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**Section: Monday 2:30-5:30 P.M.**

**AGR 1110**

**November 24, 2014**

**AC Hazlet Rye Seed: A Prospective Canadian Export To Nepal**

**Introduction**

Nepal a country that is growing, technologically, and agriculturally, very quickly. While Nepals' technological and agricultural development may be behind Canada, it does not mean that Canadian technology cannot contribute to the growth and development of Nepal. AC Hazlet fall rye seed is a very prospective crop to export from Canada to Nepal, with many benefits to both Canada and Nepal from this possible exchange. This paper will introduce AC Hazlet fall rye seed, explain how it works and where it is from, map out the process of getting this product to Nepal, describe how it is going to benefit both Canada and Nepal, and clarify many other points of interest.

## **Part 1: Product Information**

### **AC Hazlet Fall Rye**

AC Hazlet rye is a fall rye variety that was developed by Canadian breeder Dr. Grant Macleod of Agriculture and Agri-Food Canada (SeCan, 2014). AC Hazlet rye is a medium sized rye variety, with higher or similar yields and higher kernel weights (average of 35.8mg/kernel) compared to other commercial winter and fall rye varieties grown in Canada (SeCan, 2014). The AC Hazlet rye variety has very good resistance to both lodging and shattering, contributing to a decreased loss of grain before and during harvest (SeCan, 2014). The AC Hazlet rye variety also does very well against winter damage, has excellent winter hardiness traits with a winter survival of 89%, and can germinate in temperatures as low as -1°C to 2°C while vegetative growth requires a temperature of at least 4°C (SeCan, 2014), (Ontario Ministry of Agricultural Food and Affairs, 2012).

Figure 1. AC Hazlet Rye Compared to Other Rye Varieties

**Cooperative Fall Rye Registration Trials (2000-2003)**

Variety	Grain Yield % of Prima	Test Weight (kg/hl)	Kernel Weight (mg)	Height (cm)	Maturity (days)	Winter Survival (%)	Lodging Resistance 1=upright 9=lodged	Ergot (%)
Prima	100	71.1	29.8	103	210	85	3.2	0.20
AC Rifle	87	69.2	27.5	75	211	71	1.3	0.20
Dakota	118	68.9	29.6	95	213	89	3.3	0.25
<b>AC<sup>®</sup> Hazlet</b>	<b>113</b>	<b>71.9</b>	<b>35.8</b>	<b>93</b>	<b>213</b>	<b>89</b>	<b>2.4</b>	<b>0.31</b>

**Saskatchewan Varieties of Grain Crops 2006 – Fall Rye Comparison**

Variety	Years Tested	Grain Yield % of Prima Area 1 & 2	Grain Yield % of Prima Area 3	Maturity	Winter Damage	Shattering	Lodging
Prima	16	100	100	M	VG	F	F
AC Rifle	16	98	90	M	VG	VG	VG
AC Remington	5	109	97	M	VG	VG	G
<b>AC<sup>®</sup> Hazlet</b>	<b>3</b>	<b>120</b>	<b>104</b>	<b>M</b>	<b>VG</b>	<b>VG</b>	<b>VG</b>

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[https://www.secan.com/en/data/files/\\_workspace/secan\\_searchvalues/R016/AC%20Hazlet%20July%202007%20Gene.pdf](https://www.secan.com/en/data/files/_workspace/secan_searchvalues/R016/AC%20Hazlet%20July%202007%20Gene.pdf)

Cover crops such as fall rye play a significant role in sustaining soil productivity and soil quality (Ontario Ministry of Agricultural Food and Affairs, 2013). Rye is an excellent cover crop that has many functions that are beneficial to farmers, these functions include, soil erosion prevention, weed suppression, nitrogen and nutrient scavenging, organic matter addition, and soil structure building (Ontario Ministry of Agricultural Food and Affairs, 2009). Rye is very effective in preventing wind and water erosion and it is commonly grown for this function (Ontario Ministry of Agricultural Food and Affairs, 2013). The top growth of the rye crop covers the soil surface, protecting the soil from strong winds, and the impact of rain. While the top growth covers the soil surface, the very fibrous and extensive root system of rye, that can reach depths of two metres and a radii of one metre stabilizes and binds soil particles to improve soil structure and further prevent soil erosion (Ontario Ministry of Agricultural Food and Affairs, 2013), (Ontario Ministry of Agricultural Food and Affairs, 2012). Rye is an

