



PEI Soil & Crop Improvement Association - Taking Charge Team

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Residue Management in Potato Production Long Term Common Scab and Yield Study

What is Residue Management?

By modifying tillage practices, producers are able to obtain 20 to 30 % soil surface cover from the previous crop's residue after potatoes are planted. The previous crop could be a cereal or a forage treated with glyphosate. Residue Management (RM) in potato production was introduced to PEI in 1993, and within 5 or 6 years nearly 20,000 acres of potato production utilized this management system.

Benefits of Residue Management (RM)

- Increased soil moisture retention
- Decreased need for irrigation
- Decreased soil loss from water and wind erosion
- Often, increased total and marketable yields
- Decreased fuel consumption and greenhouse gases
- Decreased need for equipment and tractors
- Improved soil structure and tilth
- Increased carbon sequestration
- Increased soil microbial activity
- Decreased severity of some potato diseases, including Rhizoctonia canker and black scurf.



Previous Research

Research conducted by Agriculture and Agri-Food Canada, and the PEI Department of Agriculture Fisheries and Aquaculture since the early 1990's had demonstrated many benefits to this practice over conventional tillage.

- almost no wind or water erosion the winter prior to potato planting
- soil erosion loss by water to be 18 to 27-times lower between potato planting and hilling operations
- improved plant moisture conditions from reduced runoff and evapotranspiration.
- improved average potato yield of 10 %
- no significant effect on the incidence of common scab or rhizoctonia
- decreased tillage costs of \$ 35 to \$ 50/acre

Need for this Long Term Study

Producers saw the need to have a long term on-farm field study on the effect of RM tillage on the incidence and severity of common scab in their crop, since observations suggested there was a possible link. In this study, both spring and fall plowing (SP and FP) are being compared to RM tillage for several crop rotations. Each time potatoes are planted on these farms, tillage treatments will be repeated in exactly the same plot, to see if long term RM treatments will affect disease incidence or severity. Other data collected include potato yield and quality, surface residue levels, and soil nutrients and organic matter.



The Soil Conservation
Council of Canada



Agriculture and
Agri-Food Canada

Agriculture et
Agroalimentaire Canada



Canadian Cattlemen's Association

Dairy Farmers
of Canada



Les Producteurs laitiers
du Canada

Description of Plots

This study started in 2004 and two sites are being established each year. Each tillage treatment (SP, FP and RM) is replicated four times for a total of 12 plots per farm or site. Each plot is approximately 30 feet wide and 120 feet in length. Potato varieties have included Russet Burbank and Yukon Gold in 2004, and Fabula and Goldrush in 2005. Typically Russet Burbank, Fabula and Goldrush are reported to be somewhat resistant to common scab while Yukon Gold is reported to be susceptible.

Observations

Yield:

Yield samples were collected approximately a week before harvest and were based on the mean tuber weight arising from 10 plants harvested from each of two rows in each plot.

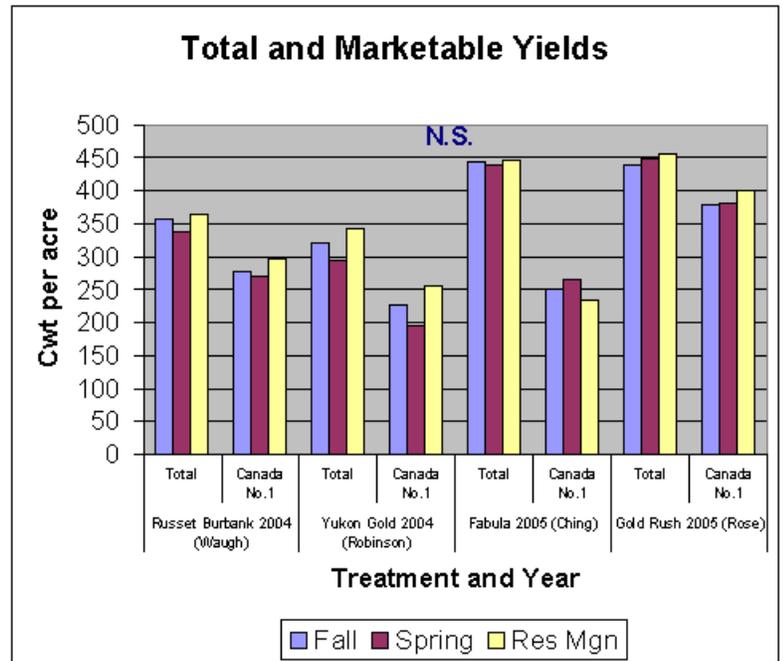
Statistically, there were no significant (n.s.) differences in tuber yields at any of the four sites. In three of the four sites, the marketable yields in the RM plots were higher (6 % to 20 %) than the SP and FP plots; the total mean yields in RM plots at all four sites were higher (2 % to 16 %) than the SP and FP plots. The Robinson (2004) site did not have FP plots - all plots that year were SP or RM.

Common Scab:

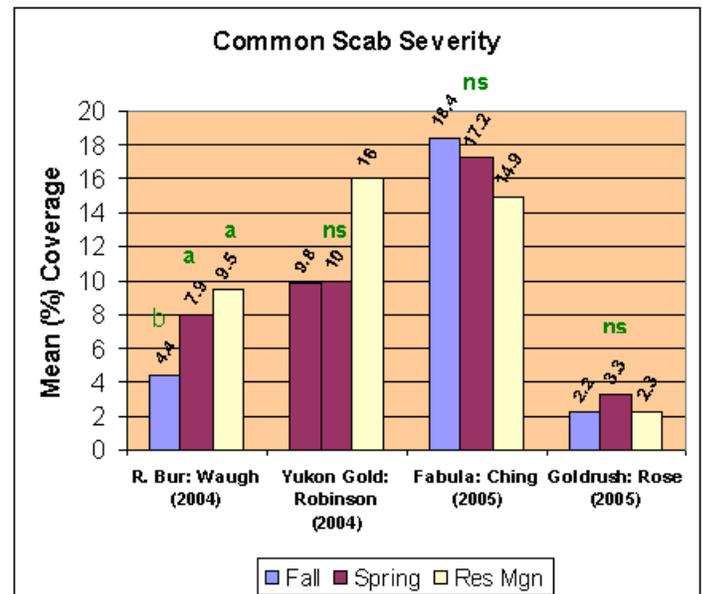
Tubers obtained from each of the 12 plots per farm were rated for common scab. In the graph, the disease severity values represent the mean percent of tuber surface covered with scab lesions based on rating 50 Canada No.1 tubers from each of 12 plots per farm.

Statistically there were no significant differences (n.s.) in the common scab severity among tillage treatments at the Robinson (2004), Ching (2005) or Rose (2005) sites. The Robinson (2004) site did not have FP plots - all plots that year were SP or RM. There was however a significant difference among treatments at the Waugh 2004 site; tubers from FP plots had significantly less disease than tubers from SP or RM plots.

None of the rated potatoes had deep pitted or powdery scab lesions or black scurf.



Culls: < 38.1 mm or > 114.3 mm
 Small: 38.1 mm to 50.8 mm
 Canada No.1: 50.8 mm to 88.9 mm
 Large: 88.9 mm to 114.3 mm



Conclusion

Studies will continue to determine the long-term impact of residue management on the severity of common scab in potatoes.

For more information on residue management or this study, please contact the PEI Soil and Crop Improvement Association at (902) 887-2535.

