The Export Potential of a Drip Line Irrigation with a Supplementary Fertilizer Injector

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This piece was developed to provide information of the potential export of a drip line irrigation system with a supplementary fertilizer injector. Below, there will be many different positives and negatives outlined in two general sections. The first general section is all about the product information and Nepal. In the second section, all regards to exporting the product will be outlined as well at the benefits to Nepal. Finally, a general conclusion summary of the paper is provided to approve or disapprove the system for export.

Part I: Information Regarding the Drip Line Irrigation System with a Supplementary Fertilizer Injector. As Well as a Brief Introduction to Nepal.

i) Introduction to Nepal

Nepal is a developing country with many diverse issues and challenges. The estimated population is roughly thirty-one million people (The World Factbook – CIA, 2015). The mountainous region of Nepal is landlocked between India and China (The World Factbook,- CIA, 2015). There are three specific ecological regions to Nepal. The Terai region is referred to as the plains of the country, containing the most productive land in the country (The World Factbook – CIA, 2015). Then there is the hills and flatlands region located in between the Terai and the Mountains (The World Factbook – CIA, 2015). Following these, there is the mountainous region of the country that contains the Himalayans (The World Factbook – CIA, 2015). These mountains make farming very difficult and the only simple and productive method of agriculture is called terrace farming. The total landmass of Nepal is one hundred and forty seven thousand one hundred and forty-one square kilometers (Pariyar, D.,

n.d.). Approximately twenty one percent of the total area is under cultivation for agricultural purposes (Pariyar, D., n.d.)

ii) Nepal's Irrigation Systems

Agricultural irrigation within Nepal is present, but is not in a good state. Nepal requires a very specific, low cost irrigation system due to different environmental and community based issues. Some of these environmental issues would be pollution and nutrient run off (Bhandari, R., Pokharel, D., n.d.). Pollution of rivers from different sources such as vehicles, chemicals and factories can cause serious damage to crops. Damage to crops can be caused by the use of most common irrigation "Farmer managed systems" (Bhandari, R., Pokharel, D., n.d.). They are inefficient methods to irrigating crops as they are very labor intensive and requires a plethora of maintenance (Bhandari, R., Pokharel, D., n.d.). Despite this, the systems are generally quite simple. As well, they often do not need any other source of energy aside from gravity, and do not contain any complex filter system (Bhandari, R., Pokheral, D., n.d.). This will make the entrance of harsh chemicals and destruction of crops easier, causing a reduced yield for the farmer. Nutrient run off is an issue in the agricultural industry around the world today. Nutrient run off is the fertilizer flowing from the field into a water system (Figure 1) (What is nutrient pollution?, n.d.). These can be caused by over irrigation, improper application of fertilizers, or heavy rainfall (What is nutrient pollution?, n.d.). This can cause issues because the polluted water system may have a direct route to a drinking water outlet. The community-based issue faced is the introduction of modern agricultural technology to older style farmers in Nepal. Examples of this can be related to the

information provided above, the “Farmer Managed Systems”. Another issue is that locals have categorized modernization as expensive. The Nepalese people may perceive it this way but the irrigation product proposed is quite inexpensive and more efficient compared to tradition methods.

iii) Information Regarding Drip Line Irrigation with a Supplementary Fertilizer Injector System

A drip irrigation system is proven to be more efficient than the sprinkler type systems for various reasons (Figure 1.5 below) (Drip Chemigation Basics - Drip Irrigation., 2013, October 22). The name of the system is the Thin Wall Streamline 820 series from Vanden Bussche Irrigation (Bussche, V., n.d.). It is very versatile and comes with a variety of wall tubing thicknesses. These different exterior walls are six, eight and ten millimeters (Bussche, V., n.d.). The six-millimeter tubing has been selected for cost efficiency and to ensure proper pressure throughout the system. The interior diameter for this six-millimeter system is 0.820 inches (Streamline series, n.d.). The Drip Line system that is purposed is easily

