Prospective Canadian Export: Outlining the Opportunity and Need for an Economical Soybean Press to be Sold in Nepal

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Section 0101 – Monday 2:30 – 5:30

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Introduction

Contained in this report is a detailed analysis of the benefits and drawbacks of exporting an economical soybean press to Nepal. The analysis will include a discussion of the benefits to pressing soybeans and the many products that can be produced. Information will be provided on the various oilseed presses that are available, with a detailed analysis of one particular Canadian-made oilseed press. The value to Nepal will be critically analyzed by outlining the potential nutritional, economic and welfare benefits to Nepalese farmers that harbour the technology. Lastly, recommendations will be made to Canadian and international businesses that could benefit from the export opportunity.

Part 1: Product Information

Soybeans are an oilseed commodity that have a diversity of processing and marketing opportunities for the producer, largely attributed to the substantial protein and oil content of the seed (Clemente & Cahoon, 2009). After harvest, the crop is often put through an extrusion process, whereby oil is extracted from the seed, leaving a high-protein oilseed cake that can be further processed into a livestock feedstuff known as soybean meal. Studies conducted by Ahrar & Schingoethe (1979) and Pongmaneerat & Watanabe (1992) have shown the importance of including soybean meal as a supplement in livestock feed rations, especially in regions of the world where protein intake is limiting. Similarly, Lardy (2008) showed the benefits of integrating soybean meal into livestock diets when grazing marginal rangelands or feeding low quality forages.

Historically it has been difficult to press soybeans at smaller scales due to the significant capital required to purchase automated equipment, or the significant labour needed to extract the oil by traditional methods; however, modern small-scale oilseed presses allow individual producers to mechanically extract soybean oil at lower levels of production (Energrow, 2015). Producers that harbour this technology benefit by being able to produce their own vegetable oil and soybean meal on-farm, with less capital investment than is needed for large commercial oilseed presses.

Soybean Oil Extraction

There are several different approaches that can be used for the extraction of oil from soybean seeds. Each method varies in terms of the amount of oil that can be successfully recovered from the seed, and the amount of equipment required to do so. In a detailed evaluation by Axtell and Fairman (1992), it is shown that the extraction process can be completed through traditional methods, as well as using both manual and power oilseed presses. These methods are outlined in table 1, including an overview of each system.

Table 1: Most common extraction procedures for oilseed commodities worldwide

Extraction Process	Name of System	Details
Traditional Methods	Hot Water Flotation	Oilseed is ground and material is placed in boiling water. Oil floats to the surface and is skimmed off.
	Ghani	Powered by animals or human power (sometimes mechanical power). Mortar is fixed and pestle rotates. Oil is released by friction and pressure.
Manual Oilseed Press	Plate Press	Plate/piston is forced into a cylinder that contains the oilseed. The bottom of the cylinder is perforated allowing the oil to be forced

		out. This works on a batch system.
	Ram Press	Similar to plate press, a ram forces the oilseed forward into a perforated cage. The extracted oil is released through the perforations. This allows for a continuous flow instead of a batch system.
Power Oilseed Press	Oil Expeller	Most common and most efficient in terms of the percentage of the seed that can be extracted as oil. Raw material is fed continuously to the expeller. A shaft pulls the oilseed into a horizontal cylinder and then pressure is built up causing the oil cells to rupture. Oil flows out through perforations. The expeller allows for a continuous throughput design.

The details on the various oilseed presses presented in table 1 come from literature by Axtell and Fairman (1992) and Head et al. (1995).

As shown in table 1, the traditional and manual methods offer the benefits of less sophistication, at the expense of higher labour inputs. At the other end of the spectrum, the power oilseed press allows for continuous flow of material, and greater oil recovery rates; however, a large capital investment must first be undertaken to acquire the necessary mechanization. When considering which type of press could be beneficial in developing nations, the factors of cost and required labour need to be balanced in order to make the export feasible. Figure 1 below shows a typical animal powered ghani to better illustrate the setup for traditional oilseed presses. This method can be beneficial in terms of its minimal capital requirements and lack of power required. Figure 2 depicts a manual plate press, illustrating the perforations in the cylinder that allow the oil to be released. The figure helps to visualize the batch system which could make this style of press very slow and tedious for the operator.