outstanding scavenger of nitrogen left behind in the soil from previous manure applications or the previous planted crop (Ontario Ministry of Agricultural Food and Affairs, 2013). These nitrogen-scavenging abilities of rye prevent nitrogen losses due to leaching in the soil, and also prevents potential nitrate contamination in bodies of water located near pertaining fields (Ontario Ministry of Agricultural Food and Affairs, 2013). The extensive root system of rye may also help to increase the concentration of potassium at the soil surface (Ontario Ministry of Agricultural Food and Affairs, 2012). When rye is harvested, only the grains of the crop are collected, while the remaining vegetative part of the plant remains in the field (M. Bujnowski, personal communication, November, 2014). This remaining vegetative growth can be harvested for emergency forage, be grazed on by livestock, or can be left in the field as a crop residue (Ontario Ministry of Agricultural Food and Affairs, 2009). If the residue of rye is left on the field after grain harvest, the nutrients held in the plant tissue will be restored to the soil to be used by the succeeding crop in the next season (Ontario Ministry of Agricultural Food and Affairs, 2013). Rye crop residue also contributes a large amount of organic matter back to the soil, which has very positive effects on the soil and for the crop grown in the subsequent season (Ontario Ministry of Agricultural Food and Affairs, 2012). Fall rye has an allelopathic effect against many weeds, inhibiting weed germination and weed growth, these allelopathic effects have been found to reduce total weed biomass by 60-95% in the succeeding year that rye has been grown and the crop residue has been left on the field (Ontario Ministry of Agricultural Food and Affairs, 2012) (Oelke, E, et, al., 1990). Little to no herbicides may be required for fall rye as fall rye is sensitive to herbicides and if the competitive

growth of the rye crop establishes a vigorous canopy early in the season, weed growth will be suppressed (Ontario Ministry of Agricultural Food and Affairs, 2012).

Fall rye grows more quickly, matures earlier than other wheat cereals, is the hardiest and most disease resistant crop of the wheat cereals, and it is commonly grown under conditions where other cereals fail (Ontario Ministry of Agricultural Food and Affairs, September 2012), (Gramene Secale, n.d.). Fall rye is very drought tolerant, more so than wheat or oats, but thrives best in a moist environment (Ontario Ministry of Agricultural Food and Affairs, 2012). When compared to other cover crops, rye is superior in all characteristics associated with cover crops (see Figure 2.) (Ontario Ministry of Agricultural Food and Affairs, 2009).

Figure 2. Fall (winter) Rye Compared Against Other Cover Crops

Species	Building Soil Structure	Weed Suppression	Grazing Potential	Quick Growth	Root Type
<b>Grasses</b>					
Spring cereals	Good	Good	Very good	Very fast	Fibrous
Winter wheat	Good	Good	Very good	Fast	Fibrous
Winter rye	Very good	Very good	Very good	Very fast	Fibrous
Sorghum sudan	Good	Good/Fair	Very good	Very fast	Coarse fibrous
Pearl millet	Good	Good/Fair	Good	Fast	Coarse fibrous
Ryegrass	Very good	Fair/poor	Good	Slow to establish	Fibrous
<b>Broadleaves - Legumes</b>					
Hairy vetch	Good	Fair/poor	C <sup>2</sup>	Slow to establish	Tap with secondary fibrous
Red clover	Good	Fair	C <sup>2</sup>	Slow to establish	Weak tap/fibrous
Sweet clover	Good	Fair	C <sup>2</sup>	Slow to establish	Strong tap
Soybeans	Poor	Good/fair	C <sup>2</sup>	Fast	Tap
Field peas	Poor	Good/fair	C <sup>2</sup>	Fast	Weak tap/fibrous
<b>Broadleaves - Non-Legume</b>					
Buckwheat	Poor	Very good	Poor	Fast	Weak tap/fibrous
Oilseed radish	Fair	Very good	Good	Fast	Moderate tap
Other brassicas, i.e., forage radish	Fair	Very good	Good	Fast	Moderate tap
<b>100 kg/ha = 90 lb/acre</b>					
<sup>1</sup> Oilseed radish, buckwheat and the grasses do not fix nitrogen from the air but are scavengers of nitrogen from soil and manure applications. <sup>2</sup> Clover legumes make good feed or grazing, however feeding pure legumes can cause bloat.					