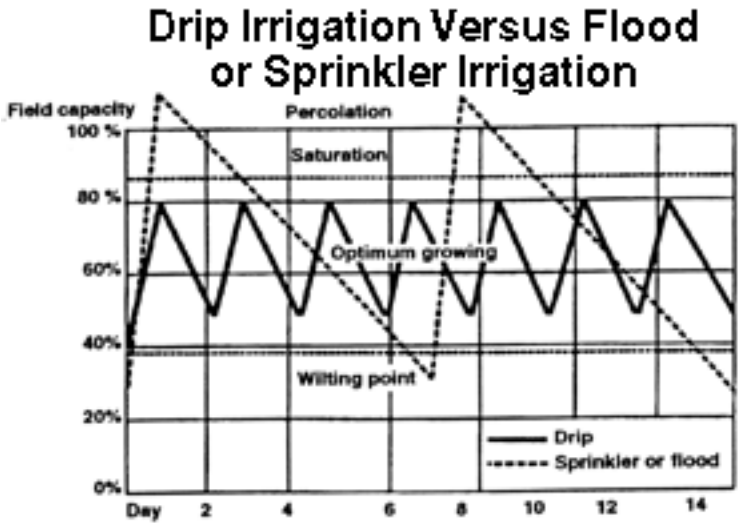


Fig 3. Drip irrigation, with its high frequency-low volume watering, keeps a much more efficient soil-moisture level than does sprinkler or flood irrigation. It is also much more adaptable to the use of automated watering systems

adapted and can be used in a far more modern method with the use of a gas or electric pump. As well it can be modified to run off gravity fed systems for using rain or river water. A very important benefit is the fertilizer injector is strictly water driven system (Bussche, V., n.d.). In a gravity fed method the system runs from the water source or a valve. The water source can either be natural (river, rain barrel, lake) or a piped water source with a valve. Following this, it runs through the backflow preventer. The backflow preventer is installed to prevent contamination or pollution due to backflow of water (Bussche, V., n.d.). Next the water goes through the pressure regulator and the filter. A pressure regulator only allows the water to run at a certain level, if it goes above the allowed pressure the water is cut off. The filter is there to eliminate bacteria and other negative soil nutrients. Then the fertilizer injector is set in place, allowing only a selected amount of fertilizer to be added to the water. The injector will provide the perfect ratio of water-fertilizer solution directly to the root of the plant (Bussche, V., n.d.). This will reduce the environmental issues of nutrient run off and help minimalize pollution. Following this, the tubing adapter is applied to connect the system to the Drip Tubing. It then heads down the main drip line, and into the sub-main line and into each individual drip tubing line. Then down the drip tubing, there are emitters that act as a water excretion system for the solution (Streamline solutions, n.d.). The emitters are generally eighteen inches in separation (Streamline solutions, n.d.). The system is identical when the use of an electric or gas pump is set in place. The pump is placed before the fertilizer injector and after the filter.

IV) Canadian Company and Benefits to Canada

Vanden Bussche has provided Canada with very high tech and cost efficient products for over sixty-one years (Bussche, V., n.d.). Vanden Bussche Irrigation is the Canadian company that is producing the drip line irrigation system for exporting. The company has offices located all around Ontario. Their head office is located in Delhi, Ontario and others are located in Milton, Scarborough, Concord and Ottawa (Bussche, V., n.d.). Gerard and his son Roger Vanden Bussche established the Company in 1954 (Bussche, V., n.d.). At the time Roger was a recent graduate of the Ontario Agricultural College and was beginning his career in the family business (Bussche, V., n.d.). Currently Rogers's son, Marc Vanden Bussche, is the acting president after the passing of his father and grandfather (Bussche, V., n.d.). Marc Vanden Bussche has a goal of making the Vanden Bussche Irrigation and Equipment Limited Company a national leader in the field (Bussche, V., n.d.). As this being a company based out of Canada, our country will profit greatly. The benefiting areas are the economy, Vanden Bussche Irrigation, and our political reputation. The economy is boosted from the sale, usage and exportation of a Canadian product. Vanden Bussche is benefitting from increased sales, greater gross domestic product (GDP), and a larger international name in the agricultural field. The export of a Canadian product to a developing country can improve our international political reputation. In doing so, this could potentially open new markets with importing and exporting countries and companies.