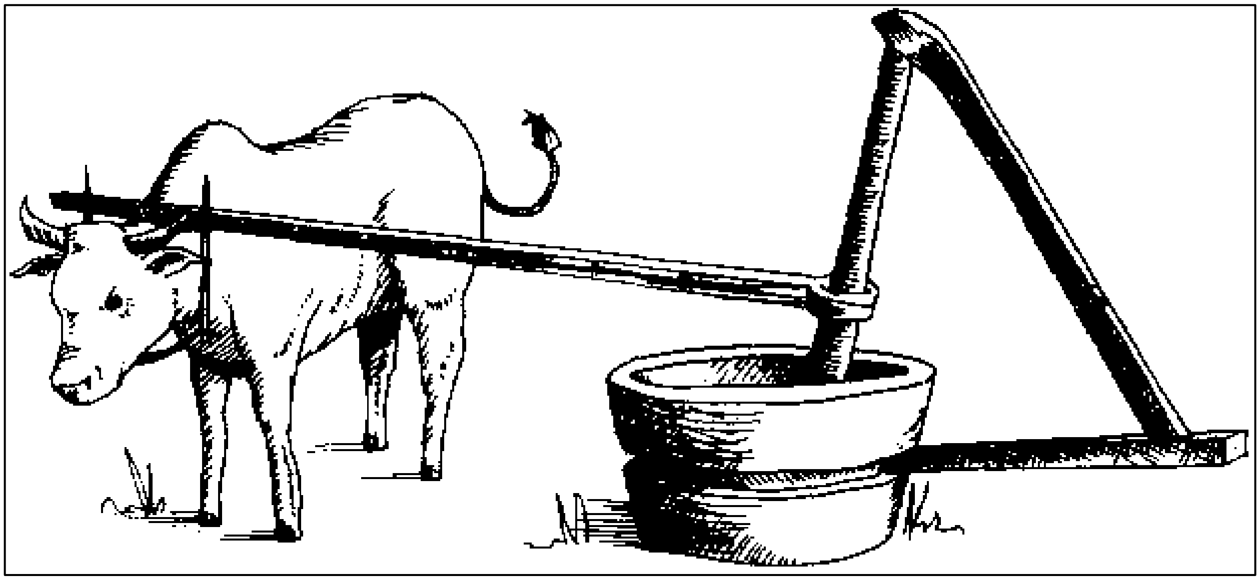

Figure 1: Depiction of a traditional animal powered ghani used for oilseed extraction (Axtell & Fairman, 1992)

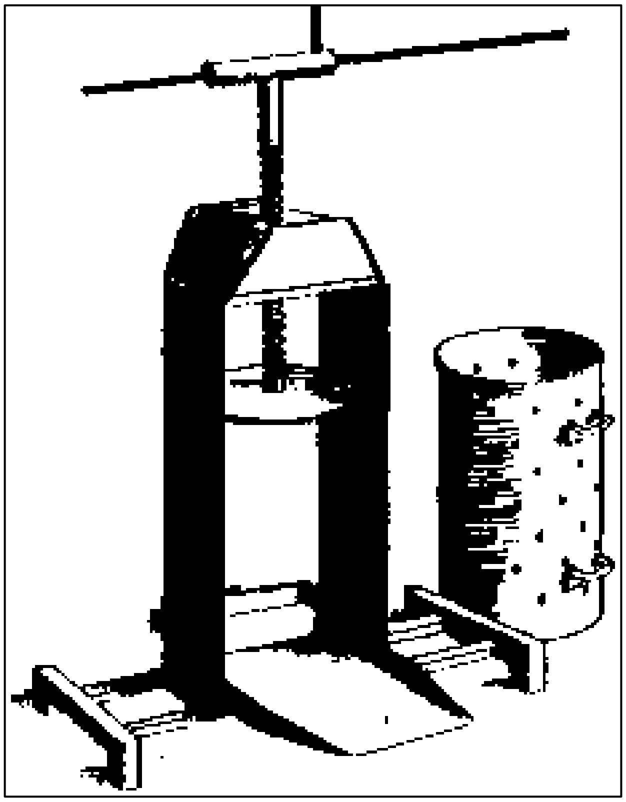

Figure 2: Depiction of a manual plate press used for oilseed extraction (Axtell & Fairman, 1992)

Canadian Manufacturers, Canadian Distributers and Potential Benefits to Canada

The Canadian market is primarily dominated by power oilseed presses which use an expeller to mechanically remove the oil from the crop (Energrow, 2015). This allows for the greatest efficiencies to be reached in terms of the amount of oil that can be recovered from the crop and the speed at which it can be removed, primarily attributed to the expeller's continuous throughput design (Axtell & Fairman, 1995). Although a significant portion of the Canadian market is dominated by very expensive and high capacity expellers, there are a few smaller, automated oilseed presses available which would suit the low per capita production of soybeans in Nepal (FAO, 2015). One oilseed press of particular interest comes from a company native to

Listowel, Ontario. The company is Energrow, and their ES3750B farm-scale oilseed pressing system can extract anywhere from ten percent to thirty percent of the weight of the bean as oil and it further compresses the resulting mash into feed-grade pellets (Energrow, 2015). The machine can extract the oil from up to one tonne of soybeans per day and the unit is small enough to fit in an area of approximately four metres squared (Energrow, 2015). The setup for the ES3750B oilseed press can be seen in figure 3, with its single phase, five horsepower motor driving the press. The company currently sells the presses for around 30,000 Canadian dollars, and they produce the machines entirely in Canada. The company also employs additional support personnel to provide service for their machines that are already in operation (Energrow, 2015). One of Energrow's business strategies is to use biodiesel produced from their oilseed presses to power their company vehicles, making their business a highly sustainable enterprise (Energrow, 2015).

Figure 3: An advertisement from Energrow for their ES3750B farm-scale oilseed pressing system (Energrow, 2015)

The benefit to exporting the Energrow oilseed press to Nepal is that these units are produced entirely in Canada, including most of the materials, raw steel, motors and machined parts (Energrow, 2015). Energrow additionally supports several local machine shops which produce the precision parts needed to build the ES3750B oilseed presses (Energrow, 2015). Although there are a few other companies that distribute imported brands of oilseed presses, Energrow is the only company that manufactures oilseed presses entirely in Canada (Energrow, 2015). Given the local production and distribution of Energrow's ES3750B, the product is an ideal candidate for exportation to Nepal, as there is substantial opportunity to benefit the Canadian economy. An increase in overall sales resulting from exports to Nepal would allow the company to reach a larger scale, employing a greater number of Canadians for manufacturing, input production, service, support and managerial positions. In table 2, the Energrow ES3750B is compared with other small oilseed presses that are distributed in Canada. As shown in table 2, the Energrow oilseed press is quite competitive with the European models from a pricing standpoint, with the exception of the small manually operated press built by Komet, which costs substantially less but requires substantially more labour for operation. Energrow claims that their press is more suited to processing Soybeans than European models since soybeans are the most common oilseeds pressed on farms in North America, unlike Europe where rapeseed is the most common oilseed pressed (Energrow, 2015). As such, European oilseed presses are designed around pressing rapeseed; however, soybeans are much harder on equipment, and the design and materials used to build the Energrow ES3750B system reflects that data (Energrow, 2015). This would indicate that the Canadian oilseed press from Energrow may be more competitive for Nepalese markets, if the goal is to extract the oil from soybeans as opposed to other oilseeds.

