Canadian Hemp Decorticator for Nepalese Hemp Fibre Production

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Introduction

At one point in time, what once used to be the world's largest agricultural crop, is still being grown and used for many beneficial resources throughout the world today (Johnson 2015). A variety of the *Cannabis sativa L.* plant, Hemp is an extremely versatile crop that has many advantageous possibilities, ranging from: textile fibres, nutritional supplements, cosmetics and even construction material (Johnson, 2015). However, within Nepal, areas of poverty and vast numbers of unemployed individuals are beginning to utilize this crop in a fight to advance the developing country's economy (Vaverko, 2010). The production of industrial hemp as a textile fibre originated many years ago, it is believed that hemp could have been one of the oldest human industries, as it dates back nearly ten thousand years ago (AAFC, 2016). It is evident that using industrial hemp as a textile fibre has been a success since production has lasted so long. Hemp production as a textile fibre in Nepal however, has many drawbacks since the methods used are dated and less efficient (Vaverko, 2010). The process of producing hemp textiles within Nepal is a laborious and time consuming process, although the time taken to produce the textile fibre does not successfully reflect the quality of the fibre (Vaverko, 2010). Since the textile fibre created through the traditional Nepalese people's process results in rough and low quality textile, it would be extremely beneficial if another method was to be introduced (Vaverko, 2010). The D-8plus Industrial Hemp Decorticator could be the possible innovation that brings life to Nepal's hemp textile industry. This decorticator will ensure that high quality fibres will be produced for further manufacturing purposes (Canna-Systems, 2016). Ultimately, Nepal could greatly benefit

from further hemp production as the expansion of the industry has potential to boost Nepal's economical state (Caprara, 2016).

Product Information

Hemp decortication is the process of a machine decorticator separating the skin or bark off the raw stock or core of the *Cannabis sativa* plant to prepare the hemp for furthering processing (Marcus and Small, 2002). The D-8plus industrial hemp decorticator is an extremely efficient machine compared to traditional Nepalese methods. Within many methods a process known as retting takes place, this procedure involves weeks of time either waiting or soaking the hemp stocks within water to ensure the stalk separates from the core fibre of the *Cannabis sativa* plant (Marcus and Small, 2002). Retting also greatly affects the quality and quantity of the hemp fibre, which is detrimental to processing large quantities of industrial hemp fibre (Marcus and Small, 2002). However, this long thorough process is completely eliminated when processing hemp stocks within the D-8 decorticator, making it much more efficient than not only traditional methods but other industrial grade decorticators (Canna-Systems, 2016). The D-8plus industrial hemp decorticator is designed to feed raw hemp material onto the conveyor system where the fibre is collected and then distributed via exiting conveyor in a once pass system (Canna-Systems, 2016). This machine guarantees production of high quality manufacturing purposes; the hemp fibre produced can be very versatile as the fibre could potentially be used for a variety of useful products. Including, fibre for clothing textiles, material for paper, material for construction products and many more fibre based products. On average an acre of hemp could produce between four to ten tons of fibre and with processing rates of two to five tons of fibre and core material per hour, the decorticator's production rate is clearly superior to traditional methods (Canna-Systems, 2016). The innovative design of the D-8plus industrial hemp decortication was

designed and developed by Textiles and Composite Industries paired with Austeng Engineering in Geelong, Australia. Although Canna-Systems, based out of Toronto Ontario, Canada has been initiated to bring this modern technology of processing industrial hemp on a large scale to North America. This team of developers and manufactures are invested in producing higher yields and greater quality hemp fibre, as well as developing a product that allows industrial level production of hemp fibre. The industrial decorticator was developed so that raw hemp material can be processed directly from the field, rather than managing the production at a different source. Relying on on-site processing of hemp increases efficiency, time management and lowers cost. This evolutionary hemp decorticator has been manufactured to weigh approximately 12,000 pounds, with the dimensions of nearly three meters in height, five meters in length and two and a half meters in width. This machine has multiple possibilities of power sources varying from a hydraulic drive, a 220v AC motor or a PTO source. However, this revolutionary industrial grade hemp decorticator costs $240,000 USD.