V) Thin Wall Streamline 820 Series Product Price's

The Streamline 820 series developed by Vanden Bussche Irrigation has certain costs for purchasing. The six-millimeter wall thickness comes in nine thousand foot (9000 Ft) rolls, but the product is priced per foot (Streamline solutions, n.d.). Around fifteen cents ($0.15) per foot for this specific product (Personal Calculation). Using the information above, the price per one thousand feet would be one hundred and fifty dollars or eleven thousand nine hundred and eighty one rupees (Streamline solutions, n.d.). This would be the most efficient size to transport and sell the product. These rolls will not be used completely as it can be cut and sold per foot for twelve Nepalese Rupees. Although this is a quite expensive product it can be purchased by a village and used in small-scale operations where many members of the community can benefit from it (Figure 2).

Figure 2 *(Not to scale)*

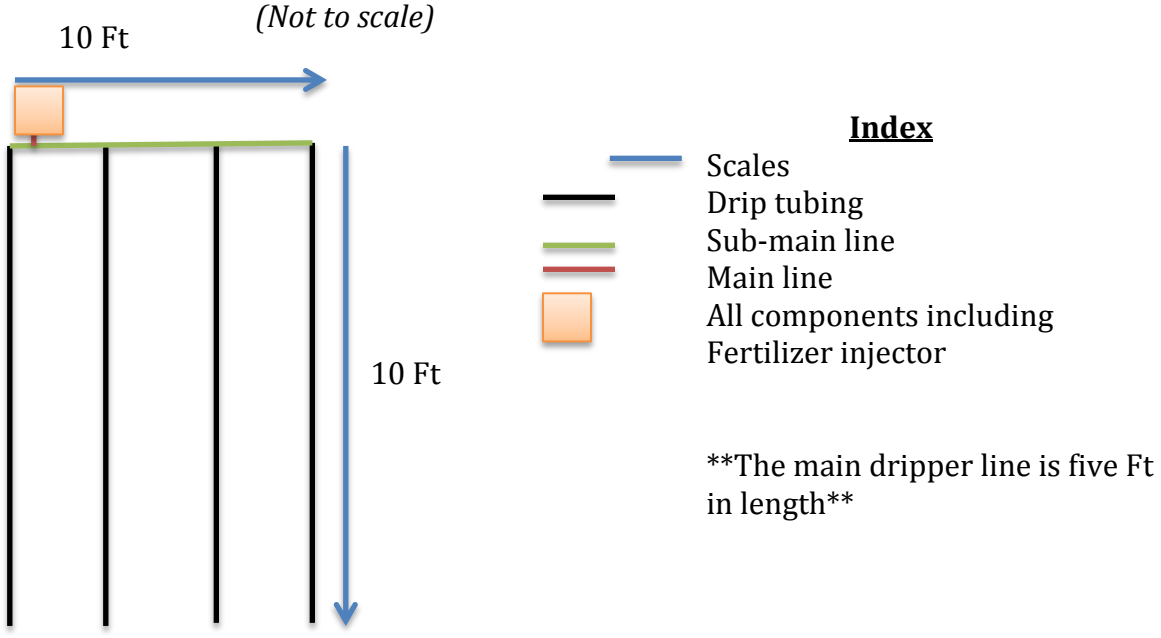


Figure two shows an example of a small-scale strawberry operation that can be found in Nepalese areas. There are all the components to hook the system up from

the water source to the main drip line. The tan square box in the diagram represents these applicators and the fertilizer injector. The price for all the applicators and the fertilizer injector is four hundred and twenty six dollars and seventy-one cents Canadian (Figure 3) (Bussche, V., n.d.). The fertilizer injector is the MixRite system made by Vanden Bussche Irrigation (Figure 4) (Bussche, V., n.d.). This system may be quite costly for Nepalese farmers but this system only requires energy from the kinetic force of the water. The water drives the pump and that mixes the water-fertilizer solution before it is injected (Dema, n.d.). Then the system goes to the main drip line that is five feet long (5 Ft). Then through a T adapter to the sub-main line and runs through all adapters into the four drip tubing lines, which are all ten feet long (10 Ft). The four drip lines are thirty inches in separation to replicate a real strawberry patch (Small Fruit Crops for the Backyard - University of Illinois Extension., n.d). This system will have a total of fifty-five feet (55 Ft) and will cost eight dollars and twenty-five cents Canadian, costing six hundred and fifty nine rupees. The whole system will cost approximately forty two thousand three hundred and ninety seven rupees and ninety-one cents (□□42, 397.91).

