A Critical analysis of Canadian Chickpea's with seed treatment Apron Maxx by Syngenta for export to Nepal

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Part 1

Product Description

Pretreated Chickpea seeds are a product that could be quite useful in Nepal. To benefit Canadian businesses, these chickpeas would come from the Columbia Seeds in Alberta. This Company was selected due to their experience exporting chickpeas and other pulse crops globally, for both propagation and consumer shelves (Columbia Seed Co. Ltd., n.d.). They export bags of seed from 500 grams, for consumption to 1000 kg bags for propagation, with these bags commonly going to seed houses and breeding companies. Columbia Seeds buys it's Chickpeas on an open market and then pre-treats seed on sight, with the desired product and then distributes it, making it an a fit company to export to Nepal.

The seed treatment that would be best for use in Nepal that is also available in Canada is Apron Maxx by Syngenta (Syngenta, 2007). Apron Maxx is the most commonly used seed treatment for chickpeas in the Canadian prairies, to protect against Ascochyta Blight and a variety of other diseases chickpeas are susceptible to says Jeorge Klempnauer, head of sales and contracting at Columbia sales (Klempnauer, J. 2015).

Canadian Benefits

There are some benefits to Canada as it would be increased exports. Although not by much as only 1 metric ton of chickpeas would be shipped to Nepal initially, this would be a very minor venture for the Columbia Seed company. The Columbia Seed Company has the capacity to process 12MT an hour, making 1 Ton to be designated for Nepal a simple thing to do providing a slight economic benefit to the company as 1 Mt of chickpeas pretreated costs 1500 dollars, but more importantly adds a new client (Klempnauer, J. 2015). The new client being chickpea producers in Asia. Starting in Nepal the demand for pretreated chickpeas may grow if the product is successful. Another benefit would be for Syngenta, they could also use this mission as a social marketing tactic, to show the quality of their product. Although the real benefit for Canada would be to the local Albertan farmers who Columbia Seeds buys their chickpea seeds from as the physical seed treatment is not produced in Canada. The active ingredients of Apron Maxx are made in their US plant, then Sygenta's Canadian distribution is from the office in Guelph, Ontario (Syngenta, 2015). Overall the distribution of chickpeas to Nepal would have the greatest social benefit through international recognition for Canada.

Part 1 References

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Part 2

Chickpeas in Nepal

Chickpeas are an important crop in Nepal, they are the second most important winter legume crop, behind lentils, grown in the Terai (Acharaya, Shrestha, Sharma, Lama, 2015). Chickpeas are an extremely nutrient rich food, for an estimated 57% of the population they are the primary source of protein, they are also full of essential amino acids, carbohydrates, vitamins and minerals (Central Intelligence Agency [CIA], 2014; Pande et al., 2005). In 1981-82, 54,000 ha of Nepal's agricultural land grew chickpeas, but by 1997 this had dropped by 65%, to only 19,000 ha. The dramatic drop was caused by a Botrytis Gray Mold [BGM] outbreak, which completely destroyed the chickpea crop of that year (Pande et al., 2005). In 2010 only 9000 ha of chickpeas were planted, due to reoccurring outbreaks (Rashid, Hssain, Kashem, Kumar, Rafii, Latif, 2014).

Botrytis Grey Mold

BMG is the most common occurring disease in chickpea plants in Nepal, the disease can also easily become airborne, causing rapid spread across a crop (Rashid et. al 2014). BGM is a fungus that infects the plant commonly at flowering stage, and causes the flowers to rot, preventing fertilization, thus preventing any seed formation and yield (Pande et al., 2005). BGM also has the ability to infect the plant at any stage of plant growth, and eventually covers the plant in a thick grey *fuzzy* appearing mold, killing the plant (Pande et al., 2005).

BGM control in Nepal

The proven method for managing BGM in Nepal and grow healthy, high yielding chickpeas had been shown to be starting with a good seed treatment and then followed with spraying fungicide at the beginning of the flowering stage and subsequent sprays as needed (Rasid et. al., 2014). Alothough this method is not very practical for Nepalese farmers because of the cost of all these inputs is to high (Rasid et. al., 2014). So currently Nepalese farmers are only using spray fungicides to try and deal with this disease (Rasid et. al., 2014). The fungicides are hard to time correctly as they work best applied a right before a rain, making it hard to find the best time to apply them and the method of application that Nepalese farmers use is a small backpack sprayer (Rasid et. al., 2014). Integrated crop management (ICM) has been highly promoted in Nepal to control the disease (Pande et al., 2005). It has also been highly researched by Nepalese scientist to find the optimum control of BGM with as little inputs as possible, using fungicides, row spacing and frequent crop monitoring (Pande et al., 2005). The use of ICM has increased the yields of farmers by 80 – 100% along with other economic benefits outlined in Table 1 and 2 (Pande et al., 2005). Table 1 compares the costs of not using ICM to using ICM and Table 2 quantifies some of the lively hood benefits when ICM is implemented. The increased yields also lead to benefiting the livelihoods of farmers, increase labour jobs, increased protein consumption, along with many other things such as the payback of debts and the increased ownership of livestock, a successful crop of chickpeas even lead to increased yields of rice grown in the same field (Pande et al., 2005). Although integrated crop management in chickpeas was only implemented in a few districts in the Nepalese Terai, and in 2014 surveys were taken and showed that only 20% Nepalese chickpea farmers had herd of integrated crop management (Rashid, M. H. et. al. 2014).