Table 2: Comparison of small oilseed presses available in Canada

Canadian Company	**Oilseed Press Model**	**Manufacturing Country**	**Press Details**
Energrow	ES3750B Farm-scale Pressing System (see figure 3 above) Cost: $30,000 CAD	Canada	• Cold press oil extraction system • PLC touch panel control system • Process one tonne of soybeans per 24 hours, producing 21 gallons of oil and 2000 lbs of pellets

			• Resulting mash compressed into feed grade pellets • Electricity cost of $4.50 per tonne (Energrow, 2015)
Golden Green Sustainable Resources Ltd.	Anton Fries P240R Vegetable Oil Press (see figure 4 below) Cost: not retrieved	Germany	• Cold press oil extraction system • Output of 12-30kg per hour • Resulting mash is not processed into pellets but could serve as animal feed with further processing (Golden Green Sustainable Resources Ltd., 2015)
Golburn Valley Oilmill Inc. **	Komet Single Screw Vegetable Oil Expeller CA 59 1-H (see figure 5 below) Cost: 1650 Euros = approx. $2,340.00 CAD	Germany	• Manual operation • 1 to 3 kg of input material per hour • No motor and no electricity required • Very mobile and small shipping weight of 30kg (Golburn Valley Oilmill Inc, 2015)
	Komet Screw Vegetable Oil Expeller S 120 F (see figure 6 below) Cost: 22,500 Euros = approx. $31,900 CAD	Germany	• Large screw expeller • Cold pressing system • Processes 50-100 kg per hour • Machine weighs 440kg • Resulting mash is pressed into pellets (Golburn Valley Oilmill Inc, 2015)

*** Golburn Valley Oilmill Inc distributes many different models of oilseed presses. One manual and one mechanical press were displayed in table 2 for comparison.*

All of the mechanical oilseed presses listed in table 2 offer a similar setup, each having a single phase motor and a cylindrical expeller (Energrow, 2015; Golburn Valley Oilmill Inc., 2015; Golden Green Sustainable resources, 2015). The Komet manual single screw press offers the advantage of a low price point, but becomes quite limited in terms of its capacity and does not process the resulting cake into feed grade pellets (Golburn Valley Oilmill Inc, 2015). The Canadian press is advantageous for export since it would allow Nepalese producers to convert the resulting mash into feed-grade pellets instead of simply recovering the oil, as is the case with the P240R and CA59 German oilseed presses (Energrow, 2015). Additionally, the Canadian press appears to offer a more rugged design and a few more features to aid in the extraction process (Energrow, 2015). Figure 4 below illustrates the German oilseed press distributed by Golden Green Sustainable Resources in Truro, Nova Scotia, Canada. Figure 5 shows the manual Komet oilseed press distributed by Golburn Valley Oilmill in Tisdale, Saskatchewan, Canada. Figure 6 illustrates the setup for the mechanical Komet oilseed press that is also distributed by Golburn Valley Oilmill.

Figure 4: Anton Fries P240R Vegetable Oil Press (Golden Green Sustainable Resources Ltd., 2015)

Figure 5: Komet Single Screw Vegetable Oil Expeller CA 59 1-H (Golburn Valley Oilmill Inc, 2015)

Figure 6: Komet Screw Vegetable Oil Expeller S 120 F (Golburn Valley Oilmill Inc, 2015)

Contact details for each of the Canadian companies that sell oilseed presses can be found in table 3 below. The table also lists the website for each company, where more information can be accessed for each respective oilseed press.

Table 3: Contact details for Canadian companies that manufacture or distribute low-output oilseed presses in Canada

Name of Canadian Company	Location of Manufacturing	Location of Canadian Distribution Facility	Company Address	Contact Information and Personnel
Energrow	Canada	Listowel, Ontario	510 Rocher Rd, Unit 2 Listowel, ON N4W 0B2	Jasmin Hofer (Owner) Phone: 844-363-7476 Fax: 888-959-6589 Website: www.energrow.ca
Golden Green Sustainable Resources Ltd.	Germany	Truro, Nova Scotia	421 Little Dyke Rd. Truro, NS B0M 1L0	Jocelyn Harris (Manager) Phone: 902-956-1795 Email: info@golden-green.ca Website: www.golden-green.ca
Golburn Valley Oilmill Inc.	Germany	Tisdale, Saskatchewan	1 Golburn Rd West Tisdale, SK S0E 1T0	Phone: 1-800-913-3693 Email: gvo@gvo.ca Skype: golburn.valley.oilmill.inc Website: www.oilpressequipment.com

Information in this table is from (Energrow, 2015; Golburn Valley Oilmill Inc., 2015; Golden Green Sustainable resources, 2015) for each respective company.

Part 2: Critical Analysis of Potential Benefits to Nepal

Introduction to Nepal

Nepal is a landlocked country located between China and India, as shown in figure 7 (CIA, 2015). Nepal has a large variation in climate, with cool summers and severe winters in the north and subtropical summers and mild winters in the south. (CIA, 2015). The population of Nepal is around thirty million people, with an average gross income per capita of $340 in Canadian funds (World Health Organization, 2015). As such, Nepal is one of the poorest countries in the world with one quarter of the population living below the poverty line (CIA, 2015). Nevertheless, agriculture is an integral part of the Nepalese economy, providing income for over 70% of the population, and accounting for over one third of the gross domestic product (CIA, 2015). There are several challenges facing Nepal that inhibit its growth and economic success, including the country's landlocked geographic location, the persistent power shortage across the nation, the underdeveloped transportation infrastructure, as well as the country's statistically high susceptibility to natural disaster (CIA, 2015).

