

Two Person operated Hand Cultivators

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Nepal

In 2015, on April 25, Nepal was hit with a 7.8 magnitude earthquake that resulted in thousands of casualties and thousands of injuries. Following the first earthquake were many more, still significantly large aftershocks with the largest being a 7.3 magnitude aftershock on May 12 of the same year (BBC, 2015). Even still today the Nepalese are still recovering. Nepal has an average GDP of \$694.10 USD meaning on average each person in Nepal lives on a little less than two dollars a day. If this earthquake somehow damaged their own livelihood, then those specific Nepalese could be in trouble. The university of Guelph in collaboration with other sources created a project called SAKNepal, which researches into better agricultural techniques that can be used throughout the developing world (Global Affairs Canada, 2016).

Product information

The two-person operated hand cultivator is a product that should allow Nepalese farmers to be able to cultivate their land much quicker and more efficiently. The product itself is comprised of 2 wheels at the bottom of the device, angled inward to move and churn the soil into rows. Up from the wheels would come two handle on opposite sides for two people to operate the device, simultaneously cultivating and rowing the soil.

The product being proposed currently isn't a product on the market. This product is only in the design phase and still needs to be developed and tested but still many key elements were able to be estimated and thought of. Rough prototypes of this piece of equipment estimate the

wheels will be 15 to 20 inches in diameter and the entire piece of equipment will require around 900 square inches of material. 22 gauge G90 galvanized sheet steel produced and sold in Canada will be used at \$24.36 per 900 square inches (Metal supermarkets, 2016). The steel for this product doesn't have to be extremely thick, the qualities that were being looked for was just to be sturdy and be able to hold its shape once pressed into shape. The metal would be source from a company called Metal Supermarkets which has over 75 stores north America wide and has 22 stores in Canada.

Other costs for this product would include the cost to press the sheet steel into the desired shapes, so the shape of the wheels and the shape of the handle and all the rest of the piece of equipment. Due to this product being in the design phase still it was hard to find a company that would press the steel into shape. What will be needed when it comes down to it is a press large enough to accommodate the sized wheels and shapes that are needed to be pressed. As well as a die mold would have to be made in order for steel to be pressed into the desired shape over and over again. Depending on the number of products that would end up being sent to Nepal the companies involved would see increases in sales which in turn could result in more jobs for Canadians. This concept of helping nations in need will also bring good publicity to Canada as a helpful nation. The inputs of this product would be the steel itself, the labor involved in transportation to the company that will eventually press the steel into the different parts of the piece of equipment, and operating of the machines to press the steel. Overall the cultivator will boost sales of companies possibly seeing an increase in employment while providing Nepalese farmers with a good product.

This cultivator will allow farmers to do work much quicker and more efficiently so they have more time for their other inputs of farming. All the parts necessary to build this piece of

equipment will be able to be held together with basic nuts and bolts so the construction of the product on Canadian soil would just be wasteful for shipping purposes. To go along with the product would then have to be extremely basic instruction, possibly including pictures depicting how the item would have to be put together. Products will have to be shipped to India and then trucked into Nepal because Nepal's location geographically. A shipping container from Toronto to India would be around \$4500 (Freight Forwarding, 2016), that does not include getting that shipping container to Nepal. Since most men in Nepal leave the home trying to find jobs that pay more and are better than average farming, women and children have the work load of the farm. This product will allow the cultivation of the family's farm land to be much easier and faster. This product could be sold in any number of locations in Nepal like places where Nepalese farmers purchase seeds or where tools are bought to work the land. Realistically this product could cost no less than \$45 Canadian unless the government began to subsidize this product. Obviously, that is rather expensive for families living on less than 2 dollars a day so this product might be more of a village owned item. This product could increase productivity of Nepalese subsistent farms so that more money could be brought in for the family.

Once the product has reached Nepal it would then need to be sold in stores. What makes most sense would be to attempt to sell a couple of the items to remote general stores and farm supply stores to first gauge the public reaction for the product. The product cost of the estimated \$45 dollars Canadian equates to 3678.50 Nepalese rupees so testers could be sent out to small villages to showcase what the product could truly do to their fields. The showcase of the product could allow the village to gather and decide if they could as a whole group go and purchase the item to minimize the risk, share the item and as well share the cost. Once this test proves

success the order can be sent back to Canada to produce more and ship more products over to Nepal.

Compare and contrast Other Canadian Made products.

There are other soil cultivators sold in Canada that should be looked at before deciding on manufacturing the suggested product. If one were to look on HomeDepot.ca there are a good number of different soil cultivators. One manual cultivator is called a Fiskars Rotary cultivator. Retailing for \$37.98 Canadian, the product has a long handle with 6 spiked wheels at the bottom that aerate and churn the soil (HomeDepot International, 2016). Comparing the Fiskar to the suggest product, although the Fiskar cultivates the soil it does not get the soil into rows and for that an addition of a rake would be needed. Other products sold in Canada would be battery and gasoline powered tillers but are over expensive and could not be considered. Simplistic rakes are also sold from between \$12-\$30 and would require a lot more effort to till an entire field with.

