

**Norstar Winter Wheat Trade Opportunities with
Nepal Jessica Fletcher**

PRODUCT INFORMATION

Climatic Disadvantages

Canada experiences very diverse climatic factors throughout the country (Government of Canada, 2009). All regions of the country encounter each of the four seasons with warmer



<http://www.familylifecanada.com/wp-content/uploads/2015/01/bigstock-lonely-tree-at-four-seasons-ti-12116381-800x450.jpg>

temperatures in the south, close to the border with United States, and colder, more harsh temperatures experienced in the north. In the prairies, located in the midwestern part of the country, the winter season is particularly harsh and dry (Government of Canada, 2009).

These seasonal extremes cause massive production issues for the farmers located in the prairie provinces as the environment is not always favourable for the crops grown there. As the majority of wheat production is located in the prairie region, stagnated production, even through these harsh and inhospitable winter months, reduces the crop yield that is able to reach the market (Agriculture and Agri-Food Canada, 2013). A reduction in product reaching the market dictates lower profits for all involved. The solution to this stall in wheat production is a hardy winter wheat seed that can be harvested in the spring.

Winter Wheat

Winter wheat is a cereal grain and a member of the grass family (OMAFRA Staff, 2009), that can survive the winter months before being harvested the following spring. It can be grown anywhere which meets the requirements of ample snow cover or mild winters in order to avoid

the plant dying (termed “winter kill”) (Canadian Organic Growers Inc, 1992). Along with the benefits of the head start on crop growth, which is a significant benefit of winter wheat, it also aids in the reduction of soil erosion and soil compaction in the spring. It produces straw which can be left on the field or used for livestock, creates pores in the soil for aeration purposes, improves soil tilth, and provides a quality residue for the field. Lastly, winter wheat can be grown in almost any soil type, including heavy soils, provided there is no surface water due to poor drainage; surface water will cause winter kill due to the freezing of the standing water (Canadian Organic Growers Inc, 1992).



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Norstar Winter Wheat

Few crops grown on the Canadian Prairies are at the same competitive level as winter wheat (Bayer Crop Science and Ducks Unlimited Canada, n.d.). A proven reliable winter wheat breed is Norstar winter wheat. It is a hardy red winter wheat strain developed by Agriculture and Agri-Food Canada, located in Lethbridge, Alberta, and released to the public in 1977. Norstar was synthesized through the combination of previous winter wheat varieties, Winalta and Alabaskaja (Alberta Agriculture and Forestry, 2007). The result was increased winter hardiness, allowing survival through the harsh winter months that the Canadian prairies are famous for.

As Norstar is a winter wheat, it requires planting in the fall in order to germinate, then it will enter a state of dormancy once colder temperatures arrive. It will not complete its growth

cycle until closer to spring when the wheat experiences temperatures between zero and five degrees Celsius (Curtis, n.d.). This unconventional early planting, compared to spring wheat, is what allows for winter wheat's early harvestability. The advantage of being able to harvest a crop early allows for an increase in production. Winter wheat specifically takes advantage of the normally unproductive winter months and puts the land to use where other crops are not able to survive and thrive through harsh weather conditions.

Export Benefits to Canada

Norstar winter wheat, as it was created by Agriculture and Agri-Food Canada, provides royalties that are filtered back into the government-run system (Agriculture and Agri-Food Canada, 2015). These royalties contribute to both the Canadian government and the country's overall economy. With money being channelled into Agriculture and Agri-Food Canada's monetary resources, more opportunities, such as research and product development, are possible



http://cdnseed.org/wp-content/uploads/2011/08/globeflag_new.jpg

with the financial sustenance provided through the selling and marketing of Norstar. This is one of the most significant benefits when it comes to Norstar.

Another benefit to the exportation of Norstar to countries around the world is the ability to showcase to potential customers what Canada is capable of when it comes to plant genetics. Norstar is a hardy wheat seed that can survive very extreme conditions with low or below zero degree celsius temperatures. If other nations around the world experienced the benefits of winter wheat, especially Canadian winter

wheat, they would realize the quality products that Canada produces and invest more money into obtaining agricultural commodities from our country.