Figure 7: Map of Nepal showing geographic location between China and India

(Retrieved from http://bestworldmapsrota.tk/nepal-map/)

Evidence Supporting the Need for an Economical Soybean Press in Nepal

The production of soybeans in Nepal has been steadily increasing over the past decade, with a total yield of nearly 30,000 tonnes in 2013, yet there has been a steady decline in the production of soybean oil (FAO, 2015). This is emphasized in Figure 8 which shows Nepal's steady increase in soybean production from 2008 to 2013, and figure 9 which shows the substantial yield increase that was realized from 2012 to 2013. Additionally, figure 10 shows the recent decline in soybean oil production which is apparent from 2011 to 2013.

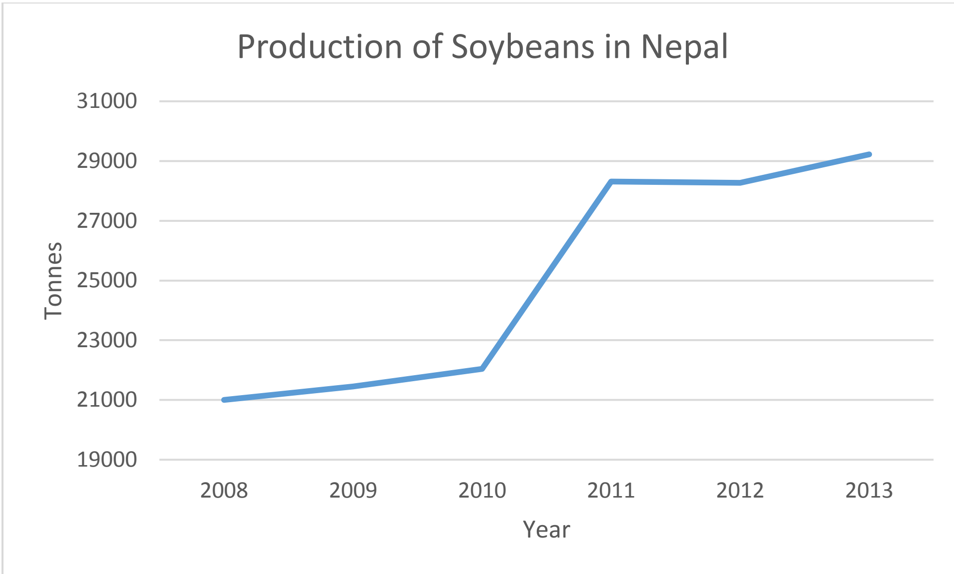

Figure 8: Soybean production in Nepal from 2008-2013, illustrating the steady increase in production (FAO, 2015)

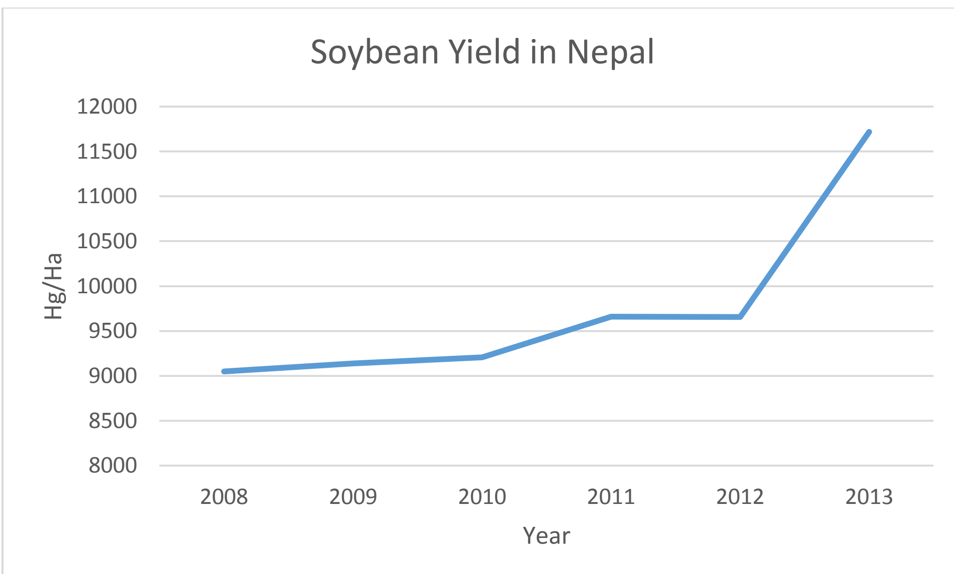

Figure 9: Soybean yield in Nepal from 2008-2013, illustrating the steady increase in yield (FAO, 2015)