## **Where is AC Hazlet Rye Produced and Who Produces It?**

AC Hazlet rye is grown by farmers across Canada, from Southern Ontario, to the Albertan prairies (SeCan, 2010). SeCan is the largest supplier of certified seed to farmers across Canada, and the AC Hazlet rye variety is sold through SeCan (SeCan, 2010). SeCan contracts farmers from all over Canada to sow, grow, and harvest the AC Hazlet rye crop, which will be sold back to SeCan, who will process the rye grain and send it to local certified seed distributors all over Canada, where the seed can be purchased (SeCan, 2010). Horizon Seeds Canada, out of Courtland Ontario is a local distributor of the AC Hazlet rye variety, where seeds can be purchased by the bag (55lb), or through premium contracts (Horizon Seeds Canada Inc., 2014). The AC Hazlet rye seeds costs \$18 Canadian or 1588 Nepalese rupees for a 55lb bag of seed, which sows approximately 3/4s of an acre (R. Van Laecke, personal communication, September, 2014).

## **Seeding, Growth, Harvest, and Labour Required for AC Hazlet Rye**

Fall rye is to be planted in late August or early September to allow for the crop to grow 4-6 weeks before cold hardening and vernalization occurs due to the weather conditions (Alberta Agriculture and Rural Development, 2011). Fall rye should be sown on a field that has not been very recently tilled (Alberta Agriculture and Rural Development, 2011). Fall rye is normally seeded with a hoe drill or a minimum tillage drill, but in cases like Nepal where these types of equipment may not be available, it is possible for the rye to be broadcast sown onto the field (Alberta Agriculture and Rural Development, 2011), (M. Bujnowski, personal communication, November, 2014). An optimal seed depth of 1-1.5 inches is required for the best emergence results, the field

should be lightly tilled after seeding to ensure the adequate seed depth and a packer wheel should be used to ensure seed-to-soil contact occurs and to enhance winter hardiness and establishment of the crop (Alberta Agriculture and Rural Development, 2011). As long as the fall rye crop receives an adequate 4-6 week growth period before cold temperatures arise, the fall rye crop should survive well over the winter, as fall rye can tolerate temperatures as low as  $-35^{\circ}\text{C}$  without receiving much damage (Ontario Ministry of Agricultural Food and Affairs, 2012).

Phosphorus should be applied to the soil during the process of seeding while nitrogen can be broadcasted in the spring (Alberta Agriculture and Rural Development, 2011). To decrease nitrogen losses, it is best to apply the nitrogen shortly before a rainfall is expected to occur (Alberta Agriculture and Rural Development, 2011).

Herbicide application may be required, and should be applied at 3-4 leaf stage if needed (M. Bujnowski, personal communication, November, 2014). Insecticide application may be required if there is significant crop damage due to insects, and should be applied early in the mornings when it is cooler and pests will be most prevalent (M. Bujnowski, personal communication, November, 2014).

When kernel moisture content is around 40-45% the rye crop should be swathed, and left to air dry in the field (Alberta Agriculture and Rural Development, 2011). When kernel moisture is below 20%, the field can be combined and the grain can be further dried artificially (Alberta Agriculture and Rural Development, 2011). If the use of a swather is not possible, swathing can be skipped, and the rye field can be combined when kernel moisture is below 20% (Alberta Agriculture and Rural Development, 2011). Omitting from swathing will result in increased shattering from the rye crop, and a volunteer crop

issue for a few years (Alberta Agriculture and Rural Development, 2011). Rye is considered dry enough when kernel moisture is below 14%, the grain can be safely stored at this moisture level and it is unlikely for mold to develop (Alberta Agriculture and Rural Development, 2011).

