AGR 2150
Kevin Chao

Nepal Export Idea – Aegle marmelos

Product introduction:

The Aegle marmelos, also known as the Bael fruit, is a citrus fruit that is grown on trees. It is native to the South Asia area, primarily in india, but is also grown in many regions of Nepal (Morton, Dowling 1987). The tree is known for being able to grow in various environments, though not ideally, where other plants usually cannot. The Aegle marmelos is part of the Rutaceae family, along with oranges, lemons and grapefruits. The fruit is very versatile because almost every part of the plant holds a lot of value. The oil in the leaves of the plant can be extracted for a multitude of uses, the bark is used for crafting things such as knife or tool handles, and the fruit can be eaten. One tree, when it reaches maturity, can produce up to 800 fruits in a season, but on average it would yield 150 to 200 fruits per tree. The tree itself also holds a religious background, as it is often times called, "The Holy Bael" as people who believe in Hinduism offter leaves to Shiva. (Orwa, Mutua, Kindt, Jamnadass, Anthony 2009) This product holds a lot of value for the Nepalese community and a lot of potential for North America as well with all the exciting opportunities possible.

Where and how it's grown

The Aegle marmelos is indigenous to India, but has spread through some of South Asia, Nepal being one of those areas, and has been grown in Florida as well before. The biophysical limits of the plants growing potential is the following; the altitude that it can be grown is between 0-1200 meters above sea level, the mean annual temperature can be between negative six degrees to forty eight degrees Celsius, and a mean annual rainfall of five hundred seventy to two thousand millimetres of rainfall (Swingle 1943). The plant thrives in well-drained soil, colitic limestone, and swampy soil, soil containing alkaline or even stony soils between the pH

levels of five to eight. For its diverse capabilities, it is known as the three that can thrive "where other fruit trees cannot survive." (Orwa, Mutua, Kindt, Jamnadass, Anthony 2009) Though the fruit has been able to grow and fruit in Florida, the plants have shown to have zinc deficiencies (Morton, Dowling 1987). The plant does well with minimal fertilizer and irrigation and is very self-sustainable. Seedlings will begin to bear fruit within six to seven years, and full production of up to eight hundred fruits a month will begin after 15 years (Morton, Dowling 1987). The Aegle marmelos has also proven to be resistant towards pests and diseases, except for the fungi causing deterioration during storage. (Morton, Dowling 1987)

Benefits to Nepal

Due to the adaptiveness of the Aegle marmelo, it can generally be planted in a lot of areas in Nepal including hillside farmers. Currently, there is no clear market associated price for the fruit which farmers in Nepal can work to their advantage. The currently Nepalese community already uses the fruit for a variety of reasons from medicinal to general consumption. If farmers were to plant and grow an even larger field of the Aegle marmelo then they will be setting themselves up for an opportunity to monetize a crop that is being undervalued in today's market. Though it may take time, six to seven years, for them to start collecting a return on investment on the land used for this crop it would be worth it for farmers for two reasons. First, they can simply export the whole fruit to countries, this will allow farmers to give more jobs to their villages more jobs in terms of farming and processing. The second benefit would be that most of the tree has value and can serve as a second method to bring more jobs and income into villages. Examples of this could be extracting the essential oils from leaves, creating fruit juices or making bael jam, jelly and marmalade. To create jam, or fruit juices is very simple and does not require a skilled work force or a heavy investment for a firm, thus this could provide jobs for a

variety of people from the older population to the younger population. Currently, fruit juices make up five percent of Nepal's exports, as of 2013, indicating that they have infrastructure setup to export this product at nearly no additional cost (Nepal 2015). Furthermore, agroforestry has shown to help improve soil quality in terms of sustainable nutrient security, and the potential of long-term soil productivity. This helps because due to the plants ability to be plated in a variety of situations, through agroforestry the plant can help increase the quality of soil of the area which could help plant different crops at a later date. (Schwab, Schickhofff, Fischer 2015)

