will be transported from Kingsville to Toronto via trucking. From Toronto, it will be flown to Kathmandu via an airline company. Once arriving in Nepal, the pouches can be sold across the country.

A company located in Nepal that could be a potential company to import the flower pouches and sell them to Nepalese farmers is Agromart. Agromart is located in Kathmandu, Nepal, and is an online store for products related to agriculture in Nepal (Agromart, 2016). Agromart Nepal sells machines, organic products, plants, seeds, and variables. They sell agricultural products, create a Nepalese market for farmers, and share information about agriculture (Agromart, 2016). By exporting Al's Flower Pouches to Agromart, the pouches will be available to Nepalese farmers across the country.

Inputs Required

By sending Al's Flower Pouches to Nepal, it would be beneficial to send soil, fruit and vegetable seeds, and fertilizer to optimize the usage of the pouches. Canadian soil that can be shipped to Nepal is The Green Formula – Original General Purpose Mix (Lambert, 2016). This soil contains Canadian sphagnum peat moss, horticultural perlite and vermiculite, and limestone. It is used for general planting, hanging baskets, and flowering plants. The soil is sold by Lambert company, which is located in Quebec. The product can be transported from Quebec to Nepal in bulk amounts because the soil is packaged in bags (Lambert, 2016). A Canadian seed company that can sell seed to Nepalese farmers is Stokes. They can provide a wide variety of seeds that

include vegetables such as collards (kale, Swiss chard), carrots, peppers, and beans, fruit, and flowers that can be sold for decorative purposes (Stokes, 2016). A Canadian fertilizer company that can export fertilizer is Agrico, (Agrico, 2016). They can provide standard and specialty fertilizers, and micronutrients. Standard fertilizers can be dry state (urea, muriate of potash, monoammonium and diammonium phosphate, calcium ammonium nitrate, ammonium sulphate, and ammonium nitrate), and in liquid and gas state (urea ammonium nitrate solution, and anhydrous ammonia). Specialty fertilizers include NK21, microessentials SZ, sulphate of potash, ESN, amidas, axan, aspire with boron, TRIO, k-mag, ammonium thiosulphate, and ammonium polyphosphate. Specialty fertilizers can be in solid, liquid, and gas form (Agrico, 2016).

Benefits to Nepal

AI's Flower Pouches are beneficial for growing fruits, such as strawberries, which Nepal isn't known for. The major crops that are grown in Nepal are rice, maize, wheat, millet, and barley, Prasai, 2010. There are positive health benefits from consuming strawberries such as antioxidant, cardioprotective, antimetabolic syndrome, and many other activities, Afrin et al., 2016. By consuming strawberries, there are antioxidant activities that occur such as improved plasma antioxidant levels and vitamin C concentrations. Cardioprotective activities that occur when strawberries are consumed are a lower risk of cardiovascular issues due to the phenolics and micronutrients that are in the berries. By consuming strawberries, the risk of having insulin resistance, dyslipidemia, obesity, and high blood pressure are lowered, Afrin et al., 2016.

Another vegetable that can be grown in the flower pouch is kale. There are many health benefits associated with eating kale because it contains antioxidants, such as beta-carotene, and

vitamin C (Blomhoff, 2006). Antioxidants have the potential to lower the risk of obtaining diseases that affect changes in body cells (Blomhoff, 2016).

Strawberries in Vertical Planting Bags

In Turkey, majority of strawberries are planted in fields or plastic tunnels and are harvested from April to June (Ozeker, 1999). The largest problem that affects the production of strawberries are pathogens and nematodes. To prevent pathogens and nematode, affects the production of strawberries are pathogens and nematodes. To prevent pathogens and nematode, affects the production of strawberries are pathogens and nematodes. To prevent pathogens and nematode, but this has had a negative effect on the soil chemistry (Ozeker, 1999). By using vertical planting bags, the density of strawberries could be three times as large than planting in the field. The production of strawberries grown in vertical planting bags has been proven to be very efficient (Ozeker, 1999).

