Manure Tea: A Cost Effective Fertilizer for Nepal

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Section 101

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Introduction:

Students in their first year of a Bachelor of Science in Agriculture at the University of Guelph, in Ontario, Canada study many different industries throughout their course. These students were asked to present a tangible product to help agri-food producers in Nepal. The objective of this assignment was to devise a unique strategy using this product that would help these Nepalese farmers in their everyday agricultural production applications. Things to consider when recommending their product include the terrain, climate, and existing needs concerning Nepal's agriculture. The costs of things such as transportation, exportation of the product itself are also critical factors to consider when suggesting an idea. It is also important not to forget about the cautions and some possible struggles that could accompany the idea and how they can be successfully avoided. Overall, what was expected of the students was to come up with a practical export idea that will provide more sustainable practices in the agri-food industry of Nepal.

About Nepal:

Nepal is a small nation located in South Asia, directly below China and above India. The climate in Nepal can vary greatly. In the harsher northern regions of the country the summers are somewhat cool and the winters are severely cold. While in the uniformly level southern regions it is almost the complete opposite, with tropical summers and mild winters. The temperatures in a Nepalese summer can vary greatly also ranging anywhere between 19 -35° C, while the temperatures in their winter range anywhere between 2 - 12°C. Nepal has an extensive terrain that

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includes southern flat river plains in the south, relatively hilly regions in the central areas, and rugged Himalayan mountains in the north (Naturally Nepal, 2012). Nepal is also the home of the world famous Mount Everest.

The agriculture in Nepal is key for the nation's development (Department of Agriculture, 2014). With heavily increasing populations and tragically limited land, Nepal is also one of the world's poorest countries. Agricultural holdings are limited and some harshly uneven terrain makes for difficult to manage farmland due to its poor quality soils (IFAD, 2014). All these factors, and an understanding of the environment of the country of Nepal need to be taken into consideration when presenting an export idea for the country's agri-food system.

Nepal's Needs:

Nepal is in need of a more sustainable, affordable and cost efficient type of fertilizer to be used on crops. The improvement of composting practices and soil health and fertility are also a large need of the country. The existing fertilizer is too expensive, and exceedingly hard to come by for the average Nepalese farmer in need. Although these fertilizers are chemically engineered and quite efficient, they are not as environmentally safe to use on crops or to be handled by the farmers. These fertilizers can also negatively impact the agri-food system and diminish its sustainability (K.C. Paudel, 2014). Therefore, Nepal is in need of a sustainable way to fertilize their crops, which will not break the bank of any farmers, or have any harsh effects on the environment, specifically the soils.

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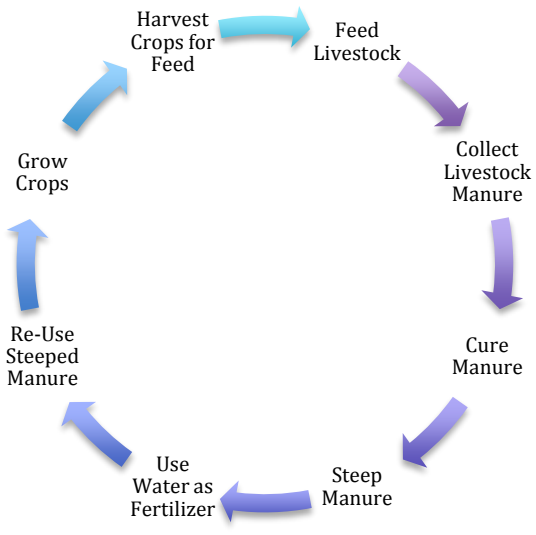
Export Idea:

The idea that is being proposed in this paper is for small scale Nepalese farmers to use "manure tea kits" to produce a sustainable type of fertilizer. The product being exported would be the "manure tea kit", while the use of them is the most important to fill the need of these Nepalese farmers. Because the operation of producing manure tea is easy to do, and more cost efficient for the average farmer, it will greatly donate in the making of a more sustainable agri-food system. Outlined in Figure 1 below is the cycle of using manure tea as fertilizer. This cycle is the reason that this idea can be considered sustainable for the farmer. Due to the fact that any livestock rearing farmers already have manure as a resource, this idea gives a purpose to an other wise useless form of waste and gives it the ability to donate nutrients to the plants and soils being grown by the farmers aswell.

