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Value Added Processing to Mitigate Disease Outbreak Impacts: The PVYn and Potato Wart Disease Outbreaks in Prince Edward Island

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1.0 Background

The Prince Edward Island (PEI) seed potato industry was battered by two important disease outbreaks during the last twenty years: the Potato Virus Y Necrosis (PVYn) outbreak of 1989-92 and the potato wart outbreak in 2000. As a result of both disease outbreaks, the US border was closed to PEI seed potatoes; two years due to the PVYn disease outbreak and nine months due to the potato wart disease outbreak. Both outbreaks disrupted traditional established links in seed potato trade between PEI and the US.

1.1 PVYn and Potato Wart Viruses

Potato virus Y (PVY, type species of the genus *Potyvirus*) is an economically important virus. PVY is transmitted by aphids and infects several *Solanaceae* crop species (Tribodet et al., 2005). The most common of the PVY potato strains are PVYn, and PVYo. Neither strains of PVY are harmful to humans. In the case of potatoes, the viral infection induces mild mottling with occasional necrotic leaves, but has little or no damaging effect on the quality of the potato tuber. It also has some minimal effect on potato yields. By comparison, because PVYn is lethal to tobacco, it is important to contain the spread of the disease. PVYn is particularly important in the seed potato sector because the disease can be transmitted to successive crops through seed tubers. In the beginning of the PVYn disease outbreak in 1989, the US (and until then, Canada) was assumed to be disease free, and therefore PVYn could be quarantined under the WTO agreement on Sanitary and Phytosanitary Measures (WTO, 1995). It was only in 1992 that Canada was able to demonstrate, through testing of US potatoes entering Canada, that PVYn existed in the US at least to the same extent as Canada, and all remaining import restrictions resulting from PVYn were lifted on seed potatoes entering the US.

Potato wart is similar to PVYn in that it is not dangerous to humans. In contrast to PVYn, it renders potato tubers worthless. While the potato wart discovered was limited to a single site in PEI in 2000, (with two further discoveries in 2002 and 2003) it can potentially have a serious long-term impact on potatoes; lasting up to 40 years on the site

where it is discovered. Therefore, the PEI field where potato wart was found was taken out of production and strict controls were placed on PEI potatoes to help contain the disease. Potato wart is considered to be an extremely dangerous disease by the US, being a plant disease listed as a potential disease of agro-terrorist threat (e.g. Monke, 2006). The US eradicated potato wart in 1992 and therefore potato wart can be quarantined under the WTO agreement on Sanitary and Phytosanitary Measures (WTO, 1995).

1.2 Objectives

This brief provides a summary of a study by Clark et al. (2007) on the effects that these disease outbreaks have had on the PEI seed potato industry. The objective of this policy brief is to provide information on the two major diseases affecting the PEI potato industry in recent years (Potato Virus Y Necrosis (PVYn) and potato wart) as well as analysis on the impact these diseases have had on the PEI seed potato and processed potato markets.

2.0 Analysis

The PEI seed potato industry never fully recovered the seed potato market lost during the PVYn crisis from 1989-92. This is demonstrated in Figure 1, a plot of the value of seed potato exports into the US. The figure illustrates that the value of seed potatoes exported into the US has been declining over time. From approximately $6 million before the PVYn crisis in 1989, the value of the PEI seed potato export market into the US fell to below $1 million by the crop year 2004/05. The figure also illustrates shocks to the PEI export market into the US resulting from both PVYn (1991/92 crop year) and potato wart (crop year 2000/01) when the value of exports of seed potatoes into the US fell to virtually zero. The figure also illustrates that the PEI seed potato industry did not recover from the PVYn crisis of 1989/90 as a significant player in the US seed potato market. Furthermore, the shock to the PEI seed potato industry resulting from the potato wart disease outbreak was approximately one third of the shock to the seed potato industry resulting from the PVYn disease outbreak.

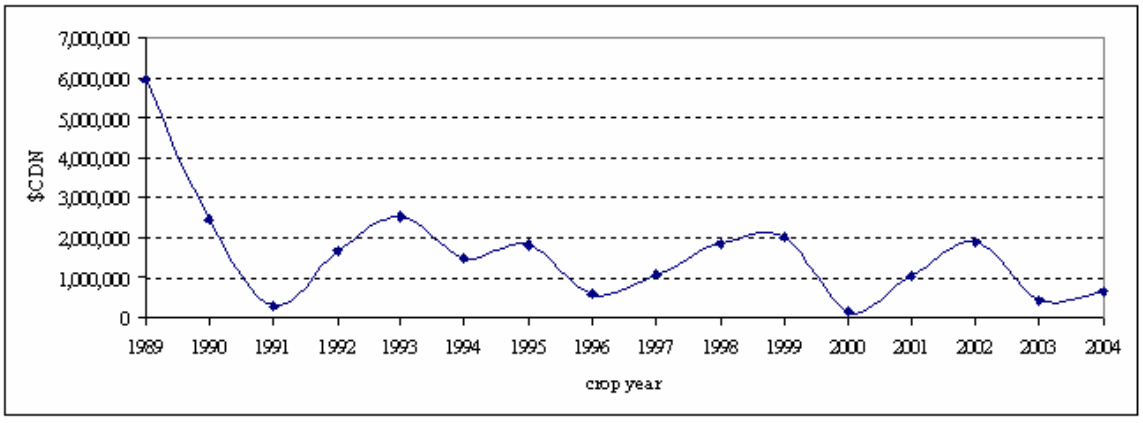

Figure 1: Value of exports of PEI seed potatoes exported to the US (Source: Industry Canada 2006).

