

FB2 Horticultural Containers for Export to Nepal

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## Part I- Product and Company Information

Plastic horticultural containers (FB2) are a solution for growers from Nepal in terms of harvest, storage and transport. The FB2 (Figure 1) horticultural containers are foldable, stackable, made with a fixed wall, vented sides (slots in the walls of the hard walls to allow air movement), and food grade plastic that are suitable for different types of produce (CHEP, 2014). The food grade plastic that the horticultural containers are made of cannot contain any plastics harmful to humans or dyes, but it may contain recycled materials. Food grade plastics tend to fall into the high-density polyethylene (HDPE) category and it also has spectacular chemical resistance qualities that allow it to be useful for many foods and in this case fruit and vegetable produce from Nepal (Great Western, 2014). In addition, these containers are waterproof and therefore reduce the produce's exposure to bacteria, and the warmer climate that could quicken the rotting process of the fruit (keeping produce cool). Also, the hard plastic material protects against pests that could threaten the produce being stored or transported. The pests could carry disease, trample the produce or consume the produce depending on whether the pest is an insect or an animal. Common insect pests can be found in Table 2.

While they are not being used the horticultural containers save space due to their ability to collapse to one third of their original size (CHEP, 2014). The containers are easily cleaned and reduce safety concerns because they are lightweight and therefore easy to work with (minimizing worker strain) (CHEP, 2014). It has a maximum capacity of 770 liters with dimensions of 1162x1162x780mm (millimeters) or 116.2x116.2x78cm (centimeters).

In order to manufacture these horticultural plastic containers a specific method

must be used, the one-step injection molding method. For this method the melted plastic is injected into the final mold that the object must be and this mold must be cold to facilitate a quick forming process. After the container is molded it is then released. All sides of the bin are made individually and then the sides are matched and connected together to form the finished product (O.Berk, 2014).

These containers are manufactured by CHEP (CHEP, 2014). CHEP began in Australia in 1945 and is operating today in over 50 countries (CHEP, 2014). CHEP's offices in Canada are located at 7400 East Danbro Crescent, Mississauga Ontario and 76 Wentworth Crescent Brampton Ontario. Their slogan is that they help find solutions for produce transport to help guarantee food safety while keeping container costs low (CHEP, 2014). Companies and business around the world use CHEP's horticultural containers and have had positive results since purchasing and utilizing them (CHEP, 2014). The containers are mainly manufactured and shipped from Australia where the company began and the large manufacturing facilities are located (CHEP, 2014).



Figure 1: FB2

## Part II- Benefits to Canada

Using the FB2s would benefit Canada through having a buyer in Nepal. If bought in mass amounts it would provide more job opportunities for Canadians due to the demand for the containers in Nepal. It would cause and export growth, trade diversification, a foreign investment in Canada and a manufacturing opportunity (EDC, 2014). Also, it would be positively contributing to the Canadian economy by bringing in money due to the new export. Not only Canada would benefit, so also would Nepal.

## Part III- Nepal Introduction

Nepal is landlocked between China and India and it is home to the famous Mount Everest and the capitol city of Kathmandu, which is all within 140 800 kilometers and it is populated by about 26.62 million people, and from this population about 80% occupies the rural areas of Nepal (Naturally Nepal, 2012) (Nepal, 2014). These areas of Nepal can be divided into 3 ecological zones, fertile plains that are known as the Terai region, mountains and valleys that are also called the Central Hilly region, and the mountain region (Nepal, 2014).

Nepal's main fruit produce includes apples, pears, peaches, plums and apricots (Deciduous Fruit, date unknown). These fruits are successfully grown in mid and high mountainous areas from the Eastern to the far Western zone of the country (Deciduous Fruit, date unknown). In these areas it is sub-humid and dry temperate where the elevation can range from 1800-2800 m.a.s.l. (Meters above sea level) and are considered to be most appropriate for particularly high quality produce production. In addition, the

humid temperate regions where the rainfall is high and the land wet, it can be decided that it is also suitable (Deciduous Fruit, date unknown).

Some of the yield is lost due to bad storage and transportation of the produce and therefore possible profit in rupees (Nepalese currency) for the farmers of Nepal is also lost (Deciduous Fruit, date unknown). A solution to this problem is horticultural containers otherwise known as the FB2s.

As shown in the table below (Table 1) the nutrition value that the Nepalese people are missing if their yields are down then the price of the produce goes up and some people in Nepal are unable to afford these necessary fruits (Health, 2014).