Lastly, exporting Norstar provides the opportunity for an increase in Canadian jobs. In order for Norstar seeds to be produced for the use of farmers worldwide, the product needs to be grown in a field with certain constraints placed on it. A grower is contracted by a seed company for the sole purpose of growing Norstar winter wheat (Fletcher, R., personal communication, November 19, 2016). The farmer contracted by the seed company prepares the fields for planting, and tends the crops as outlined by the seed company in order for the wheat to mature in a strictly controlled setting. The crop is then harvested once it has completed the growth cycle. Seed companies process the seeds further and add appropriate additives such as herbicides. Bulk and packaged seeds are transported worldwide through various methods such as truck, train, or seagoing vessels (depending on the final destination) (Fletcher, R., personal communication, November 19, 2016). All of these steps require manpower, translating into viable jobs for Canadians both at home and abroad.

Transportation of Wheat Seed

Farmers have relied heavily on freight transportation in order to transport wheat around their country as well as to other countries (Denicoff, M.R., Prater, M.E., Bahizi, P, 2014). This poses a major problem for a country such as Nepal as it does not have access to seaports, therefore causing a reliance on their neighboring country, India. Trucks are then required to move the seeds through India into Nepal, and distribute



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the packaged product around the country to the receiving farmers.

Disadvantages of Norstar

Although Norstar winter wheat has huge benefits to the farmer, including heightened tolerance to varied winter conditions, the seed is no longer produced in large quantities for planting at this time. It was created and released to farmers almost forty years ago. Further advancements that are more beneficial have since been made in the winter wheat sector. This likely has led to Norstar taking a back seat, in a manner of speaking, to the newer and more advanced varieties on the market. Norstar is now most commonly reserved for research and genetic advances for the development of other varieties. This poses a substantial complication when it comes to marketing and promoting Norstar, especially with regards to exporting the winter wheat seed to other countries around the globe. There are other Canadian winter wheat options currently on the market and available for exportation. Another wheat variety with these characteristics would be a better option with more marketable opportunities.

Priesley Winter Wheat

A more practical hard red winter wheat variety option is Priesley, sold by C&M seeds,



http://www.outdoorfarmshow.com/wp-content/uploads/2015/08/logo_cm-seeds-570x397.png

located in Palmerston, Ontario (C&M Seeds, 2016). This seed has the best yield for a hardy red winter wheat, with its yield being the most stable while including a steady increase in yields year to year (Go Cereals, 2016).

Priesley also boasts of excellent fusarium and leaf disease tolerance, increasing the ability to

achieve high yields, however the plants mature later in comparison to other winter wheat varieties resulting in a later harvest (C&M Seeds, 2016). Priesley provides all of the same benefits that Norstar does, but with increased yield and disease tolerance.

EXPORT POTENTIAL TO NEPAL

Overview of Nepal

Nepal is a small country in South Asia with a land area of 147,181 kilometers squared, comprising approximately 0.03 percent of the total land area on Planet Earth (Government of Nepal, 2016). It is located between the two South Asian countries of India and China. This locale renders Nepal to be completely landlocked, making both China and India Nepal's crucial allies and biggest trade partners. Nepal is multi-lingual as well as multi-religious, and happens to be home to the tallest mountain peak in the world, Mount Everest (Government of Nepal, 2016). The country is divided into 3 climatic regions, the Terai, Hills and Mountain regions, ranging from the south to north end of the country respectively (Pariyar, 1998). Nepal also contains the world's greatest variation in altitudes across its country, allowing for a large variety of agricultural products to be grown and produced here (Joshi, Mudwari, Bhatta, 2006).



