

Exporting Canadian hybrid 1 Pearl Millet Seed as a Dual- Purpose Seed for Nepalese

Farmers

Kerry Parker

Introduction

A potential export idea from Canada to Nepal is hybrid 1 Pearl Millet seed. This product would be used as a dual-purpose seed to aid in the farming practices of the Nepalese farmers. This export idea is expected to give benefits to both the importing and exporting nations. In order to use this seed type as a potential export to Nepal, a great deal of research has been collected to determine whether or not this product is a logical commodity to export. By researching the properties of this pearl millet seed variety and its potential benefits to both importing and exporting nations, it could be determined that the hybrid 1 pearl millet seed may be a reasonable product of choice to export to Nepal.

Part 1: Information on the Hybrid Pearl Millet Seed

Product Description

A potential product I plan on exporting to Nepal is Canadian No.1 Hybrid Pearl Millet seed. This form of pearl millet seed can be described as a cereal grain that is best known for its ability to grow in areas prone to drought (Kusaka et al, 2005). Pearl Millet is also defined as a warm season crop that gets approximately 3-6 feet in height depending on growing conditions it is placed in (Myers, 2016). Figure 1 shows an image of pearl millet growing in a field. This crop is ideal for subsistence and low-resource agriculture because they are able to thrive in areas such as Africa and India where drought, low organic matter content, low clay content, leached soil,

acidic soil, and high temperatures are relevant (Andrews et al, 1992). It also has quick root development and has the ability to utilize nutrients and moisture from the soil in an efficient manner. This is because of the plant's long roots that descend both downwards and laterally into the soil (Myers, 2016).

Figure 1.



Retrieved from:

<http://www.agweb.com/article/hybrid-pearl-millet-may-resolve-some-forage-sorghum-concerns-naa-university-news-release/>

Nutritional Value Of Pearl Millet

Hybrid Pearl Millet contains a high calorific value as a forage crop. As displayed in Figure 2, Pearl Millet has a higher amount of amino acids and a higher range or protein when compared to sorghum (Andrews et al, 1992). Pearl Millet have a higher digestibility rate because they do not acquire the condensed polyphenols much like the tannins which are found in sorghum (Vadez et al, 2012). Pearl Millet is generally composed of 69% of carbohydrates, 12% made up of

proteins, ash and fiber are approximately 2.5%, 5% is lipids and the remaining 11.5% made up of moisture content (Andrews et al, 1992). All of which aid in its overall nutritional value.

Figure 2.

Table I
Protein Content and Essential Amino Acid Composition of Pearl Millet and Sorghum Grains^{a,b}

Amino acids	Pearl Millet					Sorghum			
	No. of samples	Range (g 16 g ⁻¹ N)	Mean	Amino acid score ^c	Pattern ^d (g 16 g ⁻¹ N)	No. of samples	Range (g 16 g ⁻¹ N)	Mean	Amino acid score
Lysine	280	1.59–3.80	2.84	52	5.5	412	1.06–3.64	2.09	38
Threonine	29	3.17–5.66	4.07	102	4.0	29	2.12–3.94	3.21	80
Valine	29	4.38–7.67	6.01	120	5.0	29	3.84–6.93	5.40	108
Methionine									
+ cystine	29	1.43–3.96	2.71	77	3.5	24	1.80–2.69	2.36	67
Isoleucine	29	3.70–6.34	4.56	114	4.0	29	2.85–5.05	4.17	104
Leucine	29	8.62–14.80	12.42	177	7.0	29	10.12–17.60	14.67	210
Phenylalanine									
+ tyrosine	29	6.54–10.81	8.49	142	6.0	29	6.11–10.72	8.87	148
Protein (%)	280	6.40–24.25	12.30			412	4.60–20.25	11.98	

^a Determined by ion exchange chromatography.

^b Adapted from Jambunathan *et al.* (1984) in Rooney and McDonough (1987). Reprinted with permission from the publisher (see ICRISAT, 1987).

^c Percentage of recommended pattern.

^d From FAO/WHO (1973), p. 67.

