Glenwood Seed Potato Farm

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Acknowledgements

The production of seed potatoes in NL is a joint effort between the Provincial Department of Natural Resources, the CFIA, Agriculture and Agri-food Canada's (AAFC) Research Branch, and potato growers in an effort to manage potato pests within the Province. The supply of seed has reduced the incidence of potato wart disease, increased potato yields, improved product quality and added greatly to the marketability of locally grown potato crops. The program's success is a direct result of the collaboration and hard work of many individuals.

A sincere thank you is extended to Gary Greenslade, Steven Wood, Agnes Murphy and also to the members of the Newfoundland and Labrador Seed Advisory Committee for their expertise and support. A thank you is also extended to the growers for providing valuable feedback required to make this program a success. Finally, to the staff of the Glenwood Seed Potato Farm, thank you for your hard work and dedication.

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Introduction

Having a seed potato certification system is crucial for the control of quarantine and non-quarantine pests and essential for the control of all potato diseases, resulting in the production of high yield, high quality potatoes. Potato wart and potato cyst nematode are two serious pests found in Newfoundland and Labrador and both are subject to control by the Canadian Food Inspection Agency (CFIA) through Quarantine Enforcement and Integrated Pest Management. Both the CFIA and Agriculture and Agri-Food Canada (AAFC) have placed high priority on the continuation the Seed Potato Program in NL and in turn, have helped reduce the incidence of potato wart disease in this province; increase potato yields; and improve product quality.

The operation of the Glenwood Seed Potato Farm is essential and plays a key role in the NL Seed Potato Certification system. Certified seed production is a technical, demanding and complex system, especially for the productions of initial disease-free crops from which all other seed crops derive. Strict plant health requirements, including the absence of quarantine pests in the area of production, must be met to produce the initial seed classes. The Glenwood Seed Farm was established for, and continues to provide this function. No other farm in Newfoundland and Labrador has the infrastructure, capability, or resources to do this work. It is ideally located in a disease-free area necessary to produce disease-free material and centrally located to supply seed growers throughout the province.

Methods and Materials

2.1 Evaluation of New Potato Varieties

The Glenwood Seed Potato Farm followed Provincial Best Management Practices in their land preparation for the 2009 growing season. Nine varieties of varying classes of seed potatoes were planted into prepared fields; these varieties and accompanying poundage are summarized in Table 1.

Table 1: 2009 Poundage and Classes of planted potato varieties

Variety	Class at Planting	Number of 50lb Bags
AC Blue Pride	Pre-Elite	6
AC Blue Pride	Elite 1	52
AC Red Island	Pre-Elite	9.6
AC Red Island	Elite 1	44
AC Red Island	Elite 2	35
Atlantic	Pre-Elite	4
Atlantic	Elite 1	30
Atlantic	Elite 2	35
Frontier Russet	Pre-Elite	4.6
Frontier Russet	Elite 1	46
Glenwood Red	Pre-Elite	3.6
Glenwood Red	Elite 1	30
Glenwood Red	Elite 2	35
Goldrush	Elite 1	140
Goldrush	Elite 2	130
Yukon Gold	Elite 1	35
Yukon Gold	Elite 2	35
Mirton Pearl	Pre-Elite	6
Mirton Pearl	Elite 1	56
Exploits	Pre-Elite	6.8
Exploits	Elite 1	16
Exploits	Elite 2	16

In addition to these classes found in Table 1, nuclear seed potato plots were planted for the Canadian Food Inspection Agency (CFIA). The varieties planted included AC Blue Pride, AC Red Island, Atlantic, Frontier Russet, Glenwood Red, Goldrush, Exploits, and Mirton Pearl.

Figure 1: Potato field at Glenwood Seed Potato Farm

A contract was tendered for land improvements and the work began in August. To compliment the previous year's work, an access road was constructed to the seven acres of land that were rough cleared in 2008. Another seven acres were rough cleared, bringing the total acreage of the new field to 14 acres. With this additional land, the total farm acreage was brought to 80.9 acres of cultivated land. Additionally, the land area of one field was increased by taking out windrows.

Figure 2: Newly cleared land at Glenwood Seed Potato Farm

Three soil conditions have notably contributed to poor land fertility on the Seed Potato Farm. The soil has high clay content, leading to poor drainage; the soils are rocky, which damages equipment and bruises the tubers; and the soil is acidic. The predominance of black spruce in the area is a natural indicator of low pH. To alleviate these issues, perimeter ditching was completed on the newly cleared land as well as any remaining fields not previously ditched or tile drained; rocks were picked from existing fields on the farm throughout the growing season; and limestone was applied to fields under cultivation in accordance to completed soil analysis to raise the pH.