<http://i.infopls.com/images/mnepal.gif>

Nepal experiences varying average temperatures, across the three regions, with the whole country's average temperature lying between 9 and 12 degrees Celsius throughout the winter

months (“The Best Time to Come to Nepal,” 2012). In the mountain regions these temperatures are much lower, often in the sub zero area, dictating the minimal variety of crops that can be grown. Farmers who live in these areas experiencing sub zero temperatures, among other harsh weather conditions commonly experienced during the winter season, are limited as to timing and type of crop they can plant. Due to the varied agro-ecological diversity of Nepal, wheat can be grown as both a spring and winter field crop (Joshi, Mudwari, Bhatta, 2006). Winter wheat allows for the continuation of the growing season for the farmer as it can be grown in this unfavorable climate, and also be harvested early compared to spring wheat.

The main religion practiced in Nepal is Hinduism. A core tradition in this religion is the



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avoidance of certain animal products including beef and pork products. Due to this dietary limitation, those who follow this creed are in need of other food stuff, mainly plants. Wheat is tied with maize as the second highest consumed cereal crop in Nepal

constituting 12 to 15 percent of total national cereal crop consumption (World Bank, n.d.).

Currently, the wheat produced in Nepal is primarily used for bread and biscuits, while continuing to increase its important role in the Nepalese economy (Joshi, Mudwari, Bhatta, 2006).

Benefits to Nepal

The most common farming practice found in Nepal is subsistence farming (Chapagain, T., personal communication, September 16, 2016). In the hill region, more than 90 percent of

farmers are subsistence farming, managing an average of 0.63 hectares of cultivated land (Neupane, 2001). Subsistence farming is based on the ideal that all the goods produced, both livestock and field crops, are directed back to feeding their family and livestock and providing other necessities for the farmer's family (Subsistence Farming, n.d.). Although this method provides a food source for the family, often it is not sufficient for the traditionally large family with little to no profits providing for other necessities. As mentioned above, the average farmer has a very small amount of land to work and needs to reap as much profit as possible in order to survive. When the cold temperatures arrive, their small plot is forced to stand vacant until more favourable weather arrives. Winter

wheat, such as Priesley, has the ability to bridge the gap between fall and spring for these rural farmers, giving them hope for more abundant produce and a chance to feed their families. If combined with the farmers current



<http://dc-cdn.s3-ap-southeast-1.amazonaws.com/dc-Cover-b117c463nufgqfc0ok38op7cj7-20160610121418.Medi.jpeg>

cropping habits, it presents the opportunity for surplus crops, therefore leading to the freedom of trade and the attainment of monetary profits to help pay expenses and sustain the farm in other ways.

With the addition of extra money for the rural farmer, he will then in turn invest the money into a shop, equipment, or something of the like, by purchasing the products and equipment needed from other local business owners. This business person pays taxes to the

Nepalese government such as, corporate income tax, social security contributions, municipal business tax, and property tax (The World Bank, 2015). A cycle is produced with the farmer receiving monetary gain from his surplus produce, spending this money in a local business who then has received added support to continue their venture, taxes are paid to the Nepalese government in order to continue the business's existence, and the government now has added money to aid in the importation of a foreign product; in this case a Canadian winter wheat such as Priesley.

Lastly, a benefit to both Norstar and Priesley is their resistance to shattering; the wheat head will retain its seeds rather than let them all drop to the ground as they reach maturity (Alberta Agriculture and Forestry, 2007). This characteristic allows for a drastic decrease in the number of people required to harvest the plants, therefore saving the farmer both time and money. He is able to simply gather the wheat, stem and all, rather than trying to harvest each small grain from the ground. It saves the farmer from added physical and financial stress with the decreased need of outside hires, and being able to rely on his family to harvest the crop efficiently and in a timely manner.

Utilization of Canadian Wheat Genes in Nepal

Nepal utilizes 89 ancestor wheat genes from 22 different countries in its current wheat production practices. This represents the large diversity that Nepal contains when it comes to cultivar genes as shown in the chart below (Joshi, Mudwari, Bhatta, 2006).