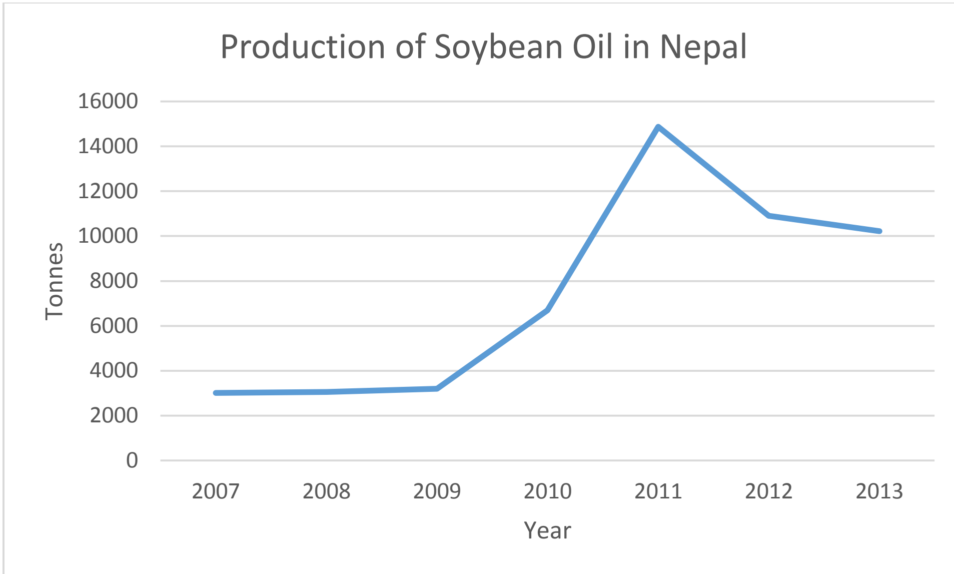

Figure 10: Production of soybean oil in Nepal from 2007-2013, illustrating the drop in production from 2011-2013 (FAO, 2015)

The decline in soybean oil production despite the increase in yield and total production of soybeans could indicate that Nepalese farmers cannot reach a large enough scale of soybean production to economically press their own seeds, especially given that each family holds less than one hectare of land on average (Manandhar, 2005). Resultantly, Nepalese communities have become reliant on importing soybean oil, instead of being able to locally produce the commodity (FAO, 2015). This is emphasized by the fact that soybean oil was Nepal’s top agricultural import by value from 2008 to 2011 (FAO, 2015). A small-scale oilseed press could benefit Nepalese farmers, allowing them to produce their own high quality protein supplement for their livestock from an already existing oilseed crop, with the additional benefit of being able to use and market the resulting oil.

Health Benefits of Soybean Oil

According to Drewwnowski (2000), soybean oil provides approximately five thousand calories per dollar spent in US grocery stores, making it an excellent source of energy in human diets. Although vegetable oils have been a major cause of obesity in certain developed nations such as the US, the oil can serve as an excellent source of energy in countries such as Nepal where there is a high prevalence of starvation (World Health Organization, 2015). Adding more soybean oil in the diet could substantially increase caloric intake to combat the considerable starvation in Nepalese communities. Soybean oil is also rich in polyunsaturated fatty acids which have been shown to have a positive impact on human health in contrast to the saturated fatty acids found in oils from animal fats (Drewwnowski, 2000). Further, Oomah and Mazza (1999) indicate that soybean oil is rich in linoleic acid which can be used to synthesize conjugated linoleic acid, yielding many anti-atherogenic, anti-lipogenic and immuno-suppressive properties. This indicates the benefit of soybean oil as a preventative health measure for Nepalese citizens, which is important given the rather limited access to health care in Nepal (World Health Organization, 2015). Another benefit is that soybean oil has a high heat transfer coefficient, making it an excellent cooking medium, allowing food to be prepared in less time, while also providing the substantial health benefits previously mentioned (Miller et al. 1994).

Markets for Soybean Oil

Although soybean oil can provide substantial health benefits when used in food products and cooking, one of the largest opportunities for the resulting oil may be the production of biodiesel. Biodiesel is produced by a process known as trans esterification, whereby the raw soybean oil is combined with methanol and a catalyst, which converts the triglycerides in the vegetable oil to glycerol and three methyl ester groups. (Lardy, 2008). Methanol is produced as a by-product, which can be recycled along with the glycerol. Figure 11 shows the general process for biodiesel production from raw soybeans.