Retrieved from: <http://www.sciencedirect.com/science/article/pii/S0065211308609360>

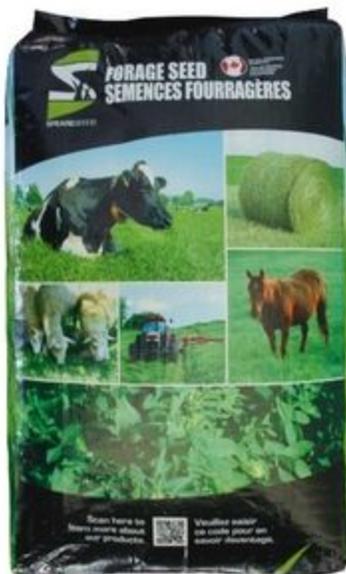
No.1 Hybrid Pearl Millet Seed from Speare Seeds

Canada is not a very large contributor in terms of hybrid pearl millet seed production as there are very few producers in Canada (Agriculture Environmental Renewal Canada, 2005). Speare Seeds is a Canadian company located Harriston, Ontario and specializes in an extensive variety of turf and forage seeds (Speare Seeds, n.d.). Figure 3 shows the Speare Seeds company logo.



Retrieved from: <http://creativelandscapedepot.com/suppliers.php>

This company has been serving Canadian farmers all across Canada for over 40 years (Speare Seeds, n.d.). They also acquire 20 full-time employees and 25 seasonal workers as well as use seed growers to produce their turf and forage seeds and seed blends (Hoewing, A., personal communication, October 02, 2016). They are able to offer a hybrid pearl millet seed that is enriched with high protein levels, and does not prussic acid while under high heat stress (Speare Seeds, n.d.). Table 1 displays all contact information available for the Speare Seeds company.



Retrieved from:

https://www.homehardware.ca/en/rec/index.htm/Outdoor-Living/Yard-Maintenance/Garden-Seeds-Bulbs/Garden-Seeds/Grass-Seeds/25kg-Pasture-Grass-Seed/_/N-ntlj4/R-I5065494

AERC Inc. is another Canadian company that exports hybrid pearl millet seed. However, AERC Inc. sells this seed type for a higher value. This potentially makes it more expensive and

possibly unaffordable for the majority of Nepalese farmers (Agriculture Environmental Renewal Canada, 2005).

Table 1. Contact Information for the Speare Seeds Company.

Contacts		Hours of Operation	Speare Seeds
President: Rick Elliott	relliott@speareseeds.ca	Monday- Friday 8:00am- 4:30pm	Phone: 519-338-3840
General Manager/ Turf Genius: Scott Bowman	sbowman@speareseeds.ca		Fax: 519-338-2510
Sales & Marketing Manager: Brandy McCarey	bmccarey@speareseeds.ca		Email: info@speareseeds.ca
Accounting A/P: Kristy Kelly	kkelly@speareseeds.ca		Address: 99 John St. N, PO Box 171, Harriston, ON, N0G 1Z0
Accounting A/R: Christine Bowman	christine@speareseeds.ca		
Shipping & Receiving: Bob Dowler	shipreceive@speareseeds.ca		
Office Manager: Krista Hale	khale@speareseeds.ca		
Sales: Amanda Hoewing	amanda@speareseeds.ca		
Forage Specialist: Kevin Crispin	forage@speareseeds.ca		

(Speare Seeds, n.d.)

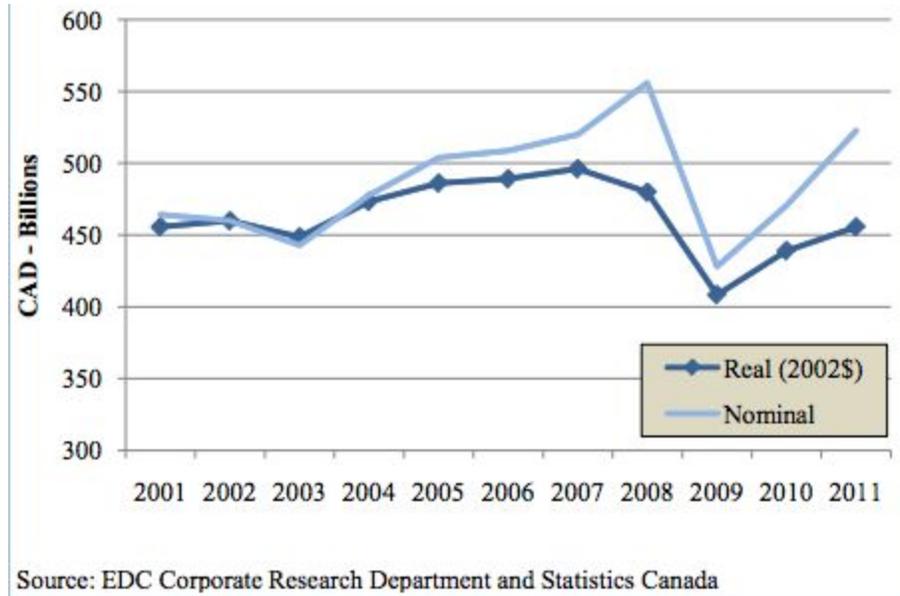
Benefits to Canada by Exporting Hybrid Pearl Millet Seed