Overall, fall rye does not require extensive amounts of labour outside of initial seeding and harvest, and possible pesticide application if needed. It is a very hardy crop and grows well under many conditions (Ontario Ministry of Agricultural Food and Affairs, 2012).

### **Issues with AC Hazlet Rye**

Some issues may arise in the cultivation of AC Hazlet rye, but the majority of these problems can be fixed or avoided. Fall rye crops are susceptible to a crop disease called ergot, this disease causes the growth of purplish-black bodies, replacing some of the grains on the head of the crop (Oelke, E, et, al., 1990). Ergot is harmful to both humans and animals, and if found in grain, should be removed by immersing infested rye grain in a water-salt solution (Oelke, E, et, al., 1990). To prevent the incidence of ergot, fall rye should be put in a 2-3 year rotation (Oelke, E, et, al., 1990). The allelopathic effects of fall rye may affect or inhibit the growth of other grass-like crops including corn, to determine whether this may be an issue, a farmer should grow a small test plot to determine inhibition due to the rye (Ontario Ministry of Agricultural Food and Affairs, 2012). Many other crops such as soybean, tobacco, and potatoes can still be grown in rotation with rye without the allelopathic effects (M. Bujnowski, personal communication, November, 2014).

## **Market Opportunity**

Rye grain is a cheap and affordable grain that can be processed into rye flour and used to make rye bread (Gramene Secale, n.d.). Rye, on its own, has a substantial amount of carbohydrates and fibre, is a very good source of manganese, magnesium, and phosphorous, and is also a good source of protein and iron (SELF Nutrition Data, 2014). Rye grain is cheaper than wheat (rye is currently priced at \$5.84/bushel, while wheat is averaging at \$6.54/bushel), and as Nepal is a poorer country, it would be more sustainable to incorporate a cheaper grain into the market, so that citizens can easier afford food to meet their nutritional requirements (Manitoba Agricultural Services Corporation, 2014). The product can be sold as rye flour, or already baked into breads or other goods, and at a cheaper cost compared to wheat products. AC Hazlet rye grain, once processed, is a product that would be required by a large amount of the population, as it would be more affordable than wheat, drawing interest from poorer citizens to feed their families.

As rye grain is cheaper to purchase over other cereal crops like wheat, it may sway Nepalese farmers to purchase rye grain and grow the crop in their fields as an alternative to other cereals that may be grown (Manitoba Agricultural Services Corporation, 2014).

There would also be a niche market for rye grain thru the wealthier population of Nepal. The rye grain can be sold from farm and processed at distilleries, where the grain can be made into rye whiskey, and sold across Nepal, and worldwide. There are a handful

of whiskey distilleries in Nepal including Chandika Distillery and Highland Distillery Ltd. (Chandika Distillery, 2014).

### **Benefits To Canada**

Selling AC Hazlet rye to Nepal will benefit Canada because SeCan will purchase these rye seeds from their contracted Canadian farmers, who will in turn profit from these sales (SeCan, 2010). The increased demand for the AC Hazlet rye from SeCan will require SeCan to contract out more farmers to grow the AC Hazlet variety, giving a larger profit to, and supporting more Canadian farmers. The increased demand of rye to be exported to Nepal may also cause an increase in the price of rye per bushel. This increase in rye prices will give Canadian farmers producing fall rye a larger payout than normal, supporting not only the farmers contracted under SeCan, but also farmers producing fall rye nationwide.

Purchasing large amounts of rye seed from Horizon Seeds for this new variety will provide more money to a growing local business, and will be supporting growth of this small, family-run company (Horizon Seeds Canada Inc., 2014). As demand grows, the AC Hazlet rye seed can be purchased from other local seed distributors in Ontario, and in the prairies as well, such as from Belterre Seeds out of La Salette Ontario or Rugg Seed Farm in Elstow Saskatchewan (Secan, 2010). As demand increases, more local seed distribution businesses will be supported in the process, allowing for growth of the companies, and the possible requirement for more employment in these companies.