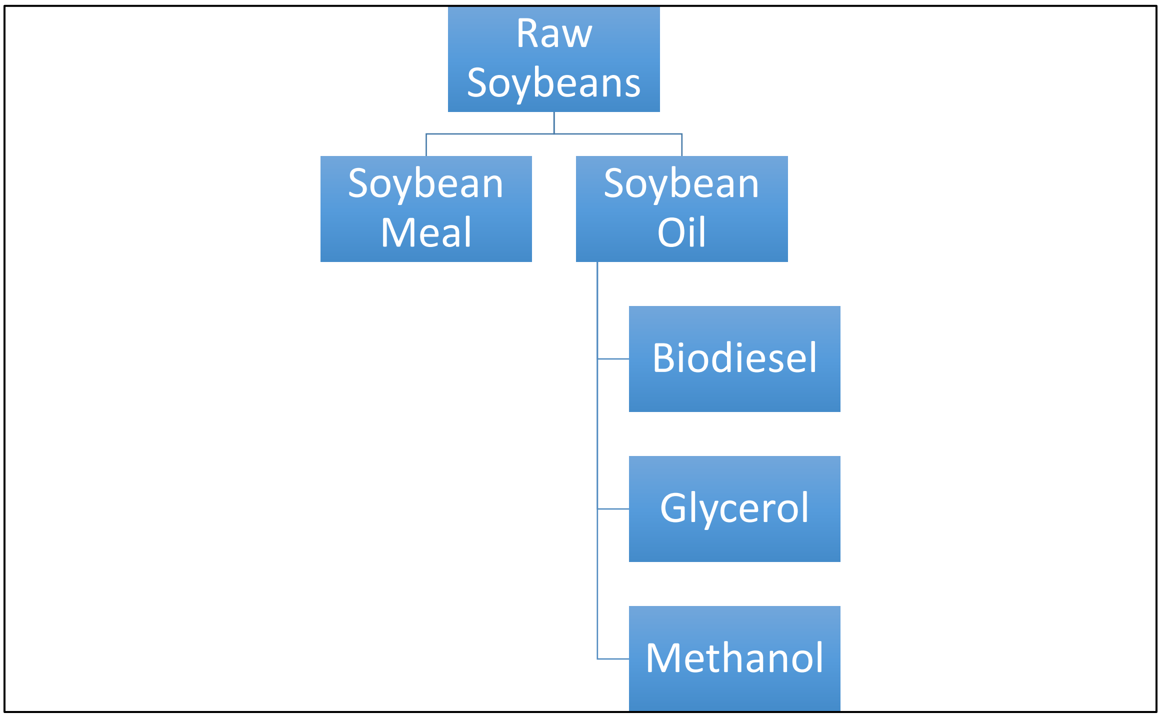

Figure 11: General schematic of biodiesel production (Lardy, 2008)

Halek et al. (2009) showed that only limited resources are required to convert pressed soybean oil into biodiesel, while Hill et al. (2006) determined that biodiesel from soybean oil yields ninety-three percent more energy than the energy invested in its production. According to Lardy (2008), 53 gallons of biodiesel can be produced form one tonne of soybeans, highlighting the efficiency of the extraction process. This provides evidence for the significant economic advantages for Nepalese communities to harbour the technology required to press soybeans. Biodiesel can then serve as an economical and environmentally conscious alternative to diesel fuel in various engines, with minimal mechanical modifications required (Agarwal & Das, 2001). In circumstances where Nepalese farmers do not have access to a power source to run the small motor on the Canadian made oilseed press, biodiesel can mitigate the problem. With a small additional investment, these communities could purchase a diesel generator that could use the biodiesel as a fuel source, to then power the oilseed press. This increases the self-sufficiency of the farmers, eliminating their reliance on an outside source of hydro to power their oilseed press. This may help to make the purchase of an oilseed press more feasible in isolated locations of Nepal where achieving a reliable power source may be impossible.

If the Nepalese farmers do not choose to market the resulting oil as biodiesel, there is also a significant global market for the oil to be used in other applications including the production of industrial materials, food products and other nonedible merchandise (Cahoon, 2003). Nepalese communities could form cooperatives to market products produced from the oil, creating entirely new enterprises. The opportunities to impact the Nepalese economy could be substantial for farmers with access to a Canadian oilseed press.

Benefits of Soybean Meal as a Livestock Feedstuff

According to Lardy (2008), soybean meal is the gold standard to which all other oilseed meals are compared, mainly attributed to its high digestibility, low fibre and balanced amino acid profile. These qualities allow soybean meal to be fed to many different animal species, even those with lower abilities to digest fiber such as monogastrics (Lardy, 2008). The nutrient content of soybean meal is compared to other oilseed meals in figure 12 below.

Table 6. Nutrient composition of various oilseed meals resulting from solvent or mechanical extraction.

Dry matter basis

	DM, %	CP, %	Fat, %	TDN,%	NEm, Mcal/lb	NEg, Mcal/lb	ADF,%	Ca,%	P,%
Camelina meal, mechanical extraction	91.5	36.5	14.1	88.6	0.97	0.64	19.2	0.38	0.77
Canola meal, mechanical extraction	90	41	7.4	76	0.8	0.52	16	0.6	0.94
Canola meal, mechanical extraction, On-farm press	92.6	36.9	14.1	88	1.09	0.77	NG	0.6	1.02
Canola meal, solvent extraction	90	43.6	1.2	69	0.73	0.45	18	0.67	1
Mustard meal, mechanical extraction	93	34.5	5.5	73	0.76	0.48	NG	NG	NG
Safflower meal, mechanical extraction	91.9	23.5	7.2	56.1	0.55	0.25	NG	0.26	0.66
Safflower meal, solvent extraction	92	25.4	1.1	57	0.55	0.29	41	0.37	0.81
Soybean meal, mechanical extraction	90.7	46.7	5.2	84.9	0.94	0.62	NG	0.31	0.65
Soybean meal, solvent extraction	89	49	1.2	84	0.94	0.64	NG	0.33	0.71
Sunflower meal, mechanical extraction, On-farm press	93.1	23.6	19	90.5	1.13	0.8	NG	0.43	0.79
Sunflower meal, solvent extraction	90	38.9	1	64	0.65	0.35	28	0.39	1.06

Abbreviations: DM = Dry Matter; TDN = Total Digestible Nutrients; NEm = Net Energy for Maintenance; NEg = Net Energy for Gain; CP = Crude Protein; ADF = Acid Detergent Fiber; Ca = Calcium; P = Phosphorus; NG = Not Given.

Figure 12: Nutrient content of various oilseed meals (Lardy, 2008)

As shown in figure 12, soybean meal excels in terms of protein content, total digestible nutrients, and energy content, providing good evidence to suggest that soybean pressing should be prioritized over the pressing of other oilseeds in Nepal. Because of its clear advantages as a feed supplement, soybean meal is often the most expensive oilseed meal, so many Nepalese farmers may not be able to afford it given their low income (World Health Organization, 2015). Nepalese farmers that can produce their own soybean meal on-farm may benefit immensely by feeding this high quality supplement to their livestock, or alternatively, they may benefit financially by the sale of the feedstuff to other livestock producers.