To further aid soil fertility and structure, oats were planted as a green manure crop in some fields on the farm. Higher yields and better quality can be expected from potatoes planted once every three years in the same field, especially when potatoes follow cereal, green manure, or forage crops in a rotation sequence. Crop rotation improves soil structure; increases organic matter levels; increases rooting depth; reduces soil compaction; improves fertility, water, yield, and crop quality while reducing pest problems.

Figure 3: Oats planted at Glenwood Seed Potato Farm

2.2 Participation in the Accelerated Release Program

An on-farm trial was established in St. Fintan's, NL to evaluate yield performance in selections for Agriculture and Agri-food Canada's (AAFC) Accelerated Release (AR) Program. The soil was a sandy loam with a pH of 6.4. Weather conditions were cold and wet in May, with a mean temperature of 6.4 ^{o}C and total rainfall amounts reported in Stephenville at 138.3mm. Best management practices were followed for land preparation and 13 selections plus one standard check were planted using a two-row planter into a prepared field on June 15th. 12-24-24 with magnesium fertilizer was banded at planting at 460lbs/acre; tuber spacing was 9 to 11 inches apart. The selections and the number of tubers distributed are summarized in Table 2.

Table 2: Selections and # of tubers distributed for on-farm trial.

Selection	# of Tubers
AR2008-08	50
AR2008-13	50
AR2008-14	50
AR2009-05	50
AR2009-08	50
F03043	50
F04054	50
F05056	50
F05057	50
F05065	50
F05084	50
F05054	40
F05060	40
Yukon Gold	50

Figure 4: Trial plot in St. Fintan's – June 26, 2009

June was a little drier, with only 88.1mm of total rainfall reported; however July and August were considerably wetter, with 165.2mm and 212.3mm total rain reported respectively. September had 83.0mm of rainfall.

Figure 5: Trial plot in St. Fintan's – August 7, 2009

Standard production practices were followed throughout the growing season; cultivation and hilling began July 11-12th. A comprehensive spray program for disease control began on July 25th with a tank mix application of Bravo 500 and Reason 500SC. This initial application was a protectant spray for control of early and late blight. Ridomil Gold was applied on August 6th to control pithium leak; Headline EC was applied on August 18th for blight control; a tank mix of Bravo 500 plus Lance WDG was applied on August 25th for blight control. Another Bravo 500 application followed within 7-10 days. Rates of all products used were in accordance to label recommendations. Harvest of test plots began on September 9th.

Results and Discussion

Evaluation of New Potato Varieties

All varieties planted in the spring of 2009 passed CFIA inspection and were certified at the Pre-Elite, Elite I, Elite II, and Elite III levels. Staff at the Glenwood Seed Potato Farm harvested 234,970lbs of seed potatoes in October, marking a record high for the Farm. Varying yields were harvested from the nine varieties, as the acreages planted were based on demand from potato growers who purchased seed in 2008. The breakdown of yield by variety and class is shown in Table 3.

Table 3: Glenwood Seed Potato Farm Yields for 2009

Variety	Class	Yield (lbs)
Goldrush	Pre-Elite	1,300
Goldrush	Elite II	88,000
Goldrush Total		**89,300**
Mirton Pearl	Pre-Elite	1,500
Mirton Pearl	Elite I	2,200
Mirton Pearl	Elite II	14,400
Mirton Pearl Total		**18,100**
Exploits	Pre-Elite	500
Exploits	Elite I	3,000
Exploits	Elite II	8,000
Exploits	Elite III	9,600
Exploits Total		**21,100**
Atlantic	Pre-Elite	500
Atlantic	Elite I	1,100
Atlantic	Elite II	9,000
Atlantic	Elite III	12,800
Atlantic Total		**23,400**
AC Red Island	Pre-Elite	800
AC Red Island	Elite I	3,000
AC Red Island	Elite II	8,000
AC Red Island	Elite III	4,800
AC Red Island Total		**16,600**
AC Blue Pride	Pre-Elite	700
AC Blue Pride	Elite I	2,000
AC Blue Pride	Elite II	17,000
AC Blue Pride	Elite III	2,500
AC Blue Pride Total		**22,200**
Glenwood Red	Pre-Elite	470
Glenwood Red	Elite I	900
Glenwood Red	Elite II	7,500
Glenwood Red	Elite III	10,000
Glenwood Red Total		**18,870**
Frontier Russet	Pre-Elite	400
Frontier Russet	Elite I	1,800
Frontier Russet	Elite II	12,400
Frontier Russet Total		**14,600**
Yukon Gold	Elite II	6,000
Yukon Gold	Elite III	4,800
Yukon Gold Total		**10,800**
	GRAND TOTAL	**234,970**

Each variety and class will be graded in the spring and a planting schedule will be completed for the 2010 growing season. Seed growers in the province will be advised as to what classes of each variety are available and they will submit their requests for seed potato. These growers will then multiply from this disease-free material from Glenwood to supply producers, nurseries, and home gardeners.

