

Lemon as a Nepalese Agri-Food Export

AGR 2150

Dr. Manish Raizada TA: Jenn Wilker

Shaelin Green

November 24, 2015

Product Information:

Lemons are a member of the citrus fruit family that are predominately grown by small subsistence farmers in Nepal (9). Lemons are an excellent choice of crop for Nepali farmers as they have many uses, such as: juice, fragrance, flavour, cleaning and health benefits (5). Currently, only about 34,000 hectares of arable land in Nepal is used for the production of citrus fruits, which is a substantial amount lower than most other citrus fruit producing countries (9). This statistic is quite striking as Nepali scholars and government organizations have named lemons as an excellent candidate for export (6,9).

Production & Difficulties in Production:

Lemon farming is most popular in the Mid-Hills of Nepal, where 70% of farmland is un-irrigated (10). This is a major issue that results in the majority of lemon orchards being under simply rain-fed conditions, without access to irrigation that is necessary for their production (6). Considering lemon is for the most part not a cash crop in Nepal, and is grown mostly by subsistence farmers, modern farming practises for this particular crop have not yet been introduced to this area yet. This is a major set-back in lemon farming, as Nepali farmers are lacking of access to proper tools and training (9).

Another major difficulty in the production of lemons for Nepali farmers is lack of access to improved seed varieties (6). The majority of farmers growing lemons are using local landraces, which have many desirable traits, however, the development of lemon seeds in Nepal is inadequate (2). This being said, citrus plants, specifically lemon, are rich in genetic diversity with strong traits. This means that there is immense potential behind lemons to

raise the quality of the crop along with easing it's production and increasing yields (2), all of which would be extremely beneficial to farmers in the Mid-Hills of Nepal.

Pests and Diseases:

A wide spread pest that affects many lemon farmers in Nepal is brown citrus aphid (6). This pest infests the stems and leaves of citrus crops, including that of lemons, and has the ability to weaken and stunt the growth of their trees (7). Fortunately, research has shown that the extract of another plant found in Nepal has effectively been able to improve the yields on lemon trees. Neem extract, when sprayed onto potted citrus plants was able to reduce citrus aphids by 20-100% (11). This discovery has the potential to be a step in the right direction for Nepali farmers who are struggling with decreasing yields due to the devastating brown citrus aphid.

As mentioned earlier, 70% of land where lemons are most frequently grown are un-irrigated (10). This means that, due to lack of access to water and typically dryer conditions, lemon farms in the hills of Nepal are much more susceptible to drought. According to the Nepal Agricultural research council, drought during flowering and fruiting season is one of the main causes of low yields (9). Drought has other negative effects on lemons including the size and quality of the fruit as well as causing the plant to go under stress, which may cause leaf abscission. (1). This is a problem, that although may seem unattainable, could be fixed. This could be done through improving access to irrigation if the Nepali government or aid organizations working in the area were to choose to make it a priority.

Health and Nutritional Benefits:

As a citrus fruit, lemons can offer many health benefits to Nepali farmers and their families/communities. Lemons are commonly known for their high content of vitamin C, which is important for many bodily functions including: maintaining healthy bones and teeth (13), producing collagen and reducing length and severity of cold and flu symptoms (5). Lemons are also rich in other essential vitamins and minerals such as potassium, calcium and magnesium, as well as antioxidants, which are important for fighting diseases and healing wounds. (13). Lemons are also dense in the energy-yielding nutrient, carbohydrates (5).

Economic Benefits:

According to the Nepal Agricultural Research Council, the Nepali government is currently prioritizing citrus crops, specifically lemon, as an important exportable fruit commodity (9). It is surprising then that still; only 40% of lemon orchards in Nepal are cash crop orchards, while the other 60% are small orchards that subsistence farmers use as a secondary means of income (6). The switch from subsistence to cash crop farming holds many benefits for the people of Nepal. With an increase in reliable income they would be able to purchase household items as well as improved inputs for their farms such as: fertilizers, tools, improved seed varieties and irrigation.

Not only is there potential for farmers to benefit from the sales of their fruit for nutritional/culinary purposes, but there is a growing market for the use of lemon in many

beauty and household products as well. For example, Lush Fresh Handmade Cosmetics, a very popular Canadian cosmetics brand, imports large amounts of fresh lemons from Italy and Asia to be pressed into oils for use in their products (8). The opportunities are endless for Nepali lemon farmers as they could make their own lemon products, sell to local factories, or, as will be further discussed, export their produce outside the borders of Nepal.