Transport from Canada to Nepal

Energrow's ES3750B oilseed press weighs 660 pounds and measures 2 metres by 2.6 metres by 2.1 metres (Energrow, 2015). Because of the substantial size and weight of each individual unit, transport from Canada to Nepal would be a considerable cost associated with exportation of the oilseed presses. Since it is expected that only a few units will be sold in Nepal, there is limited opportunity to receive bulk shipping discounts. As such, the units would be ideally shipped through a large international freight company that can offer competitive prices on worldwide freight. A1 Freight Forwarding, is headquartered in Toronto, Ontario with delivery points across the world. A shipping quote was received from A1 Freight Forwarding and is displayed in Figure 13 for the shipment of an individual Energrow ES3750B oilseed press from their warehouse in Toronto, Ontario to the airport in Kathmandu, Nepal.

A1 FREIGHT FORWARDING

Canada & Worldwide Cargo Express

Thank you for taking the time to contact us.
A1 Freight Forwarding is pleased to help you reduce your shipping costs.

Please note that we have based our quotation on the dimensions and weight that you have provided.
Should there be any variation in the dimensions or weight of your shipment, we will prepare a revised quotation.

AIR FREIGHT - GENERAL CARGO SHIPMENTS

FROM: Toronto (Our warehouse)
TO: Kathmandu - Nepal (Airport)

SHIPMENT TYPE: Commercial cargo

Type	Qty	Dimensions	Weight
Box	1	200 x 260 x 210 cm	660 lb

AIR FREIGHT RATE	3.30 $ CAD / KG ALL IN
ACTUAL WEIGHT	298.98 KG
VOLUME WEIGHT	1820.00 KG
CHARGEABLE WEIGHT	1820.00 KG
AIR FREIGHT	6006.00
TERMINAL & SCREENING FEE	409.00
PROCESSING FEE	75.00
SURCHARGES	0.00
TOTAL:	**6490.00 $ CAD**

The final invoice will be based on the actual weight and dimensions from the cargo receiving terminal.

Additional and optional services are: Pick up, Insurance and Palletizing (Not included in quote above).
Please note that, according to the carrier's instructions, some freight must be palletized prior to shipment and that the volume of your shipment may increase upon palletizing. Check with us for details.
Warehouse Fee (if applicable): 50.00 $CAD per 1 Heat Treated Pallet.

Quote includes all charges up to the cargo's arrival at the airport.
Rates do not include destination charges, customs clearance, duties and taxes.

Figure 13: Air freight quote number 152157 from A1 Freight Forwarding (A1 Freight Forwarding, 2015)

As shown in figure 13, the cost of the freight for Energrow's oilseed press is approximately 6,500 dollars. Combined with the purchase price of approximately 30,000 dollars (Energrow, 2015) the total cost of the press once it arrives in Nepal is 36,500 dollars. The route that the cargo would take is shown in figure 14 below. It is assumed that the cost of transporting the oilseed press from Energrow's manufacturing facility in Listowel, Ontario to A1 Freight Forwarding's warehouse in Toronto, Ontario would be negligible. The substantial cost associated with freight from Toronto to Kathmandu does, however, pose a burden on the export potential of the Canadian oilseed presses, especially given the small per capita income of Nepalese citizens (World Health Organization, 2015)

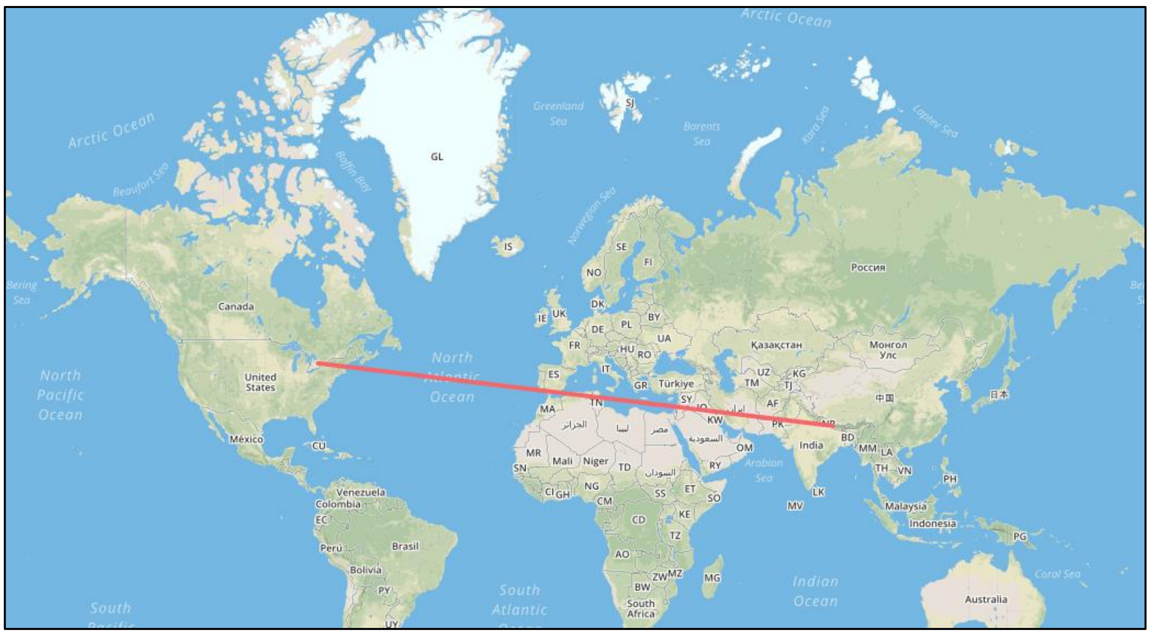

Figure 14: Air transport route taken from warehouse in Toronto to airport in Kathmandu, Nepal (retrieved from www.google.ca/maps)

Competitive Products from Other Nations

Energrow's ES3750B is considered a small oilseed press as it has a marginal five horsepower motor and a small capacity of around one tonne of material per day (Energrow, 2015). There are competing oilseed presses produced in other nations that have similar output capacities and design. These products have been presented in table 4, to compare the various features of each model.