Figure 3

Drip Line Irrigation System with a Supplementary Fertilizer Injector Components	Cost Per System (Canadian Dollars)	Cost Per System (Nepalese Rupees)
Backflow Preventer	$5.25	□□419.51
Pressure Regulator	$11.79	□□942.10
Filter	$13.98	□□1117.10
Master Tubing System Adapter	$4.50	□□359.58
Drip Tubing and Adapters	Adapters - $45.87 Drip Tubing - $150.00/1000ft Drip Tubing - $0.15/Ft	Adapters - □□3665.34 Drip Tubing - □□11986.06/1000ft Drip Tubing - □□11.99/Ft
MixRite Fertilizer Injector	$350.00	□□27967.48
Emitters	$4.96/Emitter	□□396.34

Figure 4

VI) Market Opportunities

This product is looking to be broadcasted amongst a very vast market. Around seventy percent of Nepal's total population is involved in agriculture, setting a very wide market (Nepal | Agriculture and Food Security | U.S. Agency for International Development., 2015, November 20). That means there are of the twenty nine point two million people around twenty million four hundred and forty

thousand (20,440,000) potential consumers. Another large issue is the fact that an average Nepalese salary is forty five thousand five hundred and thirty eight dollars and seventy cents (□□45, 538.70). This leaves a very slim margin between the average salary and the gross cost of the system, making it a difficult but possible purchase for farmers.

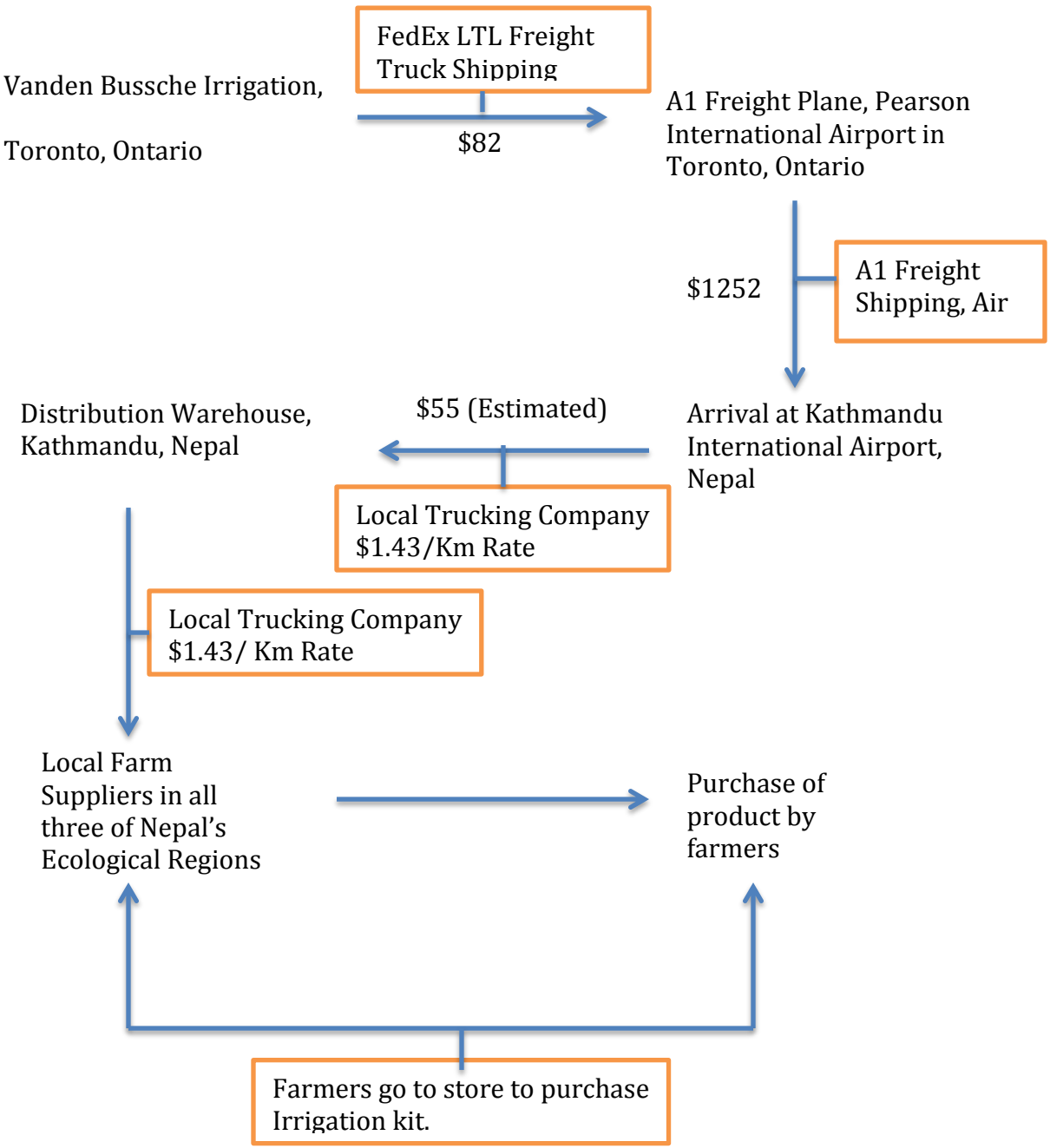
Part II: Exporting Potential and Benefits to Nepal