Compare and contrast with products from different nations

At the end of the day the best product in the eyes of a Nepalese farmer will more than likely come down to cost. Living on less than two dollars per day a cheaper option would most likely be favored if it came down to needing a new tool for the farm. So, during the research into the two-wheeled cultivator it was in good measure to also look into other products from other places in the world. A website call Alibaba.com had many different kinds of soil cultivators for various prices. One product the stood out was called a long handle manual hand rotary soil garden cultivator (Lee, 2016). This product is manufactured in Zhejiang China, which is located in the south-eastern area of china, close to the East China Sea. The product from the website consists of a long telescopic handle that is attached to 6 wheels with numerous spikes coming out from each wheel. To operate this product, it is run over the surface of the soil aerating the soil as

well as mixing and churning the soil. Comparatively this product does not line the soil in rows but from the pictures it does look like it does a good job aerating the soil. From the website it says that a minimum order of 1000 products and even though the website doesn't clearly state the price of the item, it is with best estimates it looks like the product will cost \$15 each USD. As well the products will have to most likely be shipped overland to Nepal which is a distance of nearly 3400 kilometers. Other items on the website included gas powered tillers and such things but they would be more money than the average farm could even think of spending. As well, products that requires inputs such as fuel would be very expensive to keep running.

Benefits of cultivation

Some may question if this product truly has a market or solves a problem for subsistence farmers. Even though there has been a lot of research into no till farming and ideas similar, there are still a lot of benefits to cultivating soil before planting. As this product goes along through the field it churns the dirt as the wheels pass through. This churning of the soil loosens the dirt which benefits root growth in plants due to the ease the roots will have passing through the soil getting deeper and larger. Any larger organic materials that may be lay in the dirt can now be further incorporated into the soil so as it continues to decay and release nutrients, the organic matter is closer to the roots of the crop so the nutrients can be better utilized. With the soil being loosened any rainfall will better penetrate the soil instead of just sitting on top the earth or running off. (Lee, 2014)

Benefits to Row Planting

Row planting is the practice of planting crops in straight rows and this practice would be especially easy with the use of this suggested product. As said before as the wheels pass through the soil in a churning motion, the wheels also guide the dirt into a row. So, with a couple passes

with the product, row planting could happen right afterwards. There are benefits to planting in rows other than just aesthetics, for one, the rows could be angled in such a way to match the travel of the sun. Planting in an east west direction would allow light to reach all plants, minimizing other crops shading out crops to allow even growth in the field (Bareja, 2011). Planting in rows allows easier access to the growing crop, being able to walk through the rows and weed, or remove troublesome infected plants. As well as light being able to pass through, planting in rows increases the airflow in between the rows, this can increase the gas exchange of the photosynthetic process. The air flow also limits the level of humidity within the rows which could decrease the growth of fungi that thrive in humid environments (Bareja, 2011).

Now these benefits are good for the plants that you are trying to grow but they also aid the growth of unwanted plants such as weeds. Like said before, having the crop in rows will allow easier access to different parts of the field. Having the crops in rows, allows for bare strips of dirt to be between each row. These strips of dirt would then be easy for a weed to thrive in, but being in rows, the farmer now does not need to selectively weed, because he or she knows that between the rows would just be weeds. The use of this product could also make it easier from farmers to implement other new agricultural techniques that could further increase yield. One technique such as intercropping, could be easier because the rows allow for organized intercropping in the field. Another technique could be planting beneficial cover crops between the rows like planting a legume between the rows which would also increase the nitrogen in the soil.

Using this product as well as incorporating other agricultural techniques could help Nepalese subsistence farms become more productive and aid in a higher crop yield. This in turn

could increase the amount of money in the home and would then better the lifestyles of everyone within the home.

The type of agriculture that occurs most often in Nepal is subsistence agriculture, meaning just growing enough fruits, vegetables and meats to support feeding the family. Any excess crops are sold or traded so other things that need to be attended to around the home and farm can get attention. But this way of only growing what is needed can have problems if the farm land is in drought, effected by insects or fungi, or lacking key nutrients. If any of this happens families can go hungry and even starve, lacking key nutrients for daily human functions and leading to an unhealthy lifestyle.

Summary

What must be remember about all of this information is that the proposed product still is an idea. So all of this is a large proposal of all of the benefits of having this product being manufactured and sent to Nepal. Overall the biggest obstacle to overcome would be cost, because the product could realistically not be sold for under \$45 Canadian. That amount of money for a Nepalese family would be a large sum so this product could be marketed as a village tool that could be shared so that the costs could be shared. This item in the scheme of things would work extremely well with other agricultural techniques to go along with it. Planting in rows has many benefits and also leads to many opportunities such as the use of cover crops or intercropping techniques. The other barrier this product may face is the simple fact that it is not a product yet. There would still have to be a lot of money put into this idea to find out if it is truly feasible and entire marketing, manufacturing and finite transportation systems would have to be put in place to finally get the item to Nepal. With all that being thought of Nepal still is a very poor country with a large majority of its population involved in agriculture and specifically

subsistence agriculture. This proposed product could in fact increase crop yields and contribute to a better, more sustainable lifestyle that could one day completely revolutionize Nepal. So at the end of the day this idea could be the idea to transform the live of Nepalese farmers, and maybe even Nepal itself.

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