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Part 1B

Nepalese Chili Pepper

### **Where and how chili pepper is grown and processed**

Farmers in the Hillside Mountains of Nepal face the challenge of scarce amounts of land coupled with varying conditions of the soil. In order to overcome these issues, hillside farmers form terraces along the slopes of mountain, which ultimately creates more usable land. As a result, the farmers are able to maximize the use of the land along the mountain as well as continue to farm farther up the mountain. This is especially advantageous when farming chili peppers that grow along the terrace wall. Chili is a warm-season crop that requires transplanting in late spring when the risk for frost is minimal (OMAFRA, 2010). “Some chilli growers plant up to 10 lb of seed per acre” (Bosland, 2004). This would benefit the farmer in the event that there is low germination of the seed lot. Additionally, chilis usually grow to pod length in 60 to 75 days (OMAFRA, 2010). Throughout this time, the farmers need to ensure that they practice good crop rotation in order to manage pests and diseases. Fresh chilis are valued highly by consumers due to their varying flavours, appealing colors, and unique texture. In order to achieve these positive aspects, chili growers must put in hard work throughout the entire season.

### **Labour required**

In regards to chili farming in Nepal, “most fresh chili is harvested by hand into buckets or sacks and then emptied into bulk bins for transport to the packing shed or processor.” (Walker, 2004). “Good cultural practices such as fertilization, irrigation, and disease management in the field are critical to producing a high-quality crop.” The process for packing chilis varies depending on the type. “Loss of capsaicin...is a problem in the preparation and storage of dehydrated peppers”(Wang, 2007). For example “green chile is peeled and then frozen or even canned. (Walker, 2004) In contrast, red chile is harvested while it is ripe, in the dried stage, and

is brought to the processor before it is packed to be dehydrated further. They can be packaged in a variety of ways from whole pods to powder. Furthermore, Cayenne peppers which are often converted into hot sauce, undergo fermentation throughout processing. Additionally, a small percentage of Jalapeños are dehydrated, they are often pickled before being packed (Walker, 2004). In regards to the land labour, "Preparing soil involves plowing, deep chiseling, discing, smoothing, and listing...today most commercial chile acreage is directly seeded" (Bosland, 2000). Often it is the women of Nepal growing and caring for the chili peppers throughout the year.

### **Impact on Nepalese Women**

Women contribute largely to the rural economy of Nepal. The agricultural sector is rapidly changing due to economic and social forces and the women take on many different roles in regards to the farming of chilli peppers in Nepal that have a positive impact on their lives. The production of chili peppers is a large source of income in rural areas and as a result of growth in the sector it is likely that the empowerment of women will rise as more jobs will be provided. Due to the fact that the chillies have two harvest seasons, there are consequently two income streams. Another benefit for the rural individuals is that sustainable livelihood will increase due to the success of the farming. Due to the improved market opportunities, the Nepal farmers in the eastern hills living standards will improve as these individuals will be able to have additional income for children's education as well as increased cash crop farming. Nepal farmers will be able to increase their profitability of doing business with high-grade chili peppers. The export of chili peppers offers high poverty reduction as well as employment opportunity in processing and packaging practices.

### **Health and nutritonal information associated with the product**

With focus on health and nutrition, chili peppers have many benefits. According to Nakatani (1992), The chili peppers "compounds have antioxidant activities that are more effective than the natural occurring antioxidant, alpha-tocopherol." Additionally, capsaicin is considered a topical analgesic agent in the management of arthritis pain, diabetic neuropathy, mastectomy pain, and headaches. Futhermore, red chilies contain large amounts of vitamin C and some amounts of Provitamin A. Their very high vitamin C content can increase the uptake of non-heme iron from other ingredients in a meal, such as grains. In addition, peppers are a good source of B vitamins, and vitamin B6. They are also high in potassium, magnesium, and iron. (Nakanti, 1992).

### **How to improve productivity or overcome constraints**

There is potential for increase in production by improving production techniques. In Nepal many families are able to be more financially stable as a result of chili peppers. Further, with the implementation of new processing practices, production will increase and the export earnings of Nepal will be able to remain high. Throughout the winter months of the year, Western countries run the risk of facing a gap in supply and demand of chilli peppers due to their inability to produce in the cold weather. It is throughout these months that the demand and price for exported chili peppers could climb. Evidently, due to Nepal's tropical climate throughout the year they are able to supply during the high demand winter season. Also, in regards to improving productivity, the process of transplanting demonstrates many advantages for farmers as, "It guarantees a well-distributed stand of plants, reduces seed and thinning costs, and requires less cultivation and irrigation" (Walker, 2004). In regards to pests and diseases common to the chili, aphids are one of the biggest pest problems that can occur with chilli growing as a severe

infestation can ruin chili plants (Black, 1991). In addition, chili pepper growers face the risk of their crop attracting the fungal infection, grey mould which attacks plants through the stem. This mould can enter the plant but have no visible signs until the pepper starts to ripen. It is important to be alert for these kinds of issues because “The level of stress that the crop endures in the field will influence yield, pungency, fruit color, diseases, and, ultimately, postharvest quality” (Walker, 2004). Despite the many pests and risks involved with chilli farming, there are many opportunities for the chilli pepper, anywhere from being sold at the market to being used for processing. In order to maximize the shelf life of the pepper, it is crucial to ensure that quality is maintained from the field production all the way to the end result. According to (Walker, 2004), “High-quality chile begins with selecting the proper variety and purchasing certified seed.”

### **Exporting to Canada**

In regards to storage issues from post-harvest to market, it is important to consistently note the status of the chili during the growing seasons in order to estimate whether the chili is able to meet the standards of the market. With focus on fresh chilis, ensuring quality remains from the growth of the chilli to the consumer is very important. A key element in regards to chili processing is to master the cooling techniques while ensuring the pepper stays safe from any injuries. According to Walker, “Fresh chilli is a highly perishable commodity...poor temperature management and ethylene accumulation during storage or transit promote ripening and decay” (Walker, 2004). Fresh green chili loses water quickly after harvest and will likely turn color within a few days if not properly refrigerated (Pagmas, 2008). Moreover, post harvest, the chilli is placed onto conveyor belts or into a wash tank. There are several cooling methods for chilis however, forced-air cooling is a favourite among farmers. “Forced-air evaporative cooling is a system that uses evaporative coolers instead of refrigeration units...[it is more]...energy-

efficient than mechanical refrigeration, and growers can build their own systems” (Walker, 2004). Lastly, “Fresh chile is typically packed in 1 1/4 bushel size corrugated cartons that hold 30 lb. The boxes may be waxed, and should have top and bottom gaps and side slots for ventilation and cooling.” (Walker, 2004). In addition, when evaluating the market opportunity of the chilli pepper, according to Evan Elford's article for the Ontario Ministry of Agriculture, Food, and Rural Affairs “...Recently, there has been increased interest in the market potential of specialty vegetable crops in Ontario”(Elford, 2013). In addition Chili peppers gained a spot on the “Top thirteen vegetables for the three largest ethnic groups (South Asian, Chinese, afro Caribbean) in the GTA” (Elford, 2013). As a result of this information, one can conclude that chili pepper is a niche product that is desired in many markets in Canada. Furthermore, although “background research is highly recommended before growing any specialty crop...It appears there is an increasing demand for specialty vegetables in Ontario” (Elford, 2013). While taking this information into consideration, the primary customer and desired consumer for chili peppers is the niche Asian ethnic market across Canada. There is great potential in this market which could be further explored through extensive research on the many benefits of chili peppers for use in cuisine.

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