i) Transportation Logistics

The shipping of products to Nepal is not an easy task; it comes with high costs and takes many different steps. Despite that, the products are quite durable and no fragile care will be necessary during transportation. Vanden Bussche Irrigation has many different supply offices around Ontario. The one that has been chosen for lowest shipping cost is the Concord, Vaughn, Ontario location (Bussche, V., n.d.). It will be shipped on a forty-eight by forty-eight inch skid with ten, one thousand foot rolls on it. Along with all the applicators, filters, fertilizer injectors and other parts. The total shipping weight is one hundred and seventeen pounds with the skid included (117 lbs.) (Shipping quote., n.d.). The product will travel from the warehouse via FedEx LTL freight truck and arrive at the Pearson International Airport in Toronto, Ontario. This route will take the truck twenty-five minutes dependent on traffic. The cost of this move is estimated to be around eighty-two dollars ($82.00) per trip (Get rates and transit times, n.d.). Upon arrival at the airport the skid will then be loaded onto the A1 Freights plane and sent too the Kathmandu International Airport, Nepal. The cost of this shipping will be one thousand two hundred and fifty two dollars ($1252.00) (Shipping quote, n.d.). After

some time, the pallet will arrive at the airport in Kathmandu, Nepal and will embark on its final journey. From there via truck it will be transported to a separate distribution warehouse in the city of Kathmandu. The cost of this is still varying but the average price for shipping is one point four three dollars Canadian per kilometer ($1.43/km) (Personal Citation). From there, they are sent to local agricultural supply stores for essential and easy access for farmers (figure 5). The same shipping prices apply per kilometer.

Figure 5 (Chain of Transportation – Supplier to farmer)



ii) Cost Analysis and Profitability

Looking deeper into the potential profit some alarm bells have gone off in the input costs against the output costs category. Digging deeper we look at the total cost which is fifty six thousand eight hundred and eighty five rupees (□□56, 885). By calculating a total and subtracting by number of systems shipped created the shipping costs. Then adding the shipping cost to the base price of the system to get a total. This would be leaving the company at a profit if all systems were sold. If all systems are not sold, the Canadian company can use different methods to break even and maintain profitable. Ways of doing so would be selling equipment separately instead of selling as a whole system to attract new potential consumers. A very beneficial partner in this exporting process will be the Canadian Trade

Commissioner Service (TCS) (Government of Canada, May 7, 2013). This service will be along side Vanden Bussche to provide market evaluations, and expert advice to product marketing and tariffs involved.