Figure 1: D-8plus Industrial Hemp Decorticator (Canna-Systems, 2016)

Background of Hemp

Hemp is an extremely versatile agricultural commodity, the production of hemp can be used for many beneficial products, such as nutritional supplements or as textile fibres (Hansen, 2015). Hemp is a variety of the *Cannabis sativa* plant which has been genetically modified to be

a useful production item rather than a medicinal product (Hansen, 2015). Typically industrial hemp is most often grown and used as an agricultural commodity. The *Cannabis sativa* plant itself on average grows by a single stock to a height varying from 6 to 15 feet and is typically harvested between 70 and 140 days which allows multi-harvesting seasons (Hansen, 2015). Specifically hemp as a fibre is known to be one of the most durable and strongest natural textile fibres, although the result of the durability hemp is also known to be an extremely rough textile. (Marcus and Small, 2002). However, the D-8plus Industrial Hemp Decorticator also increases the quality which results in a much finer and softer feeling textile (Canna-Systems, 2016). Furthermore, hemp cultivation is another important aspect to analysis since it can determine the current state of the hemp industry. Since 1999 global hemp production has increased from 250 million pounds to more than 380 million pounds (Johnson, 2015). However, reason for increased production in hemp is result of harvested hemp seed rather than for the production of hemp fibre, (Johnson, 2015). Although hemp fibre production is not contributing to the increase of global hemp production, the trend since 1999 has been relatively consistent (Johnson, 2015).

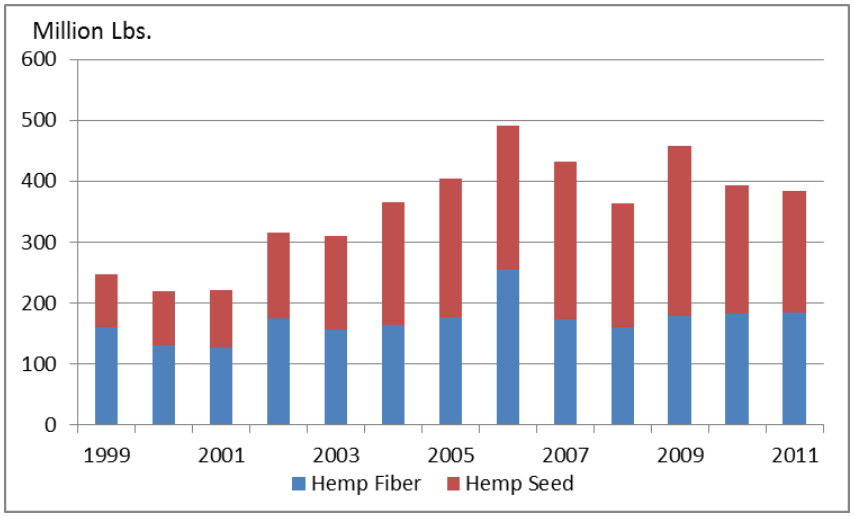

Figure 2: Hemp Fiber and Seed, Global Production (Hansen, 2015).

Benefits of Canada

Since Canna-Systems is one of the companies aiding in the production and exportation of the D-8plus Industrial Hemp decorticator, Canada as a country will receive several benefits. As Canada deals with imports and exports between Nepal, these countries will develop better trade relations. This could be a beneficial outcome since more goods and resources that are not available in the other country could be traded for. In addition, Canada's developing hemp industry has potential to improve when more products are exported (AAFC, 2016). If the production of Canna-Systems' decorticator increases Canada's hemp industry could also reap benefits as well since more income will rise in the industry. Although, Canna-Systems is just a distributer of the product within North America now, the other developers of the D-8 decorticator, Textile and Composite Industries are the current manufactures and main worldwide distributer of the product (TCI, 2016). However, Canada still has potential to receive benefits since the companies are dual developers of the product, if the D-8 model was to be exported from the world-wide distributer located in Australia, Canna-Systems would receive profits as well (Canna-Systems, 2016). Potentially, if the success of this decorticator was to be large enough there could be a chance for another manufacturer of the product possibly within Canada, this would be beneficial for Canada because it would not only increases profit within the hemp industry, but it would create several jobs for Canadian's as well.

Distribution

Although the D-8plus Industrial Hemp Decorticator is not readily exported to Nepal from Canada currently, if Nepal was to import this product, the machine would be exported from Victoria, Australia (TCI, 2016). These industrial grade machines have been manufactured to be

shipped fully functional and equipped in 20 foot shipping containers (Canna-Systems, 2016). The methods used to ship these containers is by a cargo ship to the areas nearest port, the path that would be taken if the product was to be exported from Australia would be; cargo shipping from the port of Victoria, Australia to the port of Vishakhpatnam, Nepal. After the shipping a transport carrier would then deliver the container to larger locations within Nepal. Canna-Systems and Textile and Composite Industries has organized all shipping costs to be included in the retail price of $240,000 USD (Canna-Systems, 2016). If Canada later becomes an international distributer or manufacturer, Canada would ship these containers via cargo ship from, Vancouver, British Columbia as this is Canna-Systems current distributing location (Canna-Systems, 2016).