Global Competition

Rapitech Instruments Ltd. is a company that produces a gardening vertical wall plant that includes planting bags, which is produced in China (Alibaba, 2016). Inquires about pricing for the vertical wall plant with planting bags can be found at https://www.alibaba.com/product-detail/Gardening-Vertical-Wall-Plant-Grow-Bag_60390590494.html?s=p

This product would be a better choice if Nepal were to import vertical planting bags because the vertical wall plant with planting bags is produced in China, and transportation costs would be lower. The distance between China and Nepal compared to Canada and Nepal is a smaller distance, resulting in a lower transportation cost compared to Canada and Nepal.

Conclusion

If Al's Flower Pouches were to be exported to Nepal, the flower pouches should be sent to the hill region because the capital is located there, which is where majority of the tourism is. If strawberries and kale were to be grown for the purpose of selling them to tourists, it would be beneficial to have the strawberries and kale grown in that area because it would minimize the transportation needed.

It would also be recommended to have pre-moistened grower mix, fertilizer, and fruit and vegetable seeds available to Nepal. Without these items, the pouches would not be useful to the Nepalese farmers.

The export potential of Al's Flower Pouches to Nepal is unknown because the pouches have not been exported internationally before. Studies should be conducted to see if the pouches are beneficial to Nepalese farmers, and if the product is useful in their styles of farming.

The cost of Al's Flower Pouches is low cost, and by sending it to Agromart Nepal, Al's Flower pouches could have the potential to be sold throughout the country, and not be limited to the capital, Kathmandu. This would be beneficial to Nepalese farmers, but the inputs required, such as soil, fertilizer, and seeds, to use the pouches to their fullest potential would be expensive. If there was low cost soil, fertilizer, and seeds available to farmers, the pouches could be more useful to them.

References

- Agrico (n.d.). Retrieved November 26, 2016 from www.agricocanada.com
- Agromart (n.d.). Retrieved November 27, 2016 from www.agromartnepal.com
- Alibaba (n.d.). Retrieved November 26, 2016 from www.alibaba.com
- Bernard, A.B., Jensen, J.B. (1997). *Exceptional Exporter Performance: Cause, Effect, or Both?* Journal of Economics
- Besthorn, F.H. (2012). *Vertical Farming Social Work and Sustainable Urban Agriculture in an Age of Global Food Crises*. (66) Australian Social Work
- Blomhoff, R.B., Carlsen, M.H., Anderson, L.F., Jacobs, D.R. (2006). *Health Benefits of Nuts: Potential Role of Antioxidants*. (96) British Journal of Nutrition
- Daily Currency Converter (n.d.). Retrieved November 25, 2016 from www.bankofcanada.ca
- Gallaher, C.M., Mwaniki, D.M., Njenga, M.N., Karanja, N.K., WinklerPrins, A.M. (2013). *Real or Perceived: The Environment Health Risks of Urban Sack Gardening in Kibera Slums of Nairobi, Kenya*. (10) EcoHealth
- Malla, G.M. (2008). *Climate Change and its Impact on Nepalese Agriculture*. The Journal of Agriculture and Environment
- Nepal (n.d.). Retrieved October 10, 2016 from www.weatheronline.com
- Original General Purpose Mix (n.d.). Retrieved November 26, 2016 from www.lambertpeatmoss.com
- Ozeker, E.O., Eltez, R.Z., Tuzel, Y.T., Gul, A.G., Onal, K.O., Tannrisever, A.T. (1999). *Investigations of the Effects of Different Growing Media on the Yield and Quality of Strawberries Growth in Vertical Bags*. (491) ISHS Acta Horticulturae
- Pudasaini, R.P., Pande, K.R. (2015). *Evaluation of Tillage and Farmyard Manure on Soil Properties and Maize Yield in the Mid-Hills of Nepal*. Nepal. CAB Interaction
- Stokes Seeds (n.d.). Retrieved November 26, 2016 from www.stokeseeds.com
- Tiwari, K.R., Sitaula, B.K., Bajrachanya, R.M., Borresen, T.B. (2010). *Effects of Soil and Crop Management Practices on Yields, Income and Nutrient Losses from Upland Farming Systems in the Middle Mountains Region of Nepal*. (86). Nutrient Cycling in Agrosystems
- United Nations Food and Agriculture Organisation. (2011). *An Introduction to the Basic Concepts of Food Security*.