By exporting hybrid pearl millet seed from Canada to Nepal, potential benefits could arise to the exporting nation. The Speare Seeds company will be able to obtain a reasonable profit for their products due to the fact that a large quantity would be used to export to Nepal (Hoewing, 2016). Since the Speare Seeds company is a small, locally owned business with few employees, there could potentially be more job opportunities available in terms of seed growers due to the fact that a large quantity of this seed would need to be manufactured in Canada (Hoewing, 2016).

Another beneficial factor that may arise from exporting this seed may be by the creation of a more diverse market for the Speare Seeds products. This may be a potential outcome considering this company only distributes its products across Canada. Opening this market up to Nepalese farmers could possibly expose their business potential (Moeller, 2012). This may also develop a wider range of clients for Canada to export products to other countries, creating more stable market conditions that can withstand fluctuations (Global Affairs Canada, 2012).

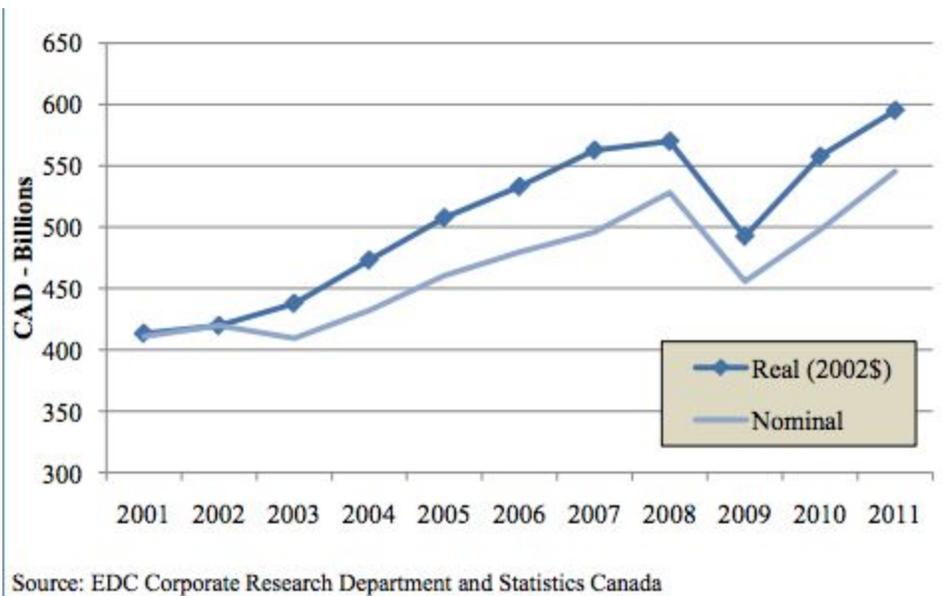
Exporting pearl millet seed out of Canada will likely contribute to increasing Canada's export growth. Figure 3 displays a graphical representation that shows Canada's real exports over the given timeframe. Figure 4 displays a graphical representation that shows Canada's imports over the same given time frame (Moeller, 2012). These graphs indicate that Canada has been importing significantly more products from other countries than exporting. Exporting pearl millet seed to Nepal could potentially add to the rise of Canada's export growth, aiding in the relief of past declination in exports (Moeller, 2012).

Figure. 3



Retrieved from:
<http://www.edc.ca/EN/Knowledge-Centre/Economic-Analysis-and-Research/Documents/canadian-integrative-trade-performance.pdf>

Figure. 4



Retrieved from:
<http://www.edc.ca/EN/Knowledge-Centre/Economic-Analysis-and-Research/Documents/canadian-integrative-trade-performance.pdf>

Not only will exporting pearl millet increase trade, but it will also better Canada's Gross Domestic Product. This may occur due to a greater yield of products being exported as well as a larger range of services being utilized throughout the process of exportation (Global Affairs Canada, 2012). This will likely give a greater value for the total amount of seed being produced, processed and shipped (Moeller, 2012).