Table 1: Nutritional Value Certain Fruit

Fruits	Amount	Minerals Contained	Vitamins Contained
Apple	One medium apple with skin contains 0.47 grams of protein, 95 calories, and 4.4 grams of dietary fiber.	Potassium - 195 mg Calcium - 11 mg Phosphorus - 20 mg Magnesium - 9 mg Manganese - 0.064 mg Iron - 0.22 mg Sodium - 2 mg Copper - 0.049 mg Zinc - 0.07 mg Also contains a trace amount of other minerals.	Vitamin A - 98 IU Vitamin B1 (thiamine) - 0.031 mg Vitamin B2 (riboflavin) - 0.047 mg Niacin - 0.166 mg Folate - 5 mcg Pantothenic Acid - 0.111 mg Vitamin B6 - 0.075 mg Vitamin C - 8.4 mg Vitamin E - 0.33 mg Vitamin K - 4 mcg Contains some other vitamins in small amounts.
Peach	One medium peach (with skin) contains 1.36 grams of protein, 58 calories and 2.2 grams dietary fiber.	Potassium - 285 mg Phosphorus - 30 mg Magnesium - 14 mg Calcium - 9 mg Iron - 0.38 mg Selenium 0.1 mcg Manganese - 0.091 mg Copper - 0.102 mg Zinc - 0.26 mg Also contains small amounts of other	Vitamin A - 489 IU Vitamin B1 (thiamine) - 0.036 mg Vitamin B2 (riboflavin) - 0.047 mg Niacin - 1.209 mg Folate - 6 mcg Pantothenic Acid - 0.229 mg Vitamin B6 - 0.037 mg Vitamin C - 9.9 mg

		minerals.	Vitamin E - 1.09 mg Vitamin K - 3.9 mcg Contains some other vitamins in small amounts.
Pear	One medium pear contains 0.68 grams of protein, 103 calories and 5.5 grams dietary fiber.	Potassium - 212 mg Phosphorus - 20 mg Magnesium - 12 mg Calcium - 16 mg Sodium - 2 mg Iron - 0.3 mg Selenium 0.2 mcg Manganese - 0.087 mg Copper - 0.146 mg Zinc - 0.18 mg Also contains small amounts of other minerals.	Vitamin A - 41 IU Vitamin B1 (thiamine) - 0.021 mg Vitamin B2 (riboflavin) - 0.045 mg Niacin - 0.279 mg Folate - 12 mcg Pantothenic Acid - 0.085 mg Vitamin B6 - 0.05 mg Vitamin C - 7.5 mg Vitamin E - 0.21 mg Vitamin K - 8 mcg Contains some other vitamins in small amounts.
Plum	One cup of sliced, fresh plums contains 1.15 grams of protein, 76 calories and 2.3 grams dietary fiber.	Potassium - 259 mg Phosphorus - 26 mg Magnesium - 12 mg Calcium - 10 mg Iron - 0.28 mg Manganese - 0.086 mg Copper - 0.094 mg Zinc - 0.17 mg Also contains small amounts of other minerals.	Vitamin A - 569 IU Vitamin B1 (thiamine) - 0.046 mg Vitamin B2 (riboflavin) - 0.043 mg Niacin - 0.688 mg Folate - 8 mcg Pantothenic Acid - 0.223 mg Vitamin B6 - 0.048 mg Vitamin C - 15.7 mg Vitamin E - 0.43 mg Vitamin K - 10.6 mcg Contains some other vitamins in small amounts.

Source: health-alternatives.com

Table 2: Nepal Insect Pests

SN	Insects Name	Major Symptoms	Management
Temperate fruits: Peaches/Pears/Apples			
1.	Wolly aphid <i>Eriosoma</i>	They are a fruit sucker. They produce a dew like substance that allows	<b>Chemical method:</b> Agroservo oil can be used at 5mL/liter of water. <b>Biological method:</b> <i>Aphelinus mali</i> - a hymenopteron parasite also can be used

