

MaizeX Seed Export to Nepal

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Section 103, Monday 8:30 am

November 24, 2014

Product Description:

Hybrid corn varieties can play a very important role in the corn production in Nepal, MaizeX seeds offers products along these lines that could greatly benefit the agriculture sector in Nepal and Canada. The products that would be the most beneficial to Nepal would be the MZ 1440r variety and the more conventional variety MZ 211X. MZ 1440r is a newer hybrid, which is known for its exceptional root and stalk strength and its very fast grain dry down (MaizeX Seeds Inc., 2014). Overall it has a very attractive appearance accompanied by open husks when it comes to harvest time (MaizeX Seeds Inc., 2014). This seed variety comes with a licensing agreement on the roundup ready trait, which can limit the use of the product to Canada and the US (Winter, S., 2014). This could maybe be overcome through the use of special permission from Monsanto's. If it isn't possible, the more conventional varieties would have to be used, due to there being no constraints to where the corn seed can be used. The MZ 211X variety has many desirable traits, for example conventional corn, which in return can mean it doesn't have as many desirable traits as the round up ready varieties, but on the other hand having some other benefits to growing in Nepal. MZ 221X has superior yield potential; as well it has a very broadly adapted performance (MaizeX Seeds Inc. 2014).

Produced:

The product is produced in Tilbury, Ontario at MaizeX Seeds headquarters. The majority of the plant breeding is done on site by their plant breeder (MaizeX Seeds Inc., 2014). The way that hybrid seed corn is produced is by crossing 2 inbred lines of corn. The 2 inbred are at are used in this process are referred to as a male, which is responsible

for producing the pollen and the female, which is responsible for producing the seed (Seed Corn Growers of Ontario., 2014). Throughout the process there is great care taken in the quality of the product by breeding for desirable characteristics. Some of these things can include drought resistance, GDD days (growing degree days) and for certain conditions and climates (30 Seed Corn Growers of Ontario, 2014). The seed is then harvested and stored at the optimal temperature and moisture content (13-14%)(Paudyal et al., 2001), until the seed is bagged and distributed. The product is shipped all over Canada for the distribution to all the dealers, where it is then distributed further to the customers for use in the field (Johnson, L., 2014).

Product use:

The seed can be planted at different times throughout the spring growing season, ideally planting the seeds as early in the season after the last frost day, this in turn will allow the crop to mature early in the fall (OMAFRA Staff., 2009). This can reduce the chance of early fall frost damage, and adverse weather at harvest (OMAFRA Staff., 2009). When planting the soil temperature also come into play, the seed will not germinate unless the average temperature is over 10 degrees Celsius (OMAFRA Staff., 2009). The way that the average soil temperature can be estimated, is by taking a 10cm soil thermometer and placing it into the soil at 11:30am (OMAFRA Staff., 2009). As the optimal planting date is passed, there is approximately a change of 1% in the final yield of the corn (OMAFRA Staff., 2009). The first rule to corn planting is to plant into the moisture, the planting depth of the seed depends on where the moisture is in the soil, on average the planting depth is

1.5" or 3.75cm (OMAFRA Staff., 2009). If the seed is not correctly placed in the moisture zone, it can lead to rootless corn syndrome, which can allow the plant to be more prone to injury's from herbicide application (OMAFRA Staff., 2009).

Table 1.

Final plants/ha	Finalplants/acre	Row Width: cm (in.)						
		(28)	76	(30)	91	(36)	97	(38)
		Distance between in-row corn plants in cm (in.)						
54,300	22,000	(10.2)	24	(9.5)	20	(7.9)	19	(7.5)
59,300	24,000	(9.3)	22	(8.7)	18	(7.2)	18	(6.9)
64,200	26,000	(8.6)	20	(8.1)	17	(6.7)	16	(6.4)
69,200	28,000	(8.0)	19	(7.5)	16	(6.2)	15	(5.9)
74,100	30,000	(7.5)	18	(7.0)	15	(5.8)	14	(5.5)
79,000	32,000	(7.0)	17	(6.6)	14	(5.4)	13	(5.2)
84,000	34,000	(6.6)	16	(6.1)	13	(5.1)	12	(4.9)

1 ha = 2.47 acre; 1 cm = 0.39 in.

<http://www.omafra.gov.on.ca/english/crops/pub811/1planting.htm>

When it comes to the row-to-row spacing it can depend on the soil type, as well as the temperature of the soil. With a colder temperature soil, it is expected that there is an increase of 10% (refer to Table 1.) when it comes to the values. When planting in warmer soil conditions there can be an adjustment in the chart by 5% (OMAFRA Staff., 2009). The planting density can depend on the corn variety, with the MZ 211X variety, since its more conventional it is planted a at less plants per acre 54,000-64,000 plants per hectore, compared to MZ 1440r variety, where the hybrid variety where it can be planted more densely typically 64,000- 74,000 plants per hectore (OMAFRA Staff., 2009).