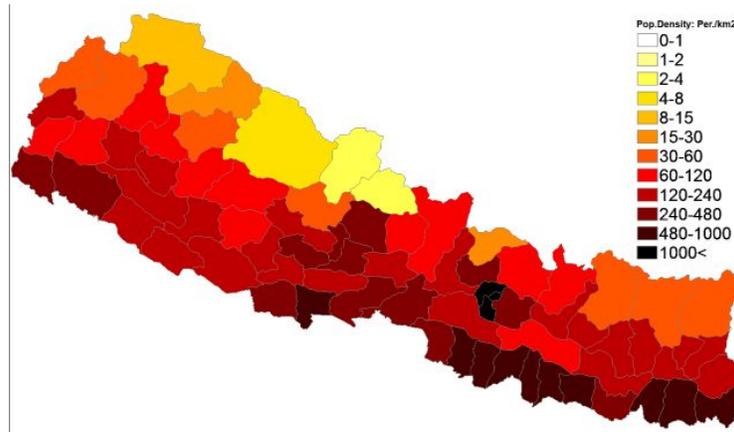
Diversification of trading partners is a key factor when considering the exportation of goods out of Canada. By obtaining a diversification in trading partners, Canada may diminish a potential threat of an economic fluctuation in a region or other country, resulting in a possible deterioration of Canada's economy (Moeller, 2012). Trading diversity with other countries may also present a beneficial factor by allowing exporters to take advantage of emerging market opportunities. This will allow for continuous and a potentially greater volume of products being exported (Global Affairs Canada, 2012).

Part 2: Critical Analysis of Potential Benefits to Nepal

Introduction to Nepal

Nepal is a developing country in Southern Asia landlocked between India and China (Central Intelligence Agency, 2016). Out of all the countries in South Asia, Nepal has the second greatest poverty rate as well as the lowest income per capita (Pyakuryal et al, 2010). The country has a population of 29 million people with approximately 16% residing in urban areas and the other 84% residing in rural areas (Hussein et al, 2011). Figure 5 is a population density map of Nepal and shows that the majority of the Nepalese population reside in the terai regions.

Figure 5.

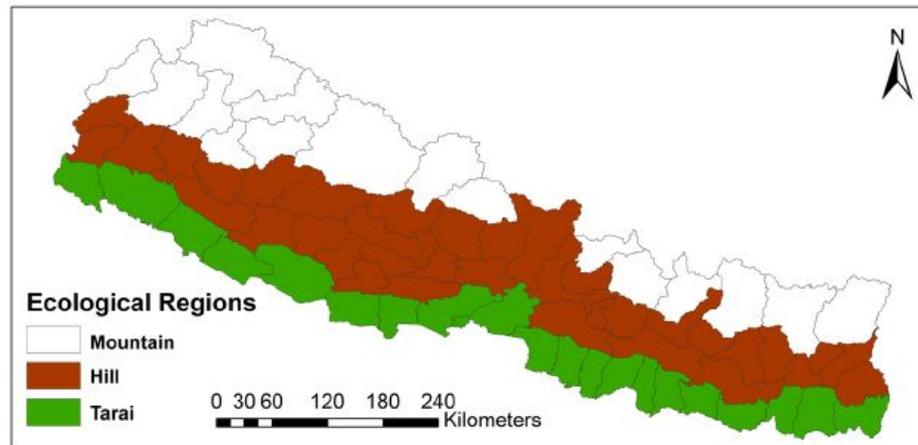


Retrieved from:

http://popdensitymap.ucoz.ru/news/86_population_density_administrative_boundaries_map_of_nepal/2015-04-27-103

A major challenge for the socio-economic development of Nepal has been the diverse topographical landscapes and political instability (Hussein et al, 2011). This country also has a great deal of gender inequality as well as a very low human development index of 0.6 (Hussein et al, 2011). The terrain in Nepal can be defined by one of three ecological sectors: the terai region, the hill region and the mountain region (Hussein et al, 2011). In Nepal, 28.8% of the land is currently being used for agricultural purposes. 15.1% of the land is arable, 1.2% is permanent crops, and 12.5% is made up of permanent pasture (Central Intelligence Agency, 2016). Figure 6 is a map that displays the three major topological regions in Nepal: the mountain region, the hill region, and the terai region.

Figure 6.