Figure 1:



This is a graphic showing the cycle of the sustainable use of livestock manure as fertilizer for crops.

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Product Description:

The product being suggested is a kit to be used in the production of manure tea. This "manure tea kit" involves products such as buckets, gloves, burlap bags, and a plastic watering can like the ones shown in below in Figure 2 below.

Figure 2:

These are examples of what items would be included in a manure tea kit. From left to right, Figure 1 shows a watering can, gloves, burlap bags, and a five-gallon bucket.

These products are all necessary in the conventional making of manure tea. Gloves should be worn to protect the hands from any harmful bacteria in the manure being handled. Burlap is used as a form of "tea bag" for the manure during the steeping process. The five-gallon bucket may be used as a receptacle to steep the bag of manure with water in, although when the practice of making manure tea becomes more substantial, larger receptacles such as bins or troughs may be used for this purpose. And finally, an apparatus such as a watering can would be used in the spreading of this organic fertilizer. These are all relatively inexpensive materials and the cost of a kit including multiple sets of each item would only amount to a

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mere 30.00 dollars Canadian or 2655.463 Nepalese Rupees. An approximate breakdown for the cost of one kit can be found in a table below labeled Figure 3.

Figure 3:

Item	Cost per Item		Number of Items Included	Total Cost of Item(s)	
	Canadian Dollar (CA$)	Nepalese Rupee (NPR)		Canadian Dollar (CA$)	Nepalese Rupee (NPR)
Gloves	4	354.062	2	8	1416.248
Watering Can	9	796.639	1	9	796.639
Burlap Bags	1	88.515	2	2	177.03
Five-Gallon Bucket	5	442.577	2	10	885.154

The numbers is Figure 3 have all been researched and approximated using the Tactor Supply Company (TSC)'s website.

The key product used in the making of manure tea is the manure itself. There are a variety of different types of manures from different forms of livestock that can potentially be used for the production of manure tea. A good ratio to use when steeping manure tea is around five parts water to one part cured manure (Phipps, Nikki 2013). Any livestock such as cattle, sheep, goats, buffalo, pig, horse or chicken can supply the manure needed for the steeping process of manure tea. When choosing the type of livestock manure to use in this process, it should be taken into consideration the amount of manure each animal will produce on a daily basis.

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Numbers for the different amounts of manure produced by different types of animal livestock is outlined in the table below that is labeled Figure 4.

Figure 4:

Animal species	Faecal output at night (kg)	Faecal output at day (kg)	Total faecal output/day (kg)	Annual faecal output/animal (mt)	Livestock population in midhills millions)	Total annual output ('000mt)
sheep	0.4	0.3	0.7	0.25	0.3	75
Goat	0.2	0.4	0.6	0.22	2.8	616
Cattle	5.5	4.5	10.0	3.65	3.2	11680
Buffalo	6.5	5.5	12.0	4.38	1.7	7446
Pig	1.4	1.4	2.8	1.02	0.3	306
Total:						20123

This table was taken from: (K.C. Paudel, 2014) (Source: Khadka and Chand (1987); LRMP (1986))

Overall, cattle and buffalo will produce the most manure daily, which makes sense seeing as they are the largest of the livestock mentioned. Yet any livestock rearing farmers will be able to follow through with this idea because these animals will inevitably always produce enough manure needed for the process.