	<i>lanigerum</i>	for sooty mold to develop. In severe infestation, the affected branches show knots like structure.	to control. <b>Physical method:</b> Banding with the help of greasy substance above 50 cm from the ground level restrict the nymph to climb the tree.
2.	San jose scale <i>Quadraspidiotus perniciosus</i>	Suck the sap from new plant parts and the plant shows yellowing coloration. Develop a dew and sooty mold in turn.	<b>Cultural method:</b> Use healthy saplings. Cutting the affected branches. <b>Chemical method:</b> Use of Agro-servo oil at 5 mL/liter. <b>Biological method:</b> Scales are often controlled by small parasitic wasps and predators including beetles, bugs, lacewings, and mites
3.	Apple stem borer <i>Zeuzera spp</i>	Bore to the stem of apple by larva. Release of sawdust where it has affected.	<b>Chemical method:</b> Use of 1-2 drops of the kerosene oil in each hole. <b>Cultural method:</b> Plugging the hole. Cutting the affected branches and pasting with Bordeaux mixture.
4.	Tent caterpillar <i>Malacoxoma indica</i>	Makes a tent like webby structure in twigs and leaves. Defoliation of leaves take place.	<b>Chemical method:</b> Use neem based pesticide. Use the contact poison. <b>Cultural method:</b> Pruning and removing of small twigs that hold egg masses, before egg hatch. <b>Biological method:</b> Small beneficial wasps will parasitize the eggs, larvae, and pupae of this pest. <i>Bacillus thuringiensis</i> var. <i>kurstaki</i> (Bt) is effective in controlling early instar caterpillars
5.	Slug caterpillar <i>Caina spp</i>	It eats the tender leaves and leaves behind only the vein structure.	<b>Chemical method:</b> Use contact poison at 2 mL per liter. <b>Cultural method:</b> Collection of larva and pupa.
Plum			
1.		Causes severe leaf distortion on the foliage of all types of plum during April to late May.	<b>Chemical method:</b> Spray with thiacloprid shortly after bud burst. Zinc sulfate (36%) can be applied in early to mid-October to control this pest. <b>Biological method:</b> Important predators include: lady beetles can be used.
2.		Pinkish white caterpillar that excrements pellets inside ripe fruits.	<b>Chemical method:</b> Use of a <u>pheromone plum moth trap</u> . Spray with deltamethrin. <b>Biological method:</b> Inundative releases of the braconid wasp <i>Macrocentrus</i>

			<i>ancilivorus</i> provided an average 50% reduction in number of infested fruit.
3.		The young maggots that develop and tunnel their way into the developing fruit. The only signs at this stage are the tiny holes that were made due to the tunneling.	<p><b>Physical method:</b> loosen and turn the soil around the base of the tree</p> <p><b>Biological method:</b> Azadirachtin - A derivative of the Neem Tree, Azadirachtin is an insect growth regulator (IGR). It disrupts and speeds up the molting process of larval insects. It kills the insect when they try to molt to the next phase of life too soon.</p> <p><b>Chemical method:</b> use of soap and pyrethrin is effective. The soap will penetrate the insect's shell and kill it by dehydration. Adding Pyrethrin creates the organic equivalent of a 1-2 knock down punch. Pyrethrin is a nerve agent that will absorb into the insect and kill by paralysis.</p>

Source: Major insect-pests and diseases of major fruits available in Nepal Paper

On average, for example the costs of fruit in a Nepalese market is as follows in

Table 3 (Government of Nepal, 2014):

Table 3: Cost of Fruit in Nepal

Fruit	Unit	Minimum	Maximum	Average
Pear	Kg (Kilograms)	190	200	195
Apple	Kg (Kilograms)	125	160	143

#### Part IV- Shipping to Nepal

Due to the fact that Nepal is a landlocked country this product would have to be shipped by a Canadian airline. It could be shipped through FedEx freight shipping depending on skid weight and size or another shipping company depending on preferences of both the Nepal importer and CHEP. The containers would be manufactured and then be transported to the nearest and most convenient airport. Then

the horticultural containers would be shipped to the Tribhuvan International Airport (KTM). This airport is located in the capital city of Kathmandu and it is the only international airport in Nepal (Maps, 2014). In order to export to Nepal a phytosanitary certificate is required for any agricultural products (Air Bridge Cargo, 2012). After the transportation of the containers, and their success, the deeper benefits will come to light.

For transportation, if the shipping company were chosen to be FedEx the shipping would have to abide by the standards set by this company. The horticultural containers could be flown by International Priority Freight any day from Monday to Friday and then delivered to major markets (FedEx, 2014). The skid weight and size would have to stay under 70 inches (178 cm) in height and 119 inches (302 cm) in length, any larger and approval is required, also the skid cannot exceed 2200 lbs. (pounds), and for this product it would not, otherwise it also would require approval (FedEx, 2014). The skid that the boxes are shipped on must also be shrink-wrapped (FedEx, 2014).