iii) Economical Benefits for Nepal

Nepal is a developing country and with that comes a struggling economy. This means a lower gross domestic product (GDP) and a smaller economy. To grow and become larger, new international connections and trade partners must be made. As the economy grows, so will the standard of living, minimum wage and the

average salary. In doing so, the possibility of Nepal maybe one day outgrowing the developing stage grows larger. A good way to do so is by importing new commercial products that will affect the largest sector of employment. In Nepal's situation that would be the agricultural field, which is currently holding seventy percent of all residents employment (Nepal | Agriculture and Food Security | U.S. Agency for International Development., 2015, November 20). Some other benefits would directly impact the farmers. They would be provided with a slightly more modernized and efficient method to irrigate crop. Possibly this could increase crop growth in dryer areas of the country and thus producing a higher yield. When a higher yield is produced more of the is crop viable for sale to markets and other local consumers. Improving all lives that are involved in the agricultural field.

IV) Recommendations, Marketing Strategy and Conclusion

The marketing strategy behind the sales of the Drip Line Irrigation system is providing the right information and the correct time. Before the product is imported, local farm suppliers will be contacted with information. They will be provided with a premeasured discount to entice consumers about the product. Upon the arrival of our product a trained employee will be alongside to provide instruction on how the system works and talk to local farmers one on one. This employee will also be providing individuals with all background information needed. If all goes as planned, the farmers will be quite enthusiastic regarding the product and sales will be boosted. This means raising Vanden Bussche Irrigation's profit margin as well as helping the local Nepalese people in more that one way. Despite this, the profit margins do not seem to be the Canadian economies favor. An

easier way for the Nepalese people to receive better irrigation for their crops would be a modified and less costly system similar to the one proposed. An example would be a system that uses garden hoses, a water barrel and bamboo (figure 6) (Drip Irrigation, n.d.). As seen in the figure below, the system is very low cost and still shares similarities with the Vanden Bussche system. The rain barrel is a very inexpensive and easy to use. Seeing as Nepal has a very high level of rainfall; on average they receive one thousand and five hundred millimeters (1500 mm) (Average precipitation in depth, n.d.). This would prove as a very effective water source to the system. Following this, the running of a garden hose to connect the water source to the drip tube. With the correct size of garden hose the pressure and water flow can be properly managed (Drip Irrigation, n.d.). A shut off valve would have to be set in place to shut the system off to reduce the risk of over irrigation. Then the drip tubing is set in place along the bed lines. It is made up of bamboo, a very common resource found in Nepal. This resource is known for its durability, abundance and adaptability. Bamboo has been used for many different things for thousands of years, including the building of houses. As well, the inside of bamboo is hollow which allows for water to pass through (Drip Irrigation, n.d.). There are roughly thirty different strands of bamboo found in the Country. Making this resource very accessible for farmers, it could either be purchased or traded for. Still, the best part of using bamboo for our drip lines is the adaptability of the plant. A simple emitter for the water to be released from can be carved and inserted to directly apply water to the root of the plant (figure 6) (Drip Irrigation, n.d.). An easy way to keep dirt and grit out of the system is to place a small piece of cloth, or a

stone over the emitter to act as a screen. Another easily accessible item to all to the system is a rain barrel cover. This cover can be made of next to anything, thus so when it is full, the addition rain water does not cause breakage. This would lower maintenance and farmers overall costs. To conclude, the system I have provided would not make sense in the form that it is too costly based off the average salary. The recommendation provided above for a new "Farmer Managed System" (Figure 6) would work very well and save money. This system would also have mostly all the benefits the provided system would aside from the fertilizer injector and other applications.

Figure 6

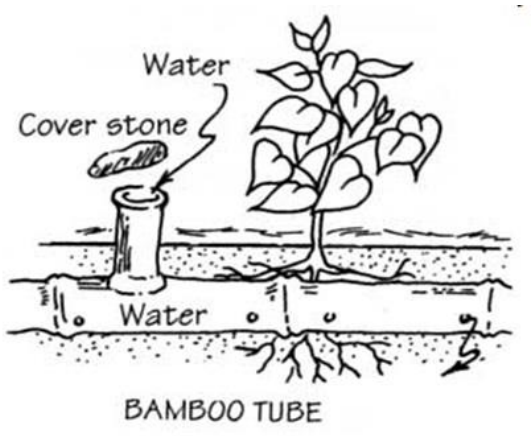


Figure 6 shown above is a brief visual description of potential substitute product for the local farmers.

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