SeCan is a very large supporter of plant breeding in Canada, as most of the varieties distributed through SeCan were developed by Canadian breeders under publicly

funded organizations such as universities, Agriculture and Agri-Food Canada, and provincial agricultural ministries (SeCan, 2010). SeCan has also returned over seventy million dollars in royalties and research funding back to Canadian breeding programs in support of Canadian plant breeders and improved agricultural sustainability for the future (SeCan, 2010). The increase in purchased AC Hazlet rye will increase profit back to SeCan, who in turn will eventually provide more money to the breeders of Canada who are developing new crop hybrids to create a more sustainable, profitable, and viable seed industry in Canada (SeCan, 2010).

### **Environmental Sustainability in Growing/Manufacturing in Canada**

The province Saskatchewan produces the most rye in Canada, but fall rye is also produced in Alberta, Manitoba, and some parts of Ontario (Canadian Grain Commission, 2013) (M. Bujnowski, personal communication, November, 2014). Rye requires little additional maintenance, and is very good at scavenging nutrients (especially nitrogen), it is also great at preventing the leaching of nitrogen from the soil into aquifers and bodies of water (Ontario Ministry of Agricultural Food and Affairs, 2013).

The farmers in Ontario who grow fall rye are typically tobacco or potato farmers (M. Bujnowski, personal communication, November, 2014). The farmers who grow fall rye in Ontario use the erosion preventative, and soil structure-building capabilities of the fall rye, as tobacco and potato crops require heavy amounts of tillage, destroying soil structure and increasing the possibility of erosion (M. Bujnowski, personal communication, November, 2014). Fall rye, when left on a field as residue after harvest also provides a substantial amount of organic matter to the field, and also returns any

unused nutrients stored in the plant back into the soil (Ontario Ministry of Agricultural Food and Affairs, 2013). The production of rye crop across Canada will improve the soil structure while preventing nitrogen leaching in the soil, and also will provide organic matter back to the soil once harvest is complete (Ontario Ministry of Agricultural Food and Affairs, 2013). All of which factors improve the environmental sustainability of the soils in which the AC Hazlet rye will be grown.

## **Part 2: Export Potential To Nepal**

### **Transportation Logistics**



Farmers contracted to produce AC Hazlet rye thru SeCan, will sow, grow, and harvest the AC Hazlet rye. When the seed has been harvested and dried, the seed will be collected and transported by truck to the nearest SeCan facility or certified AC Hazlet rye seed distributor, where the seed will be processed and packaged. If the seed has not already been transported to the seed distributor, it will be transported by truck from SeCan to a certified seed distribution company, such as Horizon Seeds. It is assumed that SeCan and the seed distribution companies have their own methods of seed transportation for these processes. A general freight carrier company such as Cavalier Transportation Services Inc. would transport the AC Hazlet seeds from Horizon Seeds to Cavalier's

warehouse distribution centre in Toronto, or directly to the distribution warehouse or port for A1 Freight Forwarding, which is also located in Toronto (Cavalier, 2014), (A1 Freight Forwarding, 2014). A1 Freight Forwarding is a world-wide cargo service provider located out of Toronto Ontario (A1 Freight Forwarding, 2014). From Toronto the seeds will be packaged and shipped on on pallets, with approximately fifty seed bags per pallet. The ship will leave from a port in Toronto Ontario, and arrive at a port in Calcutta India (A1 Freight Forwarding, 2014). From Calcutta India, the seed pallets will be transferred into a distribution warehouse for A1 Freight Forwarding, where the AC Hazlet rye seeds will be picked up by TCI Freight, and transported to a seed distributor in Kathmandu Nepal, who will sell and deliver seeds to Nepalese farmers (TCI Freight, n.d.).

As long as the AC Hazlet seeds have been properly dried, and have a kernel moisture content below 14%, there should not be any issues with transportation of the product due to spoilage, mold, or mites (Alberta Agriculture and Rural Development, 2011).

### **Benefits to Nepal**

AC Hazlet fall rye seed is targeted to Nepalese farmers in the hill and mountain regions, as AC Hazlet rye germinates in, can grow in, and cold hardens in the cooler temperatures, that are found in these regions in the fall and winter seasons (Ontario Ministry of Agricultural Food and Affairs, 2013). AC Hazlet fall rye will be a very beneficial crop for Nepalese farmers as it has many versatile uses.