About Nepal: ***Introduction of Agricultural Nepal***

Nepal is a relatively small country, that is located in southern Asia, landlocked between China to it's northern boarder and India to it's southern boarder (Shrestha, 1992). Nepal's climate is also another important factor when analyzing possible agricultural commodities. The location of Nepal creates a unique climate, as the span of 200 kilometres from the northern boarder to the southern boarder range from arctic to tropical climates (Prasai, 2010). However, Nepal is still immensely dependent on it's agricultural sector, as this industry accounts for 70 percent of employment as well as a third of Nepal's national production (Devkota and Upadhyay, 2013). In addition, approximately 30 percent of Nepal's land is occupied as agricultural land (Shrestha. 1992). Within Nepal, the country is divided in three major agro-ecological zones: theses regions include the mountain region, the hills region, and the terai region (Devkota and Upadhyay, 2013). The hills region, which accounts for 44 percent of Nepal's land also contains a great amount of Nepal's agricultural land (Devkota and Upadhyay,

2013). Within Nepal, the mountain region contributes the least amount of arable land, although the Hills and Terai contain the largest portion of arable land which is suitable for cultivation (Prasai, 2010). The reason these two regions are predominantly the greatest contributors to agriculture within Nepal is due to several factors. The hills region which is fairly similar to the terai region both contain similar soil contents; alluvial soil which is predominately within these two regions create a beneficial growing environment due to the fertile soil and thus improving agriculture growing capacities (Pariyar, 1999).

Hemp Within Nepal

Hemp within Nepal has potential to serve several purposes that could not only benefit the economy but Nepal's agriculture as well. Environmentally speaking, industrial hemp growth has many beneficial influences on the soil it is grown in (Carus and Piotrowski, 2011). Due to hemp's deep rooting system, it allows the plant to grow in a wide variety of growing conditions, this plant has great potential for land reclamation as it has potential to increase further yields in areas that hemp was once grown (Carus and Piotrowski, 2011). Furthermore hemp is a very suitable crop for Nepal as the plant can be grown without the use of any chemical pest managers such as herbicides, and pesticides (Carus and Piotrowski, 2011). Hemp's ability to be grown

	Nutrient depletion	Pesticides	Erosion	Soil compaction	Water consumption	Biodiversity	Agro-biodiversity
Permanent pasture	A	A	A	A	A	A	A
Short rotation coppice (poplar, willow)	A	A	A	A	B	A/B	A
Winter grains	A	A	A	A	A	B	B
Linseed	A	B	A/B	A	A	A/B	A
Hemp	A	A	A/B	A	B	B	A
Alfalfa	B	A	A	A/B	A/B	A/B	A
Grass	B	B	B	A/B	A	B/C	A
Switchgrass	?	?	A	A	A	B	A
Mustard	A/B	B	A/B	A	B	B	A
Sorghum	A	B/C	A	A	A/C	B	B
Wheat	A	B	A	A	B	B/C	C
Sunflower	A/B	B	B/C	A	B	A/B	B
Rapeseed	B/C	C	B	A	0	B/C	A/B
Sugarbeet	B/C	B	C	C	A/C	B	B
Maize	C	C	C	B	A/B	C	B/C
Potato	B/C	B	C	C	C	B/C	C

Figure 3: Environmental Effects of Hemp, Linseed and Different Major Crops (Carus and Piotrowski, 2011).

virtually organic is due to the plant's ability to grow vigorously, as well as the plant's hearty leaves aiding in excellent shade capacity (Carus and Piotrowski, 2011). Overall hemp is a beneficial impact agricultural crop since the plant is very diverse, can live in multiple environmental conditions, is easily maintained and ultimately a valuable crop to rotate. However, Nepal's growing regulations of hemp is limited. Within Nepal, the *Cannabis sativa* plant remains illegal to grow, although hemp is a genetically modified crop which is strictly used for it's beneficial stock, since technically the *Cannabis sativa* plant remains illegal for its drug use, hemp gets wrongfully accused and is still restricted to grow (Vaverko, 2010). Still, within Nepal there are no registered growers or farmers of the *Cannabis sativa* plant, the people of Nepal are however still reaping the benefits of this plant as it is extremely plentiful and grows naturally in Nepal (Vaverko, 2010). Although the legality of the *Cannabis sativa* plant may be detrimental to the production use of the D-8plus Industrial Hemp Decorticator, there are still potential

possibilities for hemp fibre production. Despite hemp being illegal to grow within Nepal, importing and exporting raw hemp is legal within Nepal (OEC, 2014). Therefore the potential of the industrial decortication is still available since imports of raw hemp material could still be processed.