Where to Find:

The products included in the manure tea kit would be relatively easy to find in Canada. Basically you could buy these products at any co-op or retail supply store in the counrty. Stores such as these include companies like Canadian Tire, Tractor Supply Company (TSC), or local co-operatives. It is probably true that these types of products can already be found in Nepal's farm retail outlets, however it is the simple concept of how to use them in the production of manure tea that is the main focus of this idea.

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Transportation Details:

The transportation of this product will take an overall route from Canadian retailers, all the way to Nepalese retailers and the farmers who will use this product. This process begins with Canadian retailers shipping out the kits via a custom delivery service such as Fedex or UPS. The product will then be flown right out of Toronto, via an airplane to the capital city of Nepal, which is known as Katmandu. The process at this time will include getting the manure tea kits from the capital city retailers of Nepal, then again out to the farmers. Here is an oppurtunitie for local co-operatives and farm retailers in Nepal to carry this type of inventory and distribute these kits to the small scale farmers that are in need of them.

Figure 5:

This is a flow chart to describe the transportation of manure tea kits to Nepal, from Canada.

Storage:

None of the products in this kit are particularly in need of a specific type of safe storage. Since these products are made of different types of non-perishable or

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considerably temperate materials, there are no necessary storage restrictions upon the process of shipping or handling. Although the manure used when producing the manure tea does have certain specifications in order for it to be stored safely and properly. The process of storing this manure before and during handling is very important in order to have an effective end result of efficient fertilizer and to ensure the safety of the surrounding environment. It is important to let the manure sit out in direct sunlight while occasionally turning it up to allow even curing (doityourself 2014). The desired environment that allows for the proper curing of manure must be located quite conveniently, meaning that it is close by to livestock and requires little maneuvering. The manure should also be stored where there is a great amount of airflow so the manure can have equal access to the environment and to the sunlight that works to cure it. Perhaps the most important specification for the storage of the manure used is that it should be located somewhere that does not allow for flooding of any kind (Wieland, Betsy, 2014).

Labor:

There is labor involved in the use of this product and in the manufacturing of manure tea as fertilizer. There are certain aspects of the process of making manure tea that involve some types physical labor. These aspects include the collection and handling of manure, where the manure is moved to a stock pile and has to be turned and mixed by the farmer to allow for correct, evenly distributed curing. The type of manure used will also have an effect on the amount of labor involved in the process. For instance, using manure of large livestock will be more intensive since there is

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substantially larger supply. This physical labor could potentially be reduced with the use of a hose with a spray attachment instead of the watering can that comes in this beginner like manure tea kit.

Cautions:

A large caution to be taken in the production of manure tea is the presence of harmful pathogens in the manure of the different livestock. These pathogens are capable of causing disease in animals and humans. This can take place via direct or indirect transmission of the pathogens. Direct transmission including contact with the livestock or the manure, and indirect transmission including the consumption of contaminated food or water supply. There are certain practices that need to be put in place when handling the livestock's manure to reduce the amount of these pathogens or better yet, destroy them altogether. It is the farmer's job to follow through with these simple practices to limit the amount of pathogens and their movement to and througout the environment. The most crucial caution to take is to control run offs from the storage of the manure being cured, which hosts the greatest risk for pathogen movement. Another caution to be taken into consideration is in the actual process of curing or composting the manure. It is vital that the pile of manure is mixed or turned quite frequently (M. Spiehs, and S. Goyal, 2007). This is because all of the manure needs to have even exposure to the heat that it is producing and to the UV rays produced by the sun, to ensure the proper and uniform curing. All of these customs should be known to the farmers to ensure a safe and harmless production of fertilizer from composted and steeped manure.

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Target Market:

The target market for this export idea and product includes small, livestock owning and crop growing farmers. Because the production of manure tea is a very labor-intensive process, and the kit being exported is small, for beginner use, it would be impractical for this product to be used on large-scale operations. However, the idea of using manure tea as a fertilizer can still be used, just with larger, and more labor efficient equipment on these sizable operations. A farm that raises livestock would be an ideal situation because the will already have convenient access to the manure needed in the process of making manure tea. And most obvious is any farmers that grow crops are included in this market since the crops they are growing are the very things necessary for the fertilizer to be applied to.