Table 1: Ancestors of 35 Nepalese Wheat Cultivars and their Origin (Joshi, Mudwari, Bhatta, 2006)

S N	Name	Abb	Origin Name	Origin Abb	Growth Habit	Species
1	21931	21931	ISREAL	ISL	?	AESTIVUM
2	36896	36896	AGRENTINA	ARG	?	AESTIVUM
3	8A	8A	INDIA	IND	?	AESTIVUM
4	8B	8B	INDIA	IND	?	?
5	9D	9D	INDIA	IND	?	AESTIVUM
6	AKAGOMUGHI	AGM	JAPAN	JPN	WINTER	AESTIVUM
7	ALFREDO CHAVES 6.21	AC	BRAZIL	BRA	SPRING	AESTIVUM
8	B4946.A.4.18.2.IY	B4946	?	?	?	?
9	BONZA	BZA	COLUMBIA	COL	SPRING	AESTIVUM
10	BREVOR	BVR	USA	USA	WINTER	AESTIVUM
11	BUNGE NO 2	BN2	?	?	?	?
12	BUTTON	BUTTON	?	?	?	AESTIVUM
13	C13	C13	INDIA	IND	SPRING	AESTIVUM
14	C209	C209	INDIA	IND	SPRING	AESTIVUM
15	CARIANCA422	CAR422	CHILE	CHL	WINTER	AESTIVUM
16	CENTENARIO	CTR	BRAZIL	BRA	SPRING	AESTIVUM
17	CHRIS	CHR	USA	USA	SPRING	AESTIVUM
18	CLEMENT	CMT	NETHERLANDS	NLD	WINTER	AESTIVUM
19	CPAN1687	CPAN16 87	INDIA	IND	SPRING	AESTIVUM
20	DAVIS6301	D6301	USA	USA	?	AESTIVUM
21	DEMOCRATE	DO	USA	USA	?	AESTIVUM
22	EL GAUCHO	ELGAU	ARGENTINA	ARG	SPRING	AESTIVUM

Opportunities with Nepal

23	FEDERATION	FR	AUSTRALIA	AUS	SPRING	AESTIVUM
24	FLORENCE	FLO	?	?	?	?
25	FROCOR	FCR	BRAZIL	BRA	SPRING	AESTIVUM
26	FUFAN17	FFN	CHINA	CHN	SPRING	AESTIVUM
27	FURY	FURY	KENYA	KEN	SPRING	AESTIVUM
28	GABO-AUS	GB	AUSTRALIA	AUS	SPRING	AESTIVUM
29	GAZA	GAZA	EGYPT	EGY	SPRING	DURUM
30	GENERAL URQUIZA	GU	ARGENTINA	ARG	SPRING	AESTIVUM
31	HARD FEDERATION	HF	AUSTRALIA	AUS	SPRING	AESTIVUM
32	HARDRED CALCATT	HRC	INDIA	IND	SPRING	AESTIVUM
33	HOPE	H44	USA	USA	?	AESTIVUM
34	HYBRID DELHI845	HD845	INDIA	IND	SPRING	AESTIVUM
35	IUMILLO	IU	USA	USA	SPRING	DURUM
36	KANRED	KR	USA	USA	WINTER	AESTIVUM
37	KAVKAZ	KVZ	RUSSIA	RSA	WINTER	AESTIVUM
38	KENTANA48	KT48	MEXICO	MEX	SPRING	AESTIVUM
39	KENYA C6042	KC6042	KENYA	KEN	?	?
40	KENYA GOVERNER	KGV	KENYA	KEN	SPRING	AESTIVUM
41	KENYA STANDARD	KS	KENYA	KEN	SPRING	?
42	KENYA117A	K117A	KENYA	KEN	SPRING	AESTIVUM
43	KENYA256	K256	KENYA	KEN	SPRING	?

