

AIM Research Trial Report: Fall Hilling Trial
 Working Group: Science & Technology
 Crop Year: 2020
 Author: Ryan Barrett

Project Rationale:

For the last two growing seasons, AIM has been investigating the practice of forming hills in the late summer or fall in the year before potatoes are to be planted in a field, usually along with planting a cover crop. This interest developed from hearing about trials in New Brunswick and Maine by McCain Foods that appeared to show a yield benefit from fall hilling without soil fumigation. Trials were initiated in PEI in the fall of 2017, with three fields providing yield samples in 2018 and a further three fields providing yield samples in 2019. From the first two years of samples, five out of six trials showed a positive response in marketable yield and crop value for the fall hilled treatment in comparison to the conventionally managed control.

Project Overview:

In the fall of 2019, Craig McCloskey of Bluefield Acres performed hilling in October on a field in the Miltonvale Park area. The field had three treatment areas: 1) fall hilled without cover crop 2) no fall hilling without cover crop 3) no fall hilling with a cover crop (oats). As this trial set up was performed in October and the weather in October 2019 was relatively wet and cool, the cover crop did not establish well. As a result, we will not be showing that data, as it was not different from the area without a cover crop and no fall hilling. This was a relatively level field, described by the grower as being “heavier” and slow to dry out in a potato year. There was not visual evidence of erosion. The treatments were flagged at the headland before potato planting in May 2020. The grower did not do any additional tillage to the portion of the field that was hilled, while one additional tillage pass was done on the non-hilled region. The field was planted to Russet Burbank variety. 10-foot harvest strips were dug on October 16th. Samples were then stored in a cooler at AAFC Charlottetown before being graded at Cavendish Central Grading for yield and quality. Total and marketable yield were calculated using a multiplication factor of 13 for a 10-foot strip. Crop value was calculated using the Russet Burbank contract for late February 2021 deliveries.

Results:

Table 1: Yield and quality data from Bluefield Acres Fall Hilling Trial - 2020

| | Total Yield cwt/ac | % defects | % smalls | % 10 oz | Specific Gravity | M. Yield cwt/ac | Crop Value \$/acre |
|-------------------------|-------------------------------|----------------------|---------------------|--------------------|-----------------------------|----------------------------|-------------------------------|
| Check (not fall hilled) | 283.7 | 2.9 | 7.0 | 9.7 | 1.077 | 256.5 | 2903 |
| Fall Hilled | 304.7 | 3.7 | 6.4 | 19.4 | 1.081 | 274.3 | 3237 |
| difference | 21.0 | 0.8 | -0.6 | 9.7 | 0.004 | 17.8 | 334 |

From these results, none of the variables were statistically significant at $p=0.10$ (90% confidence) using a two-tailed t-test. There was some numerical advantage for the fall hilling treatment for both percent 10 oz and specific gravity, but neither were significantly different.

Table 2: Comparison of 2020 difference between Fall Hilling and Check with average of previous six trials in 2018-2019.

| | Total Yield cwt/ac | % defects | % smalls | % 10 oz | Specific Gravity | M. Yield cwt/ac | Crop Value \$/acre |
|------------------------|-------------------------------|----------------------|---------------------|--------------------|-----------------------------|----------------------------|-------------------------------|
| 2020 (one field) | 21.0 | 0.8 | -0.6 | 9.7 | 0.004 | 17.8 | 334 |
| 2018-2019 (six fields) | 3.0 | -3.5 | -1.0 | 1.0 | 0.001 | 18.0 | 215 |

In comparing the 2020 trial results with the average difference between treatments across the six fields from 2018 and 2019, there are both similarities and differences. The gain in marketable yield and crop value fit the trend that we have seen from the past two years; however, the gain in marketable yield in 2020 was due primarily to higher total yield, while the gain in marketable yield in the other six trials was largely due to small changes in quality, especially the percentage of defects.

Summary:

Results from the 2020 trial followed closely to the trend that we have observed from results in 2018 and 2019. At minimum, it appears that there is no evidence of a negative impact on yield by forming hills in the fall in comparison to conventional land preparation in the spring. From the results of seven fields over three years, it appears that there may be a slight trend toward improved yield and quality from the creation of fall hills. This will be further verified with some additional fields planted to potatoes in 2021 that were set up with fall hills and non-hilled check in 2020.

There may also be additional economic and agronomic benefits to moving to a fall hilling system. By moving tillage earlier (late August/early September) in the year preceding potatoes, along with planting a cover crop with adequate time to establish, the grower is able to get land preparation largely completed at a less busy time of year (before potato harvest). A vigorous cover crop has also been shown to possibly have benefits to the following crop as well as soil health metrics. This fall hilling system may allow a grower to eliminate at least one tillage pass, representing a savings in fuel, labour and equipment costs. Reduced tillage is also associated with the preservation of soil organic matter and improved soil health metrics.

2021 project plans:

As noted, additional fields were set up in 2020 for evaluation of fall hilling in 2021. There is also interest to do soil moisture and temperature monitoring of one or more of these fields, both prior to potato planting and after potato planting.

Thank you to Craig McCloskey of Bluefield Acres for offering to be part of this trial in 2020 and beyond.