Export Potential:

The Canadian market has room to grow for imports of Nepali lemons. In 2013, value of all imported lemons and limes from all countries worldwide was, \$94,299,354 (4). Many of the major Canadian retailers such as Costco, Metro, Sobeys and Sysco are purchasing large quantities of lemons imported from all over the globe (4). This is a clear indication of the vast market for lemons in Canada. In terms of the transportation of lemons, it is suggested that the most efficient way to transport lemons is through a refrigerated container that has a fresh air supply and a controlled atmosphere (12). The cheaper option of cargo handling can take place, however; it can be more difficult due to stricter regulations and things are more apt to go wrong including: crates falling and damaging the fruit, weather conditions that without proper protection may cause fruit to spoil and so on (12).

Citrus fruits, specifically lemons pose a relatively low risk for the entry of pests of quarantine concern for Canada, according to the Canadian Food Inspection Agency (3). Phytosanitary certificates or a permit to import are not required for imported lemons, however; there may be some fees attached which include fees for inspection, and the dumping of poor produce (3). Furthermore, shipments of fresh lemons to Canada must also

be free from soil, soil related matter, pests, leave and plant debris (3), this is a simple cleaning process that may even be able to create more jobs for those in rural Nepal.

References:

- (1) Arbona, V., Iglesias, D., Jacas, J., Primo-Millo, E., Talon, M., & Gómez-Cadenas, A. (2005). Hydrogel substrate amendment alleviates drought effect on young citrus plants. *Plant and Soil*, 270(1), 73-82. Retrieved November 20, 2015.
- (2) Budathoki, K., Regmi, H., Pradhan, N., Gotame, T., & Poudyal, K. (2004). Citrus diversity, their characterization and evaluation in Nepal. *Proceeding of the Forth National Workshop on Horticulture*, 116-122.
- (3) Canadian Food Inspection Agency. (2014). *D-01-07: Canadian Phytosanitary import requirements for fresh citrus and tropical fruits*. Government of Canada.
- (4) Canadian Imports Data Base. (2015). *080550 – Lemons And Limes – Fresh or Dried*. Government of Canada.

- (5) Clay, William D., Economos, Christine. (n.d.). *Nutritional and health benefits of citrus fruits*. Retrieved from <http://www.fao.org/3/a-x2650t/x2650t03.htm>.
- (6) Dhakal, D., Gotame, T., Bhattarai, S., & Bhandari, H. (2002). Assessment of Lime and Lemon Production in Nepal. *Journal of the Institute of Agriculture and Animal Science, Volume 22*, Abstract retrieved from <http://www.nepjol.info/index.php/JIAAS/article/view/742>. Retrieved November 21, 2015.
- (7) Grafton-Cardwell, Elizabeth. (n.d.). *Brown Citrus Aphid*. Retrieved from http://cizr.ucr.edu/brown_citrus_aphid.html
- (8) Ingredient: Lemon Oil (n.d.). Retrieved from <https://www.lush.co.uk/lemon-oil>.
- (9) Nepal Agricultural Research Council. (2007). *National Citrus Research Program*. Retrieved from http://narc.gov.np/org/ncrp_pariptale.php.
- (10) Paudel, K. (n.d.). Implication of Forage and Livestock Production on Soil Fertility. Retrieved November 20, 2015, from <http://www.fao.org/docrep/004/t0706e/T0706E08.htm>
- (11) Tang, Y., Weathersbee, A., & Mayer, R. (2012). Effect of Neem Seed Extract on the Brown Citrus Aphid (Homoptera: Aphididae) and its Parasitoid *Lysiphlebus testaceipes* (Hymenoptera: Aphidiidae). *Environmental Entomology*, 31(1), 172-176. <http://dx.doi.org/10.1603/0046-225X-31.1.172>
- (12) Transportation Information Services (n.d.). *Cargo Information: Lemons*. Government of Germany. Retrieved from http://www.tis-gdv.de/tis_e/ware/obst/zitronen/zitronen.htm.
- (13) Zesty Citrus Fruits Signal Powerful Health Benefits (Febraury 2012). *Environmental Nutrition*, p. 3. Retrieved from <http://web.a.ebscohost.com.subzero.lib.uoguelph.ca/ehost/pdfviewer/pdfviewer?sid=5ab7846d-3438-4e28-870e05906a53e5dc%40sessionmgr4001&vid=0&hid=4201>

Potential Buyers:

Lush Fresh Handmade Cosmetics

8365 Onatario Street

Vancouver, British Columbia, V5X 3E8

Phone: (888) 733-5874

Agri-Mondo

165 J.A. Bombardier. Boucherville.

Québec, Canada J4B 8P1

Phone: 450 449-9899 / 514 323-9240

Fax: 450 449-1027

Sobeys National

4980 Tahoe Blvd.

Mississauga, Ontario

L4W 0C7

Phone: 905-238-7124