Retrieved from: https://www.researchgate.net/figure/281202065_fig1_Figure-1-Ecological-regions-in-Nepal

Livestock and forage/ fodder crop production are mainly generated in the mountain region in Nepal in order for nepalese farmers to feed and raise livestock to make a profit (Giri et al, 2013). Seeing as Nepalese farmers do not have a strong access to modern farming technologies nor farming accessories, they are forced to follow traditional farming practices that labor intensive and require continuous upkeep (Bhatta et al, 2010). Many farming practices in Nepal are typically composed of monocropping systems that lack the usage of agrochemicals (Bhatta et al, 2010).

Agriculture is one of the largest sectors in Nepal because it represents 29.4% of the country's Gross Domestic Product and employs nearly 69% of the labor force in Nepal (Central Intelligence Agency, 2016). Employees in the agricultural sector mainly contribute to the processing of agricultural products and commodities such as grain sugarcane, pulses, tobacco, and jute (Central Intelligence Agency, 2016).

The land in Nepal is currently undergoing land deterioration issues such as crop reduction and soil erosion (Thapa, 2003). It has been discovered that wood is in demand to be used as firewood in Nepal, a result of rapid deforestation methods are used to meet this demand. It is this deforestation that creates these land deterioration issues in Nepal (Thapa, 2003). Due to the lack of fodder and forage crops available for Nepalese farmers, livestock declination is an unfortunate result (Shrestha, 2015).

Benefits to Nepal

It is evident that Nepal is struggling in terms of being able to feed livestock, preventing land degradation, and economic issues. The use of Hybrid Pearl Millet seed may have the ability to aid in the improvement of all of these cases. Improving the variety of forage seed in Nepal may also lead to advantages regarding improved livestock health, prevention of land degradation, and improvement of the Nepalese economy.

Improvement of a Forage Seed

Unfortunately, Nepal is a country that is prone to drought, high soil toxicity, and diseases that are able to wipe out crop yields (Central Intelligence Agency, 2016). The Hybrid Pearl Millet is a warm season crop that contains excellent drought resistance properties and has the ability to survive in areas with little precipitation (Jain et al, 1997). This seed is also thought to have advanced soil acidity properties, meaning it is capable of withstanding acidic soils with a

pH lower than 5 (Rai et al, 1999). Hybrid Pearl Millet is able to withstand higher levels of soil toxicity than Sorghum, which is currently one of Nepal's most popular forage crops (Rai et al, 1999). Pearl Millet Hybrids are further more efficient at resisting disease and pathogens such as *M. Incognita*, which is a common nematode in corn (Timper et al, 2002). This seed could be an improvement for Nepalese farmers and smallholders who are trying to raise and sell livestock through the use of sedentary systems.

Improvement of Livestock Health and Sustainability

A major issue with Sorghum in Nepal is its tendency to produce prussic acid when undergoing drought like conditions. However, Pearl Millet does not produce Prussic acid, making it safe for ruminant consumption and grazing (Leblanc et al, 2012). Hybrid Pearl Millet has also been acknowledged for exhibiting greater gains in beef cattle and water buffalo (Andrews et al, 1992). This has been seen in pastures planted both early in the growing season, as well as late in the growing season (Andrews et al, 1992). This seed also holds a high amino acid, protein, and fatty acid content levels, which are beneficial towards its nutritional value (Andrews et al, 1992). This would make the Hybrid Pearl Millet seed a valuable asset to Nepalese farmers because they would be able to provide a safe feed with a greater nutritional value and higher yields. It would also allow Nepalese farmers to make a larger profit off of their livestock and livestock commodities.



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Useful As a Cover Crop

Soil erosion is a common issue that deteriorates the land in Nepal as a result of poor climate conditions, steep hillsides, invasive human activity, and delicate geology (Zheng-an et al, 2016). Hybrid Pearl Millet is able to create a large amount of biomass aboveground as well as reduce the presence of weeds because of its effective nutrient uptake (Garland et al, 2011). Utilizing this seed may reduce the amount of labor for women weeding fields in Nepal, as well as minimize injury in women (Halbrendt et al, 2014).

Hybrid Pearl Millet Seed may also potentially aid in this preventing soil erosion on hills and terraces by its high-density roots which keep the soil bound together (Begum et al, 2014). It also has quick root development and can take advantage of nutrients and moisture from the soil in an effective manner. This occurs due to the plant's long roots that descend both downwards and laterally into the soil to hold it together (Myers, 2016). By this logic Hybrid Pearl Millet seed could be beneficial to Nepalese hillside/ terrace farmers, as well as women.