Benefits to Canada:

The sale of MaizeX Seeds to Nepal will not only benefit Nepal but will benefit Canada as a whole in many ways. The sale of seed will put more money into the Canadian economy, by providing cash flow for the country. This could potentially fund more research for MaizeX in order to produce and/or improve their products from soybeans to hybrid corn varieties. This can benefit both parties, both the Canadian farmers as well as the Nepalese farmers due to the potential of new products as well as the research information that they can provide. The seed will also be very sustainable, due to the fact that they will always be a demand for seed all around the world, this will allow for a steady supply of seed to other countries. The revenue that would come back to Canada might not be a large quantity of money to make a substantial profit for the Canadian based company, but it can provide networking to other countries about the products that they produce.

Part 2.**Transportation:**

The transportation of the bags of the corn seed to Nepal would start in Tilbury, Ontario where the headquarters/ distribution center of the seed is (MaizeX Seeds Inc., 2014). From there the seed can be shipped through UPS via package or freight. The shipping would take place directly via air to Nepal, and the total delivery time would take 11 days guaranteed (UPS., 2014). The price for one bag of seed in a package that weighs 25kg, with the dimensions 60cm x 40cm x 20cm and the estimated value of \$220.00 would be approximately \$1,297.26 Canadian (UPS., 2014). The price is found to slightly vary depending on the variety of the seed, be it the hybrid MZ 1440r or the conventional

MZ 221x. Shipping the product via ocean freight is the better option. The seeds can be shipped in a full container, or a LCL load (less-than container load) (UPS,. 2014). The same sized bag with the same dimensions, weight and value. The exact cost for this was unable to be calculated since UPS never responded with a quote. It would on the other hand be expected to cost per bag less compared to the package price, due to the fact that it would be a larger load. Also another reason that it would be expected to be less cost per bag would be because the delivery time for the container would be substantially longer, anywhere from 30-90 days (UPS,. 2014). Some of the problems that could be associated with the transport of the seeds is if the ideal moisture content for the seeds (13%-14%) was exceeded through water contact during transport. (OMAFRA Staff., 2009). If this were to occur there will be a decrease in germination percentage from approximately 90% to 64% (S, Jasper. 1940). A way that this could be prevented is by ensuring a proper seal was made on the container before transport. Once the product arrived in Nepal it would be disturbed to the communities for sale, through the use of smaller vehicles or trucks depending on the amount of product being shipped to the final location.

Post Harvest to Market:

The process of corn production from post harvest to market in Nepal is very different compared production of corn in Canada. Two thirds of the corn produced in the mid-hill and the high-hill regions is used for human consumption, the other third is sold on the market (Paudyal et al., 2001). On the other hand the corn that is produced in the terai regions exceeds the ratio of the mid-hill and high-hill region, where over 50% of the corn is sold on the market (Paudyal et al., 2001). Corn in Nepal is first harvested at maturity and the stalks are removed to allow for the development of relay crops such as

millet, which is interplanted in the corn (Paudyal et al., 2001). The cobs then are taken and sorted by size, quality and appearance, then prepared for shelling and storing (Paudyal et al., 2001). All the smaller cobs are then taken, dehusked and dried in the sun for 3-4 days until the farmer deems that they are dry enough, since moisture-measuring devices are very uncommon (Paudyal et al., 2001). The cobs are then taken and shelled by hand or with a stick, then placed loosely if they are so be consumed shortly, or placed in a container of some sort for long term storage (Paudyal et al., 2001). The larger cobs on the other hand are then taken and tied into bunches (4-6 cob) and sun dried for 4-5 days by the farmer (Paudyal et al., 2001). The cobs then stored into speciality designed open-air structures called: *Thankro, Suli or Luta* (Paudyal et al., 2001). With these open-air structures there is great care taken to ensure that they are first water and rodent proof. The purpose of the structures is to ensure that the corn has the ability to dry down to an expectable level (Paudyal et al., 2001). The stores are then opened in December or later, where then the shelling of the corn takes place (Paudyal et al., 2001). Once the corn is shelled it is stored in bamboo baskets or wooden stores for either selling on the market or for personal use (Paudyal et al., 2001). Some of the main problems that come with the storage of corn is drying to an expectable moisture level. When the summer harvesting season is up the corn has high moisture content (23%-28%)(Paudyal et al., 2001). When it comes to the storage of the corn the ideal moisture content is 13-14% moisture, and with the humid days that follow harvest the corn is usually not dry enough for safe storage (Paudyal et al., 2001).