At the same time, there has been an expansion of the potato industry as a whole in PEI, especially processed potatoes. This is illustrated in Figure 2, a plot of seeded area of

potatoes in PEI. Seeded area grew from approximately 70,000 acres in 1988 to approximately 110,000 only ten years later in 1999. Notice that, in contrast to the Figure 1, neither PVYn nor potato wart show any appreciable impact on total seeded area. That is, while both PVYn and potato wart had an impact on the PEI seed potato market, neither disease carried over to the overall PEI potato market.

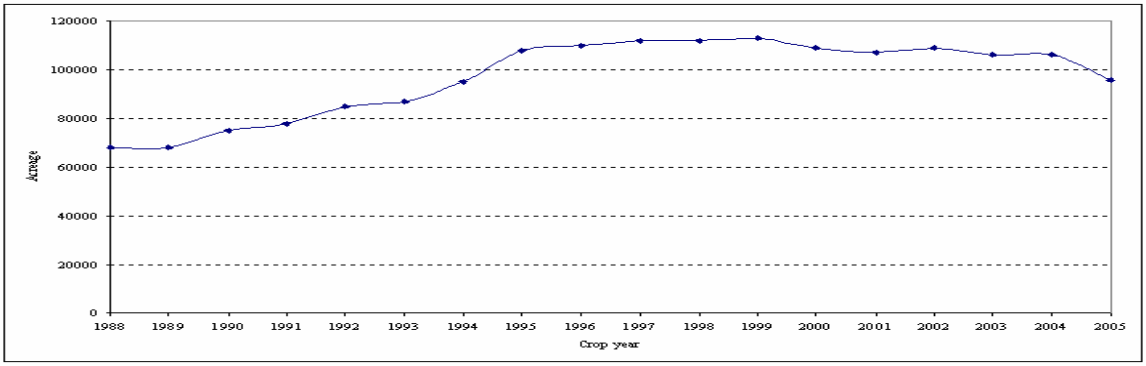

Figure 2: Total acreage seeded to potatoes in PEI (Source: Statistics Canada 2006)

The expansion of the processed potato sector in PEI has little to do with PVYn or potato wart outbreaks. This assertion is partly because there has been little or no incentive for PEI producers to re-establish the seed potato market, stemming from the establishment of additional processing capacity in PEI in the 1990s. There are three markets for potatoes: tablestock, seed and processing. Among the three, the tablestock market is the lowest valued. By comparison, the seed and processing market command price premiums, as long as producers provide the quality attributes required.

The expansion of the potato market in PEI has been fuelled by an expansion in the processing potato market. Between 1990 and 1999, McCains Foods established a new processing plant in PEI and Cavendish Farms expanded an existing plant. This greatly expanded the opportunities in the processing market to PEI potato producers. From approximately 25% of the overall market in PEI during the mid to late 1980s the processing market currently accounts for approximately 60% of total potato production in PEI (DeHann 2006).

This resulted in price premiums paid to PEI producers for processing potatoes. Thus, the new (higher) premiums processed potatoes made the PEI seed potato market less competitive. The new processing facilities also decreased the marketing risk of processed potatoes compared to seed potatoes, and increased the value of processed potatoes in PEI.

Processed potatoes offer PEI potato producers the opportunity to enter a high valued market for their potatoes without the risk of the seed market resulting from disease outbreaks. A disease outbreak like PVYn would have no impact on the processing potato market because the disease is destroyed by processing. At the same time, there was little or no incentive to re-enter the seed market lost during the PVYn and potato wart outbreaks. Processed potatoes have replaced seed potatoes as a high valued, high quality

market for PEI potatoes. Superior managers have switched their talents from seed to processed potatoes.

3.0 Conclusions

An important outcome of the changes in the PEI seed potato market is that a new disease outbreak would not likely have as dramatic an impact on the PEI potato industry as did the PVYn and potato wart disease outbreaks. In the case of a new disease outbreak similar to PVYn, the impact would be minimal because the processing of potatoes would destroy the PVYn virus during processing, thereby making disease-induced trade restrictions on (processed) potatoes unnecessary. In the case of a new disease outbreak similar to potato wart, the large areas of quarantine applied by the US to the seed potato market would be largely irrelevant to the processing market. Thus, value-added processing can largely mitigate the negative impacts of disease outbreaks in potatoes. In other words, if the raw product is what is at risk in disease outbreaks, one strategy to mitigate disease outbreaks is to abandon the raw product in favour of further-processed, value-added product.

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