Participation in the Accelerated Release Program

Plots were dug by hand and tubers were graded based on size; harvest began on September 9th with the last selection harvested on October 9th. 40 plants of each selection were harvested with exception to F05060; only 39 plants were harvested. Defects and/or disease were noted where applicable and 10 tubers of each selection were checked for hollow heart. The breakdown of yield by selection is summarized in Table 4.

Table 4: 2009 AR Potato Trial Harvest Data – St. Fintan's, NL

Selection	# Oversized Tubers	Yield (lbs)	# Large Tubers	Yield (lbs)	# Small Tubers	Yield (lbs)	# UM Tubers*	Yield (lbs)
AR2008-08	9	11	171	61.5	175	12	70	16
AR2008-13	0	0	280	105	149	13	20	6
AR2008-14	0	0	291	73	154	11	33	8
AR2009-05	26	25	186	75	26	1	24	9
AR2009-08	11	12	312	98.5	202	12	43	12
F03043	3	1	289	86	92	4	23	5
F04054	9	10	318	120.5	137	12	28	7
F05054	0	0	270	83	135	13.5	26	8.5
F05056	0	0	286	78	378	33	46	11
F05057	0	0	363	84.5	408	29	19	3
F05065	1	1.5	179	56	121	12	24	6
F05084	0	0	144	49	290	21	247	43
F05060	23	24	289	123.5	72	7	5	2
Yukon Gold	43	41.5	213	84	68	7	17	6

* UM = Unmarketable

Yukon Gold was used as a standard check in which all other selections were compared. Half of the sampled tubers from the Yukon Gold variety had hollow heart; some growth cracks were present and there was tuber greening due to sun exposure. Otherwise tuber set was high and the yields were excellent. F05060 was comparable; however there was no hollow heart present in sampled tubers.

All selections performed well with exception to AR2008-08 and F05084. AR2008-08 exhibited non-uniform growth and had some rhizoctonia and scab present. There was also some blackening on the stolon ends. F05084 experienced low yields due to severe rhizoctonia.

Small amounts of scab were present in some selections and insect damage due to white grubs was also observed in some selections. Table 5 summarizes the field notes and observations for each selection.

Table 5: 2009 AR Potato Trial Field Notes

Selection	Hollow Heart (%)	Scab Present	Rhizoctonia Present	Comments
AR2008-08	50	Yes	Yes	Non-uniform; blackening on stolon end.
AR2008-13	0	No	No	Nice run; uniform. Clean tubers with shallow eyes.
AR2008-14	0	No	No	Good run. Deep, dark eyes; White lenticels protruding on larger tubers.
AR2009-05	10	Yes	No	Good run. Uniform growth; shallow eyes. Didn't set heavy, but tubers are big.
AR2009-08	40	Yes	Yes	Good run; fairly uniform. Blackening of some tubers at stolon end.
F03043	0	Yes	Yes	Good run.
F04054	10	No	No	Excellent run; clean tubers
F05054	0	Yes	No	Nice run; uniform growth. Smooth clean tubers with shallow eyes
F05056	0	No	Yes	Good run; small- to medium-sized tubers. Clean tubers with shallow eyes.
F05057	10	Yes	No	Nice run; heavy set with uniform growth. Clean tubers with shallow eyes.
F05065	50	No	No	Harvested too early? Some irregular-shaped tubers.
F05084	0	No	Yes	Marketable tubers are clean with shallow eyes.
F05060	0	No	No	Excellent run; uniform growth. Clean tubers with smooth skin and shallow eyes.
Yukon Gold	50	No	No	Excellent run.

Conclusions

Seed potato production has contributed significantly to the Newfoundland and Labrador potato industry during the past 30 years. The supply of seed has reduced the incidence of potato wart disease, increased potato yields, improved product quality and added greatly to the marketability of locally grown potato crops. This contributes to greater financial return to producers and created a new industry which previously did not exist. The production and sale of locally grown seed potatoes provides a new market for potato producers in the Province, which was previously supplied by farms in the Maritime Provinces. The Glenwood Seed Potato Farm plays a major role in supporting the potato industry and compliments the work of CFIA and the other stakeholders to suppress potato diseases. The 2009 season at Glenwood was successful, marking a milestone in production levels. Further cultivar evaluations will continue in the future as new, promising varieties become available and consumer's preferences change. The Glenwood Seed Potato Farm is growing to meet the needs of the Province's agricultural industry and is encouraging industry to advance and grow with them.