Through the production and harvest of the AC Hazlet rye grain, Nepalese farmers have the option to sell the harvested rye grain to grain processing companies. The farmers will earn an extra income from the rye grain, to help support their families, and through this extra income, may be able to expand their farms. At the grain processing factories, the rye grain can be processed into rye flour where it can be sold on its own to Nepalese citizens, who will be able to bake breads and other goods to feed their families, or to sell at the market. A portion of the rye flour produced at the grain-processing factory may also be sent to large-scale bakeries, where rye bread and other goods can be produced from the rye flour (Gramene Secale, n.d.). The production of fall rye by Nepalese farmers may result in an increase in demand for fall rye grain, and will create more jobs in grain processing facilities, large scale bakeries, and provide income to Nepalese citizens selling baked rye goods at the market.

Rye grain may also be sold to distilleries in Nepal, where whiskey is produced. This also has the potential to increase jobs in this business sector in Nepal.

Nepalese farmers may also choose to keep some of the rye grain for themselves, which they can use in animal feed for any livestock that may be grown on the farm (Gramene Secale, n.d.). The farmer may also have the rye grain processed at a local mill, where it would be ground into rye flour, which would allow for Nepalese farmers to feed their family over the cold winter.

The residue of the crop left in the field post-harvest may be used by the farmer to feed their livestock (if they own livestock), through pasture grazing (Gramene Secale, n.d.). The residue of the crop may also be collected, dried, and stored as extra forage for livestock in cases where there is a short supply of livestock feed (Gramene Secale, n.d.).

The farmer may also sell this forage to other farmers if they do not own livestock, but neighbouring farmers do, and require extra feed.

As Nepal is experiencing serious soil erosion issues due to the terrain, intensive agriculture, torrential rain, and more, the extensive fibrous root system that fall rye has will help to promote soil structure, prevent soil erosion, and prolong the use of fields for farmers in the hill and mountain regions (Shrestha, D., 1997).

Nepalese farmers also have the option of leaving the crop residue post rye harvest on the field, which will increase the soil organic matter on the their fields, and return some nutrients back to the soil (Ontario Ministry of Agricultural Food and Affairs, 2013). This should decrease the fertilizer costs in the subsequent year, the allelopathic effect of fall rye should decrease the herbicide requirements in the succeeding growing season as well (Oelke, E, et, al., 1990).

Largely, introducing AC Hazlet rye into the Nepalese markets should financially and physically support farmers, bring more jobs into the grain processing, large-scale baking, and distillery industry, prevent soil erosion and improve the soil structure on farmlands, and introduce a cheaper grain alternative to a poorer nation.

### **Sales/Marketing Strategy for Selling AC Hazlet Rye in Nepal**

A number of different pamphlets should be produced and mailed to certain companies in Nepal to grab the attention of the companies and spark their interest in AC Hazlet fall rye. Descriptive pamphlets explaining the growth process and growing requirements of AC Hazlet rye, along with statistics comparing AC Hazlet rye to other rye varieties should be sent to all seed distribution companies in the Hill and Mountain

regions of Nepal. These pamphlets are to educate seed distributors on fall rye and the AC Hazlet variety, and encourage them to order the seed, and hand out pamphlets to their customers. Pictographic pamphlets with little writing should also be sent to these seed distribution companies, these pamphlets are for the Nepalese farmers who are not educated and cannot read, the pictures are to be descriptive and the pamphlets should spark interest in the farmers. Interest from the farmers will result in them asking their seed supplier about the product, and getting more information from the salesperson.

Pamphlets should be sent to distilleries and grain processing facilities in Nepal, these pamphlets would explain the benefits to purchasing rye within their own country, and encourage these companies to educate farmers on AC Hazlet rye and encourage the farmers to grow rye under contracts with these companies.

If it is not overly expensive, sales representatives educated on the AC Hazlet fall rye variety, and on rye in general should be sent to travel around the farming regions in Nepal, to speak to seed distributors and farmers, educating them on AC Hazlet rye, and encouraging them to grow the product.

### **Documentation Required To Export AC Hazlet Rye Into Nepal**

When exporting AC Hazlet rye seed from Canada, the documentation required by the Canadian government includes: a Canadian certificate of origin, a business number with an import/export account, and classification of the goods based on the harmonized system (Canada Business Network, 2014).