Target Market

The result of the D-8plus decorticator being higher quality and an industrial grade machine causes the price of the hemp decorticator to be extremely high. The D-8plus Industrial Hemp Decorticator costs $240,000 USD, which is unaffordable for any single Nepalese farmer. Thus if the potential of the industrial decorticator was to be utilized, a larger community or multiple villages grouped together in Nepal could be a possible investor. Since this product is strictly used for industrial purposes, a single farmer would not be utilizing the full potential of the hefty investment, since a single farm would not produce enough crop to make the industrial grade useful. Therefore, a possibility for this investment to be successful is if a community or company was to purchase a single unit. Therefore the community could adapt a system that allows an abundance of farmers or importers of raw industrial hemp to process there hemp at the machine. Where the material could then be further sold to fibre processing companies and or to be exported. Ultimately only limited amounts of the D-8plus Industrial Hemp Decorticator would be sold, approximately three to five machines being sold would be a large enough income for the developers of this unit to have a successful export. In addition, another possibility for the D-8 decorticator to become useful is using the machine as a portable processor. Since Canna-Systems has designed the rig to be fully portable a company could potentially invest in this product to use it as a portable processor, and ultimately transport the machine to the farmed

hemp. Essentially a company would charge a farmer for the use of their product, however the farmer revives their processed hemp in return.

Benefits for Nepal

Introducing the D-8plus Industrial Hemp Decorticator as a possible importing product for Nepal has several direct as well as indirect benefits for: Nepal's economy, hemp industry and the Nepalese famers. Hemp being such a versatile crop can potentially benefit Nepal because it may create more career opportunities and jobs. The *Cannabis Sativa* plant, including hemp seed, and hemp fibre production has been estimated to create more than 25,000 products within the global market (Johnson, 2015). If Nepal was to utilize the production capability of the industrial decorticator, more products would be able to be developed within the hemp industry since an abundance of hemp fibre is readily available. If the hemp market was to expand more products would be created and also exported, this will benefit Nepal's economy. Since Nepal has very limited exports of hemp fibres, within 2014 Nepal only exported $67,000 worth of hemp fibre, which means there is a great amount of potential within this industry, because there are limited amounts of exports already. Therefore since competition of exporting hemp fibre is minimal within Nepal, this means there is availability in increasing potential exports. By increasing the amount of exports, Nepal could certainly benefit since in 2014 the country only exported $1.06 billion worth of goods but imported $7.75 billion dollars worth of goods (OEC, 2014). Therefore by increasing the amount of hemp product markets, and hemp fibre exports within Nepal, the country's economy could benefit. Nepal receives other indirect benefits by introducing the industrial grade decorticator because more hemp could be potentially grow within Nepal. The hemp farmers of Nepal could benefit if hemp was introduced as an agriculture commodity

because hemp is known to increase larger yield percentages, greater soil structure and optimal tilth conditions, in future crops were hemp was once cultivated (Carus and Piotrowski, 2011).

Comparing and Contrasting

The D-8plus Industrial Hemp decoritcator is an innovating machine, that has extremely limited competition with other products since there are few industrial grade decorticators. However, the competition that arises within the decoritcator market, are smaller grade decorticators that are used for smaller hemp fibre processing farms. These lesser quality decorticators are much more convenient compared to the D-8plus Industrial Hemp Decorticator because of the, weight, and workability. Although the Automatic Fibre Decorticator is comparable in size to the D-8plus Industrial Hemp Decorticator, the D-8 is much heavier and weighs 4,550kg more than the automatic decorticator. In addition, the D-8 decorticator is manufactured to process strictly hemp, although the automatic decorticator is designed to decorticate not only hemp but kenaf, banana stem and ramie as well. Despite these differences, the automatic decorticator is much more cost affordable compared to the D-8 model, the automatic decorticator ranges from 7,000 USD to 13,000$ USD. The reason the D-8 decorticator model is much more expensive is due to the production rates and the quality of the fibre produced. Due to