44	KENYA291	K291	KENYA	KEN	SPRING	AESTIVUM
45	KENYA324	K324	KENYA	KEN	SPRING	?
46	KENYA350-A-D9-C-2	KAD	KENYA	KEN	SPRING	?
47	KENYA58	K58	KENYA	KEN	SPRING	AESTIVUM
48	KHAPLI	KHP	INDIA	IND	SPRING	DURUM
49	KLEIN ATLAS	KLAT	ARGENTINA	ARG	SPRING	AESTIVUM
50	KLEIN RENDIDOR	KLRE	ARGENTINA	ARG	SPRING	AESTIVUM
51	LA ESTANZUELA2787C	LAEST	?	?	?	?
52	LC55	LC55	INDIA	IND	?	?
53	LERMA ROJO	LR	MEXICO	MEX	SPRING	AESTIVUM
54	MARNE DESPREZ	MD	FRANCE	FRA	WINTER	AESTIVUM
55	MARROQUI	MRQ	MOROCCO	MAR	SPRING	AESTIVUM
56	MARSALL'S NO 3	MS-A	AUSTRALIA	AUS	?	AESTIVUM
57	MCMURACHY	MCM	CANADA	CAN	SPRING	AESTIVUM
58	MIDA-U	MIDA	USA	USA	SPRING	AESTIVUM
59	MUNDIA	MUNDIA	INDIA	IND	?	?
60	NAINARI60	NAI60	MEXICO	MEX	?	AESTIVUM
61	NAPO	NAPO	COLUMBIA	COL	SPRING	AESTIVUM
62	NARINO59	NAR59	COLUMBIA	COL	SPRING	AESTIVUM
63	NEW PUSA773	NP773	INDIA	IND	SPRING	AESTIVUM
64	NORIN10	N10	JAPAN	JPN	WINTER	AESTIVUM
65	NP114	NP114	INDIA	IND	?	AESTIVUM
66	OLESEN'S	ON	ZIMBABWE	ZIM	SPRING	AESTIVUM

	DWARF					
67	P4160E	P4160E	MEXICO	MEX	SPRING	AESTIVUM
68	POLYSSU	PSSU	BRAZIL	BRA	SPRING	AESTIVUM
69	QUINTZEL	QTZ	?	?	?	?
70	RED FIFE	RF	CANADA	CAN	SPRING	AESTIVUM
71	RED MACE	RM	GREAT BRITAIN	GBR	WINTER	AESTIVUM
72	REITI	REITI	?	?	?	?
73	S339	S339	INDIA	IND	SPRING	AESTIVUM
74	SANTA ELENA	SE	USA	USA	SPRING	AESTIVUM
75	SINVALOCHO MA	SCHOM A	ARGENTINA	ARG	SPRING	AESTIVUM
76	SPALDING PROLIFIQUE	SPP	GREAT BRITAIN	GBR	?	AESTIVUM
77	STEINWEDEL	SWD	AUSTRALIA	AUS	SPRING	AESTIVUM
78	TEZANOS PINTOS RECOZ	TZPP	ARGENTINA	ARG	SPRING	AESTIVUM
79	THEW	THEW	AUSTRALIA	AUS	WINTER	AESTIVUM
80	TIMESTEIN	T	AUSTRALIA	AUS	SPRING	AESTIVUM
81	TYPE1	TYPE1	PAKISTAN	PAK	?	DURUM
82	TYPE9	TYPE9	PAKISTAN	PAK	?	AESTIVUM
83	VERNAL EMMER	VN	RUSSIA	RSA	SPRING	DURUM
84	WAGGA13	WG13	?	?	?	?
85	WEIQUE	W	DEUTSCHLAND	DEU	WINTER	AESTIVUM
86	WILHELMINE	WHM	NETHERLANDS	NLD	WINTER	AESTIVUM
87	WILLET ERONO	WTE	USA	USA	SPRING	AESTIVUM
88	WIS 245	WIS 245	?	?	?	?