Table 4: Comparison of products from other nations that are competitive with Energrow's ES3750B Canadian-made oilseed press

Company Name	Manufacturing Location	Oilseed Press Model	Press Features
Shreeji Expeller Industries	Lundhiana, India	VK-10 Oil Expeller Catalogue #: SHREEJI VK-10	• 10 hp motor • Process 1-2 tonnes per 24 hours • Cast iron construction • Resulting oilseed cake is not compressed into feed pellets (Shreeji Expeller Industries, 2015)
Anyang Gemco Energy Machinery Co. Ltd. (GEMCO)	Henan, China	Screw oil expeller YZS-68	• 8 hp motor • Process 0.8-1 tonnes per 24 hours • Simple design, easy to operate and low maintenance • Resulting oilseed cake is not compressed into feed pellets (Gemco Energy, 2015)
Alvan Blanch	Wiltshire, England	XP100 Oil Expeller	• Cold pressing system • Process 150 kg of material per hour • Resulting oilseed cake is not compressed into feed pellets (Alvan Blanch, 2015)

The actual costs of these competing oilseed presses would need to be recovered to complete a more thorough comparison; however, the competing presses all offer the advantages of reduced shipping costs. Two of the manufacturers listed in table 4 are located in the neighbouring countries of China and India, while the third is still located much closer than Canada. Additionally, Shreeji Expeller Industries is well prepared for exports since it already sends its products to over thirty countries worldwide (Ahreeji Expeller Industries, 2015). However, Energrow's press may actually be more desirable in Nepal since it further processes the resulting oilseed cake into feed grade pellets, which can then be fed directly to livestock, unlike the competing units which do not have this feature (Energrow, 2015). This added feature may make the exportation of the Canadian oilseed press more feasible than oilseed presses from other nations, because it allows Nepalese producers to achieve greater financial benefit through feeding the pelleted feedstuff to their livestock. The setup for the Shreeji VK-10, Gemco YZS-68 and Alvan Blanch XP100 oil expellers are illustrated in figures 15, 16 and 17 respectively.

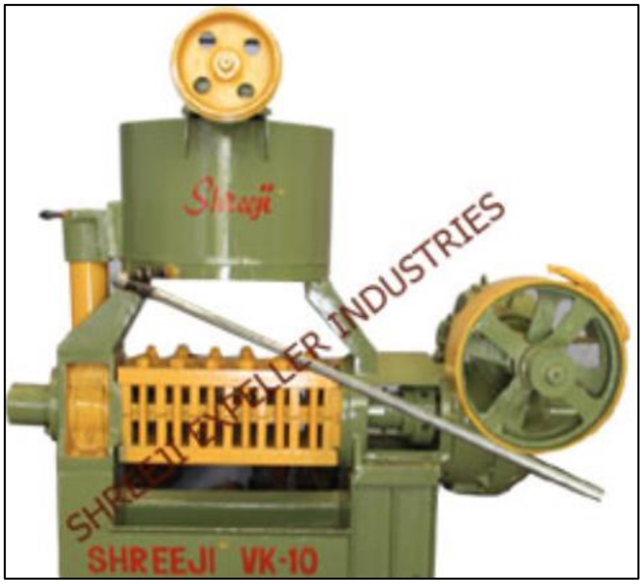

Figure 15: Shreeji VK-10 Oil Expeller (Shreeji Expeller Industries, 2015)

Figure 16: Gemco YZS-68 Screw Oil Expeller (Gemco Energy, 2015)

Figure 17: Alvan Blanch XP100 Oil Expeller Press

Conclusions, Recommendations and Product Distribution

There is no apparent negative impact on Nepalese citizens resulting from the export of a soybean press from Canada to Nepal, and it is expected that the technology should have a positive impact Nepalese farmers and communities alike. Since there are already substantial imports of Soybean oil from other nations, the press should not create competition among Nepalese farmers, but should instead make soybean oil and soybean meal more accessible by increasing local production (FAO, 2015). The oilseed press would not be marketed to individual farmers, but would instead be targeted towards farming communities, because of the moderate capital investment required to purchase the technology. A community-based approach would allow the capital investment to be split amongst several farmers, allowing them to rotate through the use of the equipment. For example, if 14 farmers invested in one oilseed press, then each farmer would have access to the machine for one day every other week. This would allow each farmer to have fresh soybean meal for their livestock and a constant supply of soybean oil, thereby providing them with a less fragmented income stream throughout the year. There would not be a substantial number of these units purchased in Nepal, meaning that a stand-alone distribution chain would not be feasible for this product. Instead, it would be more efficient to join the distribution channel for similar equipment that is already being sold in Nepal. For example, Agricultural Equipment Factory Ltd is an agricultural equipment and seed distributer located somewhat centrally in Birgunj, Nepal (Nepal Business Database, 2015). If the Agricultural Equipment Factory or a similar business could be secured as a distributor of the Canadian oilseed press, Nealese farmers would be able to purchase the equipment from an already trusted retailer.

Feder et al. (1985) combines extensive research on the adoption of agricultural innovations in developing nations and draws the conclusion that it is difficult to predict whether a new technology will be adopted in a developing nation because there are several social, cultural and economic influences. Further analysis is required to better quantify the potential market among farming communities in Nepal and their willingness to uptake the technology; however, based on the critical analysis in this report, it can be concluded that the export of an economical soybean press to Nepalese communities can give them a competitive advantage for soybean production. Having local access to a soybean press would allow Nepalese farmers to produce a quality protein supplement for their livestock with many opportunities for the oil itself.

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