Figure 4: Automatic Fibre Decorticator from: alibaba.com

the D-8 model having capability to produce higher quality and larger quantities of hemp fibre it results in a much more costly machine. These automatic decorticators are developed by a

	Size Dimensions					
	Height	Width	Length	Weight	Voltage	Price
D-8plus Industrial Hemp Decorticator	2.74m	2.43m	5.45m	5500kg	220V	$240,000
Automatic FIber Decorticator	3.1m	1.25m	3.1m	950 kg	220/380V	$7,000-$13,000

Figure 5: Comparative Analysis of the D-8 Decorticator and an Automatic Fibre Decorticator

manufacturing and trading company located in Henan, China and are listed within *alibab.com*. These products can be transported to Nepal much more cost efficient and quicker compared to the D-8 model. Overall, comparing the two models determined, that the price range is due to the overall quality and quantity of the processed material.

Conclusion

Although the D-8plus Industrial Hemp Decorticator may potentially increase production of hemp fibre, and spark a wide range of production items, overall Canna-systems' decorticator competition and quality may be to great for the potential export to strive in Nepal. Ultimately the potential of Nepal being an industrial producer of hemp is high, due to abundance and growing capacity within Nepal. Despite the productivity and grade of the D-8plus industrial hemp decorticator, this machine is not suitable for the agricultural sector of Nepal yet. Since Nepal is still classified as a developing country a machine of the quality grade Canna-Systems provides would not fit into Nepal's farmers, or industries budget (Faye, et al. 2004). Nepal's agricultural

sector has limited access to new technologies, market opportunities and advanced agricultural commodities, the fit for an industrial grade decorticator may be too early of an investment for Nepal since this sector is less developed (US AID, 2016). The price of the decorticator reaching $240,000, is an investment that is suitable for more developed countries such as Canada or Australia where the product is actually marketed (Canna-Systems, 2016). Since most of Nepal's farmers depend on subsistence farming, where farms are utilized to strictly feed themselves and or their family, most of these Nepalese farmers make only enough income to allow themselves to keep farming (US AID, 2016). Furthermore, since the cultivation of the *Cannabis sativa* plant remains illegal within Nepal, this detrimental factor is another reason importing the industrial grade decoticator is not suitable for Nepal. The alternative of importing all raw hemp material to be processed by the decortication is another reason why the potential of the importing products lacks. If a farmer or community was to utilize the D-8 decorticator with only processing imports the costs of the hemp fibre would dramatically increase since farming hemp is much cheaper than importing the raw material. Compared to importing raw stalk, it costs on average $1.23 - $0.90 per pound of hemp seed to grow (Hansen, 2015). Ultimately Nepal can not afford additional costs of importing raw stalk compared to farming raw hemp stalk; therefore for the potential of Nepal to benefit from the D-8 decorticator, Nepal must make the cultivation of industrial hemp to be legal. Nevertheless, Canna-Systems is still limited to distribution of the D-8 decorticator throughout

Commodity	US$/unit	Est Yield
Fiber	$1137 / ton $1882 /ton	
Whole Stalk	$49-78 /ton	2.5-4 ton/ac
Raw Stalk	$44-55 /ton	2.8-6 ton/ac
Whole stalks	$200 /ton	
Fiber Hemp	$100 /ton	8 tons/ac
Dry Stems	$125 /ton	
Raw Fibers	$566-647 /ton	.36-1 t/ac
Dry Fibers	$800 /ton	1.1-1.4 t/ac
Bast Fibers	$630 /ton	
Hurds	$44-55 /ton	2.8-4.8 t/ac

Figure 6: Hemp Prices and Revenue from Various Sources ($US). (Vantreese, 1997)

North America only and has not reached international shipping yet. This is another reason why the importing potential of this product is limited because for Canada to truly benefit the product must be manufactured and shipped out of Canada. Concluding, China's decorticator market is much more beneficial for Nepal than Canada's market, since the price is drastically cut and shipping being much more convenient, proves how other competition is much more beneficial. For Canada to be a potential exporting option there are several provisions that must be altered. A decorticatior that is much smaller, more portable, more resourceful and less costly should be developed in order to compete with other products. If the machine was less expensive more rural communities could afford the machine, in addition, if the decorticator had options in what material it could decorticate the investment could potentially be more beneficial for Nepal.

Contact Information

For additional information regarding the product and shipping of this potential export, questions could be answered by the following:

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