89	YAKTANA54	YT54	MEXICO	MEX	SPRING	AESTIVUM
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In the table, it is shown how many foreign wheat genes have been used in Nepal in order to improve their own domestic varieties. According to the table, there are two Canadian winter wheat genes that have already been integrated into the Nepalese winter wheat varieties currently utilized by the farmers throughout the South-Asian country. The two Canadian contributions are highlighted in yellow. The Nepalese have already utilized and integrated these hardy genes from the wheat varieties produced in Canada, and are familiar with the quality that both Canadian wheat and their corresponding genes provide to the farmer. Introducing another stellar winter wheat variety such as Priesley should be well received by both the farmer and the government. The genes from Priesley could also be integrated into their current varieties, as opposed to planting the seeds and growing the specific winter wheat variety.

Associated Costs

As Norstar is not readily available for sale to farmers the price is unknown for the specific product. However, winter wheat seed is easily available and generally inexpensive for all varieties (OMAFRA Staff, 2009). A specific price for the winter wheat breed Priestley is not given, however winter wheat seed from the company West Coast Seeds is listed as \$49.99 for 25 kilograms of product. These seeds being sold are specifically grown for plowing under upon maturity in order to increase the carbon and nitrogen content of the soil for the next planted crop. Priestly would most likely cost more per kilogram as it is specifically for harvesting and not for use as a plow down crop, although it could be.

As Nepal's landscape is extremely varied across the entire country, not all areas are easily accessible (Chapagain, T., personal communication, September 16, 2016). Roads are not



<http://4.bp.blogspot.com/-YN-jjwwaej0/UZphbDR7-el/AAAAAAAAA6s/aGFV3iGGBxk/s640/Jumla2.jpg>

well maintained to all areas and maintained landingstrips or bodies of water in order to transport goods to desired areas are not common or nonexistent. This is an important factor to consider in the exportation of Canadian winter wheat as it could be expensive and even dangerous to try to transport the wheat seed to these more remote corners of the country.

On a more positive note, Nepal does not require tax on imported agricultural goods (Chapagain, T., personal communication, September 16, 2016). This removes a large and inconvenient cost for Canada, but does not entirely benefit Nepal as the government is not reaping any profit from the import. However, it is worth the venture even without the importation tax as the agriculture industry in Nepal is not booming and would benefit from an influx in production (Chapagain, T., personal communication, September 16, 2016).

Competitors

As seen in Table 1 above, Nepal gleans the majority of its wheat and wheat genes from neighboring countries; India is a large contributor. It is far less costly to import winter wheat from India as it is geographically located south of Nepal and is accessible to seaports. India has produced a large number of winter wheat varieties as it is one of the major wheat producers in the world (Curtis, n.d.). This in itself deems India to be a more desirable trade partner for Nepal

as costs would be far lower which is of significant importance to the struggling Nepalese farmers.

CONCLUSION

In conclusion, Canada produces hardy and genetically sound crops including winter wheat. Winter wheat allows for the extension of a farmer's average growing season, therefore allowing an increase in both profit and production. The Canadian winter wheat varieties, Norstar and Priesley possess these benefits as well as many added ones. Priesley, however, provides additional benefits including, heightened leaf disease tolerance and fusarium tolerance (C&M Seeds, 2016). It is prudent to remember as well that, although Norstar does come equipped with incredible benefits, it is not produced for the use of farmers, rather it is predominantly for research-based activities.

Both Norstar and Priesley winter wheat varieties have their pros and cons, with the majority of the cons being in relation to transportation. The transportation costs associated with these seeds are astronomical in comparison to seeds transported from neighboring countries such as India. With this factor in mind, it may be more economical for Nepal to simply continue importing wheat varieties from India as it is their closest trade partner. As a result, the country experiences lower transportation costs associated with importing products and can obtain a larger profit margin.

Canada would indeed benefit from the exportation of its winter wheat varieties to Nepal. Canada would receive monetary gain both for the producer and at the government level. Jobs would also increase for Canadians with the need for producers, manufacturers, transporters and

many other positions. Again, the distance between both Canada and Nepal poses a significant complication and large price tag. Canada will also benefit from exporting its winter wheat seed to other countries; however it would serve them better to explore options for trade with other countries that are geographically closer and more accessible translating into cost effectiveness for all involved.

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