Benefits of Chickpeas with Apron Maxx

The Canadian chickpea seeds have great potential in Nepal. The Apron Maxx would give the chickpeas a head start, protecting the seed in the early stages of growth, and in Canada Botrytis grey mold infections are obsolete (Canadian Psychopathological Society, 2007). Meaning that the Canadian chickpea seeds would not already be prow to the disease when before they were even planted. The Chickpeas would work in tandem with the integrated crop management system that is being implemented across Nepal. Which would expand the list of benefits of that the integrated crop management has already given to Nepalese farmers. The Chickpea seeds would increase germination rates so that more of the seeds would make it to the stage where the integrated crop management can be implemented. On top of that hopefully introducing this product would also spread awareness of integrated crop management, and therefore increase yields and profit for more farmers across Nepal. Increased profits allows Nepalese farmers to invest in their own community and improve their livelihoods.

Costs and export predictions

In Nepal the average farmer stores 15kg of chickpea seeds for next season's crops, using this figure if 1 metric ton of pretreated chickpeas to Nepal initially there would be enough for 66 farmers to purchase (Pande et al., 2005). This would cost approximately 22 Canadian dollars which is about 1752.19 nepalese rupies not factoring in shipping costs (Klempnauer, J. 2015). The most cost effective shipping process of 1 ton of pretreated chickpea seeds would be trucked from Vauxhall, Alberta to the Vancouver port then shipped by cargo ship to Calcutta, India, and then trucked to Katmandu, Nepal. The approximate shipping cost would be 348.34 dollars Canadian. Then factoring that cost in it would cost approximately 27 dollars per 15 kgs (A1 Freight Forwarding, 2015).

Other Sources

Chickpeas are becoming a very popular product globally for all its nutritional benefits and versatility in food, in correspondence global chickpea production has increased. Chickpea production is significant now in India, the leader in chickpea production, Australia, the US and Canada (Mohapatra, S.D et. al. 2014). Syngenta is a global company, with major production facilities globally, including one in India. Syngenta does not release the exact names of the products produced in each facility but it can be assumed that if there is a strong demand for chickpea seed treatments then Apron Maxx could be produced in India (Syngenta, 2015). Meaning that Indian chickpeas could be treated with Apron Maxx produced in India and trucked north directly to Nepal, which could significantly reduce the price. Making shipping the exact same product from Canada unproductive.

Potential Issues

There are a few potential issues with the idea, including sustainability. Every year the Nepalese farmers would need to repurchase the pretreated seed, this is good for Canada, because it would be a continuing project. But for Nepalese farmers this could get a bit bothersome because if they wanted the seed treatment they could not save any of the seeds produced in harvest, but would instead have to sell the full crop, this could be both good and bad. The good would be selling the full crop for an increased income, and they would not have to try and store the product over the winter free up space within the home. But on the other side Nepalese farmers in remote locations may not be able to sell their crop at an equivalent price to the pretreated seeds. Another problem with the pretreated seed is that the pre-treatment only protects the plant in the early stages of growth, so fungicides and consistent crop monitoring would still need to be applied. Nepalese farmers may not see the benefit of the seed if it does not reduce the labour required and few data of it increasing yields alone. This product may also harm some farmers who sell their seeds to other farmers, this is quite popular in Nepal so farmers do not have to store the product (Pande et al., 2005).

Recommendations

Currently in Nepal many experts are searching and doing research to try and find a species of chickpeas that is resistant to BGM, but only resulting in some breeds that are have a lower frequency and severity of infection (M. Sharma et. al. 2013). If a breed or a genetic modification was found that was resistant to Botrytis Grey Mold it would remove the need to make multiple fungicide sprays and reduce the amount of inputs put into growing chickpeas (Ramgopal, D., 2013). The current practices in Nepal are working very well, through the integration of crop management, and introducing the pretreated seed would only slightly improve the system (Pande et al., 2005). Over all the shipping of pretreated chickpeas that would not solve the problem would only complicate the system of integrated crop management, and make it harder for more farmers to implement. Needing to repurchase the seeds each year that cannot guarantee even a significant reduction in crop infection does not seem sustainable for Nepalese farmers. The export of this product from Canada seems counterintuitive when the exact same product could come from their primary trade partner, India (CIA Factbook, 2014). Instead more resources should be put into finding a true resistance to this detrimental disease.

Particulars (/ha)	Non-ICM (US$)	ICM (US$)	% Change of ICM over non-ICM
Material cost	70.9	72.2	1.88
Operational cost	175.7	199.1	13.4
Interest on working capital	2.8	2.9	1.2
Total cost	249.4	274.2	10.0
Gross income	402.0	590.7	47.0
Net income	152.6	316.4	107.0
Unit cost of production (/kg)	0.29	0.16	–44.8

Table 1. Economics of chickpea production with and without Integrated crop management (ICM) Source; Pande, S., Stevenson, P., Narayana Rao, J., Neupane, R.K, Chaudhary, R.N., Grzywacz, D., Bo, V.A., Krishna Kishore, G. (2005). Reviving Chickpea Production in Nepal through Integrated Crop Management, with Emphasis on Botrytis Gray Mold (Table 2). Plant Disease, vol.89 (12), 1252-1262

Table 3. Impact[a] of chickpea on wealth generation in the village D-Gaon, district Banke

Economic benefit	Value US$
Seed transaction benefits	1,143.0
Sale of surplus product	2,250.0
Consumption of chickpea	500.0
Reduced burden of fertilizers	223.7
Increase in rice yield	600.0
Total	4,716.3

[a] Impact measured through structured survey conducted in the year 2003. Economic benefits are for multiple years from 2000–2001 to 2002–2003 crop seasons.

Table 2. Source; Pande, S., Stevenson, P., Narayana Rao, J., Neupane, R.K, Chaudhary, R.N., Grzywacz, D., Bo, V.A., Krishna Kishore, G. (2005). Reviving Chickpea Production in Nepal through Integrated Crop Management, with Emphasis on Botrytis Gray Mold (Table 3). Plant Disease, vol.89 (12), 1252-1262

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