Challenges:

Challenges facing the marketing and the use of this export idea include things such as the culture, religion and language barriers regarding the population of Nepal. There are many unique religions being practiced in Nepal, yet the majority of the population is either of the Hindu or Buddhist faith. These religious beliefs need to be taken into consideration when working with people native to the population of Nepal. For instance, regarding the livestock, Nepalese people do not eat beef, seeing as the cow is considered their national animal, and also because of specific beliefs involved in certain religions. Another detail to be reviewed for this specific product is that Nepalese consider cow manure to be pure for “cleansing purposes” (Ministry of Foreign Affairs of Denmark, 2014). Manure is a critical piece of this export idea

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and therefore, since these specific beliefs are in place, the methods used in handling cow manure and the cattle livestock specifically should be handled with great care in order to respect the beliefs of the native Nepalese farmers. Another challenge to be faced is that of the language barriers between Canada and Nepal. Although most government and business offices in Nepal speak English, there is a considerable difficulty with communication as the country itself contains approximately 101 ethnic groups speaking over 92 different languages (Nepal Tourism Board, 2012). Being able to communicate with the Nepalese farmers, in order to teach them the correct ways to use manure tea kits and to produce manure tea using these kits is very important. These challenges are not particularly difficult for the exporting country to over come and if handled properly and in a respectful matter, should not negatively affect the success of this product.

Benefits to Nepal:

There are many benefits that a manure tea kit would have for the country of Nepal. First and foremost, this product will help to create a more sustainable agri-food system, with it's purposeful use of livestock waste already present on local Nepalese farms. Not only will this product be much more affordable and accessible to Nepalese farmers than the more expensive chemically engineered fertilizer, but it will prove to be a renewable source of fertilizer seeing as it can be used over and over and is constantly being produced by livestock. This product is also all natural which will greatly benefit the environment and soil quality on farms in Nepal. Lastly,

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this product will help to build better co-operative relationships between Canada and Nepal.

Benefits to the Environment:

Using manure, or steeped manure will have great positive effects for the environment in Nepal, specifically the damaged and nutrient lacking soil. Effects such as these include an increased amount of carbon in the soil and a reduced amount of carbon in the atmosphere, and a reduced amount of nitrate leaching and met energy demands of the crops. Since manure contains all of the important macronutrients needed in the proper crop production, it can provide the necessary energy source for healthy, and productive soils. These effects are only present if there is also the proper application and management practices being put into action to go along with them.

Benefits to Canada:

Canada, as well as Nepal will benefit from exporting this product. Sharing their agricultural knowledge and this product itself with Nepal is a direct benefit to Canada. Gaining an export is always a positive for trade within the country and transporting this product will have many benefits as well. The transportation of this product gives work to those in the transportation and exportation industries. More work for these industries, just like for any other industries, is a large benefit to the country's economy. Also as mentioned above, this export will help build a better relationship between the co-operatives of both countries.

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Conclusion:

To conclude, the idea to use manure tea as a fertilizer on crops will contribute to a more sustainable agri-food system. It will do so by lending nutrients to the soil and the plants themselves. Since manure is an easily acquired source of fertilizer and is fairly simple to manage, it would be practical for the use of small-scale farmers in Nepal. The use of a manure tea kit including gloves, buckets, burlap and a watering can will help this process and can potentially be exported from Canadian retailers. Nepalese farmers are in need of a more accessible and cost effective fertilizer, and using manure tea could prospectively fill this need. Henceforth, the use of an all-natural manure based fertilizer would benefit Nepal. Not only the bankbooks of the farmers will be helped, but also the overall economy and the environment itself will have appreciable effects.

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