Medicinal Purpose of Aegle marmelos

The Aegle marmelos has been used as a medicinal plant in traditional societies. The fresh pulp of the fruit can be used a mild laxative to help digestive effects, often taken as though it were a tonic (Swingle 1943). Another medicinal purpose of the fruit would be for use of hemorrhoids, one would mix the pulp of the fruit with ginger and fennel. (Morton, Dowling 1987) Another use is to help in the case of diarrhea, the fruit is harvested when they are young and not fully ripe. Then they are sundried and consumed which helps halt diarrhea and dysentery. (Swingle 1943) Another use of the plant is to mix the bitter leaf with honey, then blending them to make a drink that helps with fevers. Boiling the leaves of the plant is also said to help with asthma. (Morton, Dowling 1987) Another part of the plant that can be used is the bark and the root. When boiling the root and bark, the extract helps with the effectiveness of chemotherapy as well as the prevention of cancer (Baliga, Thilakchand, Rai, Rao & Venkatesh 2013). There are a lot of medicinal benefits that the Western world has not taken advantage of yet, offering another reason to enter the market.

AGR 2150
Kevin Chao

The potential role of women in the export of Aegle marlmelo

Due to the self-sustainability of the plant, and the potential by products that the fruit can produce, it opens up an opportunity for women to take control of this market. The trees grow up to six meters tall, but the fruits droop and hang low as the fruit ripen (Swingle 1943). Though the weight of the fruits could be a potential problem with the use of wheelbarrows could aid them in transporting the fruit to their village. Additionally, the women could still maintain their house duties because they do not have to belabour over the plants. Creating the jam and jellies can be easily taught and does not require any special education. By teaching the women how to create their own jams, jellies and other by products like marmalade, that education can be applied to various other fruits to create preservatives to prolong the shelf life of fresh fruits.

Export potential

The major problem facing the exports of this fruit would be the shelf life of the product. They can be held for up to two weeks given that they have a stable temperature of thirty degrees Celsius or up to four months at nine degrees Celsius before mold begins to grow. (Swingle 1943) Storing and transport could present potential issues with the temperature control, and the ability to transport it from the farms to the central areas of Nepal. The farmers would also need to first establish a market, and market price in which they were willing to sell their produce at to gauge what their income will be to see how much money they can spend on infrastructure. This may prove to be difficult because a lot of other markets have a barometer that exists already such as teas and textiles. But the time it takes to get a return on investment would range from five to six years in which they would not be able to harvest or sell fruit. The problem that presents itself would be that the land would then not be earning any money during that duration. On the other

hand, that doesn't mean that the leaves, bark and roots could not be used for medicinal purposes. This opens up a new market or export idea as well. Perhaps selling other parts of the tree and not just the fruit could also help cover some of the starting costs and provide an incentive to start the development of this idea.

Though once the development begins, this product has a lot of potential in the international market. The flavour of the fruit is unlike any other citrus fruit found on the market today. With consumers wanting to try new exotic flavours grocery stores could be a potential target. With the medicinal potential, perhaps pharmaceutical companies would be interested in sampling this product to see if it has only potential to be used to any medicine.

AGR 2150
Kevin Chao

Bibliography

Baliga, M., Thilakchand, K., Rai, M., Rao, S., & Venkatesh, P. (2013). Aegle marmelos (L.) Correa (Bael) and Its Phytochemicals in the Treatment and Prevention of Cancer. Integrative Cancer Therapies, 12(3), 187-196.

Morton, J., & Dowling, C. (1987). Fruits of warm climates (pp. 187-190). Miami, FL: J.F. Morton ;.

Nepal. (n.d.). Retrieved November 24, 2015, from http://atlas.media.mit.edu/en/profile/country/npl/

Orwa C, A Mutua, Kindt R , Jamnadass R, S Anthony. (2009) Agroforestree Database:a tree reference and selection guide version 4.0

Schwab, N., Schickhoff, U., & Fischer, E. (2015). Transition to agroforestry significantly improves soil quality: A case study in the central mid-hills of Nepal. Agriculture, Ecosystems and Environment, 205, 57.

Swingle, W. (1943). The botany of citrus and its wild relatives of the orange subfamily (family Rutaceae, subfamily Aurantioideae). Berkeley: Univ. of California Press.