Below is a flow chart (Figure 2) as to how the ordering and shipment of the FB2s will occur:



Figure 2: Shipping the FB2 containers

## Part V- Benefits to Nepal

The people of Nepal would benefit greatly from the FB2 horticultural containers. For example it would assist in helping to save the 30% of produce that is lost due to improper storage. It can be considered 'lost' if the produce expired, if fungi and/or mold affected it, as well, if pests destroyed the produce (Spotlight Nepal, 2013). These containers would keep their produce fresh longer due to the vented feature and would provide the produce with better conditions for shipping. This would hugely impact many lives due to the fact that 80% of Nepal's population has its livelihoods in agriculture and the product will be used throughout the year due to the fact that Nepal constantly has harvest times because of their environment (Rural Poverty, date unknown) (New Agriculturalist, 2009). Since the plastic used to make the FB2s is food grade plastic no food will be contaminated with any harmful chemicals, therefore not hurting anyone after harvest. Also, the containers are reusable minimizing waste and prolonging the benefits the container provides.

Currently the Nepalese people are struggling utilizing cardboard boxes and woven bags that do not protect the fruit as well as a hard plastic horticultural container could (IBISWorld, 2014). The cardboard boxes are able to rot away and their usage time is limited compared to the FB2 containers (IBISWorld, 2014). If the cardboard is damped by the juices from the fruit it will fall apart and more produce will be lost (IBISWorld, 2014). Insects can also easily get into the produce through the woven part of the bags. In addition, the cardboard boxes cannot hold as much weight as the FB2s and in turn are not stackable (IBISWorld, 2014). The FB2s would help fix all of these problems previously listed.

### Part VI- Purchasing

Money spent on FB2 containers would pay themselves off through the money earned off of the saved produce. Also, this product will be easily marketed to Nepal, mainly by its benefits. It will hopefully be used initially in the dense agricultural areas and its success will spread by word of mouth or marketed by sales personal to the farms. For example, each farmer would begin by purchasing three containers to test the product and then purchase additional containers to suit their needs.

Currently the price of the product is unknown due to the fact that the company has not yet answered my personal communication emails. Although the price can be estimated at around 25 to 30 dollars Canadian which is about 1372.82 to 1647.38 rupees. One Canadian dollar is about 54.91 rupees currently.

### Part VII- FB2 verses Competitors

Company	Product	Similarities to the FB2	Differences to the FB2
Viscount Plastics	MacroBin 16 and 24 series (Figure 3)	Vented plastic, food grade plastic, waterproof, easy to clean, and lightweight.	546mm (54.6cm) tall box while the FB2 is 780mm (78.0cm), non collapsible.
Loscam	Produce Bin (Figure 4)	Stackable, vented sides, and easy to clean.	Non-collapsible, and hand holds for when it is empty.
Alison Handling	Stacking Crates (Figure 5)	Stackable, and vented sides.	500 mm x 300 mm x 201 mm while the FB2 is 1162x1162x780mm.

Sources: (Viscount Plastics, 2014), (Loscam, 2014), and (Alison Handling, 2014)

Refer to Figure 1 for comparison.



Figure 3: MacroBin 16 and 24 series  
(Viscount, 2014)



Figure 5: Sacking Crates  
(Alison Handling, 2014)



Figure 4: Produce Bin  
(Loscam, 2014)

#### Part VIII- Positive Results of FB2s

If they do not choose to use this product it will still open their eyes to the range possibilities of safe storage and transportation for their produce and will allow for them to make changes and improve their current systems that they utilize for their produce storage. If they choose to use this product will help change lives and will impact the country of Nepal in a multitude of ways and due to the positive results that the product will cause I am strongly recommending the consideration of the FB2 horticultural containers to Nepal as a new import.

#### Part IX- Summary

Overall, the FB2s will provide Canada will multiple benefits (mainly economically); as well it will provide Nepal with benefits in their agriculture sector.

Transportation will be done through a Canadian shipping company to the capitol city of Nepal, Kathmandu (Nepal, 2014). Once the horticultural FB2 containers arrive in Nepal they will be distributed and they will begin to assist the people of Nepal by helping to save the 30% of yield that they lose per year in fruit harvest (Spotlight Nepal, 2013). The FB2s would improve Nepal's current agriculture system greatly and would allow them to see ways of improvement for they systems. The FB2 horticultural containers manufactured by CHEP would be a wise investment for the country of Nepal.

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