Profitability:

The profitability of the corn for Nepal would be very limited if not at all for the Nepalese farmers. The reason for this is because the average income in Nepal is \$730 as of 2013 (The World Bank, 2014). In total price of the seed would be anywhere from \$220 to \$265 Canadian (Johnson, L., 2014), and the shipping of the seed via package being around \$1,297.26 (UPS, 2014). This in turn would make the total for one bag of seed to be bought and shipped to over \$1,500 Canadian. This price would be the minimum of what had to be paid by the Nepalese, there has to be a profitability margin for the MaizeX as well, so the price would be increased much more to make it worth it. With the newer hybrid the corn on the market would have an increased protein compared to the varieties that are used there (MaizeX Seeds Inc. 2014), this allows for an increased market value for the corn due to the increase in protein, so the farmers would be able to place a premium on the market value. With the high price and the low income of the farmers, the sale of the corn would be limited. Also with the price of the seed, it would be hard to make a return on the market if the farmers were to sell it, due to the high input costs that are involved to buy the seed initially. The way that it would be profitable for the Nepalese farmers is if the price of the seed as well as the shipping of the seed was reduced drastically, to around \$30-\$60, this would allow a return with profit for the farmers.

Environmental Benefits:

The environmental benefits that the corn would provide for Nepal are substantial. With the constant changing climate in Nepal, soil erosion plays a big role in the

agriculture production in the mid-hill and high-hill regions. The factor that has made soil erosion such a big problem is the reduction in plant density due to a drought after planting season (Paudyal et al., 2001). The corn varieties that have been bred by MaizeX have been developed in order to allow for denser planting, this in turn serves many benefits (MaizeX Seeds Inc. 2014). One of the greatest benefits that come with the dense planting is more fibrous root in order to hold the soil together (Sojka and Bjorneberg, 2002). Even after the crop is harvested the roots remain in the soil, which still provides structure and support for the soil. With the denser planting it creates a denser canopy of leaves, this slows down the rain and in turn reduces the amount of moving water hitting the soil (Sojka and Bjorneberg, 2002). The seeds provided have been proven to be very adaptable in new climate conditions (MaizeX Seeds Inc. 2014). This gives the ability to grow corn in the more remote climates, such as the mid-hill and high-hill regions of Nepal, where the climate can be more unpredictable (Paudyal et al., 2001). This allows for more compost/ organic matter in the soil, which improves the nitrogen level in the soil due to the rotting corn stalks, husks and roots. With the denser planting of corn, and the ability to grow crops in more unpredictable climates it will allow for a substantial increase in the production of corn, to be used for human consumption and/or for market sale.

Benefits to Nepal:

MaizeX seeds will benefit Nepal in many ways; with the newer hybrid and conventional seeds, it allows the production of corn much faster, compared to the old conventional seeds that are currently used in Nepal (Paudyal et al., 2001). The reason for

this because of the low CHU (crop heat units) needed to finish the crops, as well as the low GDD (growing degree days) (MaizeX Seeds Inc. 2014). The benefits that the MZ221X will provide is the fast dry down value, this means there is much less time need to dry the corn to the optimal moisture content for storage (MaizeX Seeds Inc. 2014), which can reduce the amount of time that a Nepalese farmer needs to spend drying. The MZ1440R on the other hand provides such as an exceptional dry down value, slightly higher compared to the MZ221X variety (MaizeX Seeds Inc. 2014). This variety also has roundup ready trait. The roundup ready trait is a glyphosate based spray, which is a non-selective, foliar herbicide that gives the ability to kill all living plants at the time of application (De Vries. 2011). With the Mz1440r corn variety, the CHU units are also considerably low, this is turn can allow the farmer to have a earlier harvest, which can give him/her more time to prepare for the drying, and storage of the corn. Both of these varieties will provide considerably higher yields compared to the corn that is being produced currently in Nepal. The corn will also have much higher protein percentage, which can allow for a higher resale value at market, and also better for human/livestock nutrition (Paudyal et al., 2001). With the faster growing corn, there will also be more organic matter available; this can be used for different things, be it making baskets out of the stalks, all the way to grinding up the stalks for animal forage. Another benefit that the low CHU and low GDD days bring is that, if there were reasons that the corn wouldn't be able to completely reach maturity, the corn would be much bigger and more developed compared the varieties used to this day (Paudyal et al., 2001). The corn could then be used for animal feed, in the form of chopping it up, and it could be left to die and decompose in the soil, acting as natural compost.

Improvements:

There are many improvements that can be made for the sale of MazieX seeds for Nepal as well as the general production. For the sale of the product the price is substantially too high for farmers, so it would be suggested that a village or a group of nearby farmers would split on the bag of seed. This would reduce the total cost of the seed, and it then could be divided up into equal parts for each farmer. Since most of the farmers in Nepal are willing to help each other in a time of need, it can be assumed that there wouldn't be a problem when it comes to sharing the seed. Another improvement that could be made is that there is little weather analysis available for the farmers, if this were to be available for the farmers it will give a good time to plant, thus reducing crop losses (Paudyal et al., 2001). There are currently contributions from various groups, that being NGO's (Non-Government Organizations) as well as VDC (Village Development Communities), these organizations provide resources for the farmers, such as providing information on planting, harvesting as well as providing funds/ loans for the farmers with low interest rates (Paudyal et al., 2001). Something that would surely benefit the farmers as well as the communities is the government involvement, by providing incentives for farmers for using the products, as well they could create a partnership with the seed companies, as well as the shipping companies to make the product cheaper for the customer in Nepal.

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