Fall Hilling: An Option for PEI Growers?

Results from local research trials

By Ryan Barrett, P. Ag., CCA

In the autumn of 2017, the Agronomy Initiative for Marketable yield (AIM) Science & Technology Working Group began work on a series of on-farm field trials to investigate the practice of creating hills in potato fields in the early fall in advance of those fields being planted to potatoes the following year.

The inspiration for this research came after coming across some research reports from Maine a couple of years earlier, where fields were hilled as part of the process to apply a chemical fumigant in the fall. In one of these fields, the hilling took place but the fumigant was not applied; however, there was still an increase in yield for the non-fumigated hilled acres compared with the conventionally managed part of the field.

Other parts of North America have experience with hilling (or "ridging") in the fall ahead of potato planting. Sometimes this is accompanied by fumigation, but not always. The theory from some producers is that by increasing soil surface area, that soil with dry out and warm up a bit faster in the spring, enabling earlier planting, particularly on heavy soils.

In addition, getting fields prepared in late summer/early fall by completion of primary tillage followed by hilling and establishment of a cover crop has the benefit of getting that work done ahead of the busy potato harvest season, while also maximizing the time for cover crop establishment. This cover crop then either dies over winter or is terminated early in the spring, followed by potato planting. Depending on field conditions and the equipment available, growers can then plant directly into those hills made the fall before (with GPS) or following a pass with a "freshener" tool.

Example of a row freshener tool.
Photo by Ryan Barrett

As noted, work began through AIM starting with set up of three fields in the fall of 2017 to compare fall hilling with establishment of a cover crop versus conventional land preparation on each farm, with establishment of a cover crop. These fields then had potato harvest samples evaluated for yield and quality in the fall of 2018. A further three fields were set up in 2018, followed by one field in 2019 and three fields in 2020.

In 2018, two fields had data loggers installed to track soil moisture and soil temperature in both the hilled treatment and the conventionally-planted control. At both sites, soil temperature in the fall hilled part of the field appeared to be 0.5 - 1.0 C higher than in the control section until early July. In addition, there was a trend for hilled treatment to retain more moisture after planting for approximately the first month than the conventionally planted area. This may be due to a reduction in tillage or moving the tillage further away from planting in order to improve soil structure and improve soil aggregate stability. Follow up testing by both AIM staff and individual growers have shown similar observations in the following years.

Cover crops did not establish uniformly well in each field. In some years, the cover established very well; in others, the cover crop was sparse due to either late establishment or poor growing conditions. Nonetheless, the cover crop establishment was similar for both the treatment and control in each field.

Table 1. Differences in yield and quality parameters between the fall-hilled treatment and conventionally planted control for 10 site-years between 2018 and 2021.

Variety/Year	Total Yield cwt/ac	% Smalls	% > 10 oz	% Defects	Spec. Gravity	M. Yield cwt/ac	Crop Value $/acre
R. Burbank 2018	-4	-3	0	-2	0.001	15	222
Prospect 2018	-2	-1	-5	-6	0.003	20	203
Ranger Russet 2018	-30	-8	8	-3	0.001	11	77
R. Burbank 2019	26	-1	5	-2	-0.001	32	438
R. Burbank 2019	-1	4	-2	1	0.000	-16	-256
Prospect 2019	29	2	0	-9	0.002	45*	603*
R. Burbank 2020	21	-1	10	1	0.004	18	334
Dakota Russet 2021	-36	-5	5	-4	0.000	-3	-110
Dakota Russet 2021	8	-1	-12	-2	0.001	15	189
Dakota Russet 2021	28	0	3	0	0.002	28	463
Average (10 site-years)	+4	-1.5	+1.2	-2.6	+0.0013	+16.5	+216

* indicates statistically significant differences at $p < 0.05$.
Positive values indicate that the mean values were higher in the fall hilled treatment than the conventionally-managed control.

Key Observations:

- While only one of the individual trials showed significance at p=0.05, there does appear to be a slight trend over time favouring fall hilling for marketable yield and crop value.
- Only two out of ten site-years showed a reduction in marketable yield and crop value.
- While total yields were not often largely different, improvements in quality parameters generally resulted in greater marketable yields and crop value favouring the fall hilled treatments.
- Seven out of ten site-years demonstrated a slight decrease in total defects favouring the fall hilled treatment.
- It is entirely possible that none of these differences trends are in reality much different than zero. Nonetheless, there could still be some agronomic and economic advantages favouring fall hilling.
- Fall hilled fields with tillage performed in late summer/early fall have a better opportunity for strong cover crop establishment before winter. Cover crops are associated with reducing soil erosion and building soil organic matter.
- A fall hilling tillage program also has the potential for reduced tillage as well as performing primary tillage under drier soil conditions, reducing the potential to worsen soil compaction.
- At the least, it appears that there is no agronomic or economic disadvantage to fall hilling in Prince Edward Island potato production. Growers should assess whether there is value in adopting this practice on their farms.

Thank You to the participating growers, members of the AIM Soil & Tech Working Group, our AIM funding partners, and to Cavendish Farms for their assistance with sample grading. A full report on this trial can be found on the PEI Potato Agronomy website at **peipotatoagronomy.com**.