To import AC Hazlet rye seed into Nepal, the documentation required by the Nepalese are: an import permit for plants, a license for seed traders, permission for

import/export of seeds, a phytosanitary certificate, and a permission for foreign investment and technology transfer (Nepal Government Portal, 2012).

### **Regional and Global Competition**

The Dakota fall rye variety provides the greatest regional competition to AC Hazlet rye. Dakota fall rye has higher production yields compared to AC Hazlet, while AC Hazlet fall rye has higher kernel weights and higher lodging resistance (SeCan, 2014). The Dakota fall rye variety has been on the market longer than the AC Hazlet fall rye variety as well (SeCan, 2014). The Dakota fall rye variety is not being marketed to Nepal, so there is little competition in regards to a market for fall rye in Nepal against other Canadian rye varieties.

Through research on Alibaba, China does not seem to present competition in the area of rye seed (Alibaba, 2014). Though there seems to be much production of grain sieves, grain sorters, and grain grinders from China, there are no sales of rye seed (Alibaba, 2014). The sale of rye grain in bulk is present overseas, with most countries of sales origin being in Europe. Very few grain prices are available, but available prices are much lower than the cost of AC Hazlet rye, with prices ranging from 250-350 USD per metric tonne (Alibaba, 2014). These bulk sales do not mention whether this grain is to be used for crop production or for food production, and do not make mention of crop varieties or growth traits (Alibaba, 2014). These bulk sales would appear to present more competition to the Nepalese farmers who would be selling their grain to grain processors over selling AC Hazlet rye seed to Nepalese farmers.

## **Contact Information of Canadian Companies and Freight Services**

For further AC Hazlet product information, and bulk purchasing information: SeCan

Head Office: Telephone: (613)-592-8600 Email: [seed@secan.com](mailto:seed@secan.com)

For assistance with marketing strategies and sales components to Nepal: Martin Harry,

Eastern marketing manager with SeCan: Telephone: (519)-423-6933 Email:

[mharry@secan.com](mailto:mharry@secan.com)

For sales inquiries through Horizon Seeds: Telephone: (519)-842-5538

President of Horizon Seeds: Rick Van Laecke: Office Telephone: (519)-842-5538

Mobile: (519)-983-7255

Cavalier Canadian terminal, logistics and distribution centre: Telephone: (905)-951-8785

Cavalier Canadian terminal, transportation services: Telephone: (514)-448-0815

A1 Freight Forwarding: Telephone: 905-499-2710

TCI Freight: Telephone: +91-124-238-1603 Fax: +91-124-238-1611

## **Future Studies Required to Fully Evaluate Export Potential of AC Hazlet Rye**

Further networking and research needs to be performed to locate seed distribution companies within Nepal. It is assumed that most of these companies do not have company websites, as their customers most likely do not have access to the internet, meaning that in depth networking through the Nepalese government, and people of Nepal is needed to find these businesses.

Further research and studies are required to determine the exact shipping dimensions and weights of the seed pallets to be sent to Nepal. Further studies must also be done to determine the spending allowance Nepalese farmers have with regards to

amount of land owned. Networking with SeCan and Horizon Seeds is required to determine whether cheaper, bulk prices of AC Hazlet rye are available. These factors will allow for a more effective cost-benefit analysis to determine whether the price point is realistic or not, and if AC Hazlet rye is still suitable for Nepalese farmers.

Further studies are needed to determine whether there is international competition in selling fall rye to Nepal, and to determine if this is already being done, and at what price the rye seed is selling for.

## **Conclusion**

AC Hazlet rye is a sustainable crop that will feed farmers, livestock, and Nepalese citizens. AC Hazlet will bring new business to Canada and benefit Canadian farmers, breeders, and seed distribution companies. It is hardy and can grow in many weather conditions, will promote soil structure, prevent erosion, provide soil nutrients in a crop rotation, and yield high amounts of grain (Ontario Ministry of Agricultural Food and Affairs, September 2012). AC Hazlet rye will create new markets and will produce jobs for many citizens (such as grain and food processing, grain transportation), provide income to farmers, and create an inexpensive food source for citizens of Nepal.

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