Retrieved from: <http://www.fotolibra.com/gallery/666695/village-girl-farming-nepal/>

Improvement of Economy

If Nepal were to import this seed from Canada they would likely be able to export their own livestock and livestock commodities, thereby increasing Nepal's GDP and Export statistics (Moeller, 2012). With an Increasing yield of livestock and livestock commodities, the use of the Hybrid Pearl Millet seed may also allow for more job opportunities to compliment an increase in productivity and yields. Thereby lowering the poverty line in Nepal.

Distribution Pathway

Seeing as the Speare Seeds company only distributes their products within Canada, Transportation to Nepal is a challenge. The speare seeds company would first need to transport the seed to Mississauga Ontario where it would be dropped off at a shipping port in pallets. This would be executed by trucking the seed to Mississauga by the use of the Speare Seeds company

owned trucks (Hoewing, A., personal communications, October 02, 2016). The A1 Freight Forwarding company is a freight company that will then pick up the pallets of Hybrid Pearl Millet Seed and ship them using ocean freight from Mississauga, Ontario to Kolkata, India (Younge, K., personal communication, November 25, 2016). The remaining transportation methods would then be left up to the Nepalese consumer to proceed with the shipping and distribution of this product as they wish.

Cost Analysis

The Speare Seeds company sells their Hybrid Pearl Millet seed in 50 lbs seed bags for \$3.00 CDN per pound, and applied using 25lbs per 1 acre (Hoewing, A., personal communication, 2016). For one 50lb bag of seed, it costs \$150.00 CDN. By conversion the cost of one 50 lb seed bag of Hybrids Pearl Millet will cost ₹12271.08. This may be expensive for many subsistence farmers, but will likely lead to a greater profit in the end. Table 2 represents the approximate costs of all the companies involved in exporting this product, as well as the approximate overall cost of the product and shipping this it to Nepal.

Table 2. Approximate Costs of Exporting 4 Pallets of 2000 lbs Each of Hybrid Pearl Millet Seed From Canada to Nepal.

Cost of 4 Pallets of 2000 lbs Each of Hybrid Pearl Millet Seed	Cost of Speare Seeds Trucking Company	Cost of Ocean Freight by A1 Freight Forwarding	Total Approximate Cost
\$24000.00 CDN	\$183.38 CDN	\$1882.24 CDN	\$26,065.63 CDN

(Crispin, K., personal communication, November 5, 2016), (Hoewing, A., personal communication, October 02, 2016), and (Younge, K., personal communication, November 25, 2016)

Main Issues with Exporting Hybrid Pearl Millet Seed

Competitive Products from Other Nations

Although exporting Hybrid Pearl Millet seed from Canada to Nepal would potentially present many beneficial factors to both importing and exporting nations, there are some setbacks to this product's distribution. One issue exporting this seed arises is that pearl millet is already produced and distributed in many parts of Asia and India. Thereby making it more efficient and most likely less costly to import pearl millet seed from one of these neighboring countries (Rai et al, 1999).

Cost

Seeing as this product is relatively expensive, it is most likely that wealthy livestock producers or large livestock operations in Nepal will purchase this product. If this were to occur, then the yields and demand of these farmer's products may increase. The drawback to this situation is mainly towards the subsistence farmers in Nepal who are producing livestock and are not able to afford to this seed. Thereby potentially risking unemployment of many Nepalese citizens and inducing poverty (Wellisz, 1957).

Summary of Recommendations

To conclude, Hybrid Pearl Millet seed has great potential as a dual-purpose seed for Nepalese farmers. It offers an improved forage seed type, the improvement of livestock health, the prevention of land degradation, and the improvement of the Nepalese economy. All of which allow this seed to be of great use to Nepal.

In regards to future exporters, a suggestion that could be made to improve exportation to Nepal could be to use a company in Canada that already ships to India or Nepal. This would decrease the amount of additional charges and fees needed to ship products. It could also be suggested to ship relatively smaller amounts of products to in order to keep costs low and ensure affordability of the importing nation.

Future Research of Hybrid Pearl Millet Seed

There are still many unknowns about that require research of the Hybrid Pearl Millet seed as well as further development (Andrews et al, 1996). This includes improved germination features, an improved tolerance to herbicides, improved threshability, the production of new hybrid parents, improved resistance to blight, market development, and continued research (Andrews et al, 1996). Further research could include the use of Hybrid Pearl Millet in subsistence agriculture and its uses as a forage crop in ranging climates (Andrews et al, 1992). All of which may

potentially lead to further discoveries regarding the Hybrid Pearl Millet seed and its potential as a forage crop.

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