

AIM Trial Report: Straw Mulch to Reduce Impact of Aphids in PVY Spread
Working Group: Seed and Tuber Quality Improvement
Crop Year: 2024
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Project Rationale:

One of the largest challenges facing seed producers in Prince Edward Island is the transmission of Potato Virus Y (PVY). Numerous research papers have been published in Canada and elsewhere demonstrating the reduction in marketable potato yield due to PVY infection. In recent years, the dominance of new necrotic PVY strains not only cause yield reductions but also are linked to internal defects in certain varieties. Since 2022, aphid numbers have dramatically increased in the Atlantic Northeast (PEI, New Brunswick, Maine), with a much earlier appearance of green peach aphids (*Myzus persicae*), which is known to be a more efficient vector of virus spread than other non-colonizing aphid species.

There are several cultural management practices that seed producers can use to reduce PVY spread. Planting clean seed, frequent application of mineral oil and effective aphicides to foliage, the use of green border crops to attract aphids away from potato fields, and early termination of seed fields have all been associated with reduced PVY spread in the past. During a study tour to Scotland by the AIM Seed & Tuber Quality Working Group in 2023, multiple growers and agronomists mentioned that straw mulch has been used on high-generation seed in Europe to deter aphid visitation. The theory for using straw mulch is that aphids are deterred from visiting potato underlaid by straw mulch because of the colour difference between the green plants and the yellow/beige straw, compared to the colour difference between green plants and dark soil that they are used to. Aphids are highly responsive to colour when deciding where to land; therefore, interrupting these patterns may result in a reduction in PVY transmission.

As a result, the AIM Seed Working Group decided to pursue a field trial in 2024 where use of straw mulch was compared with a control treatment with no mulch under field conditions. Brett Francis, an AIM Seed Working Group member was the collaborating producer on this trial.

Project Overview:

One seed field of Mountain Gems was used for this project which was planted on May 24th.

After giving the seed time to emerge, straw bales were spread across a section of the field on June 24th using a bale buster. Six bales were used to cover approximately two acres of the field.

On September 19, six, ten-foot samples were dug in each treatment. Samples were graded based on three different seed sizes; under 40 mm, 40-55 mm and over 55 mm. Off type or cull tubers were also recorded. A marketable yield estimate was then calculated with a factor of 13. From each treatment, four samples of 50 tubers each were submitted to the Potato Quality Institute for post-harvest PVY testing through grow-out and ELISA testing.

Aphids were collected with a yellow pan trap in both treatment and control twice per week under the PEI Department of Agriculture Aphid Alert Program.

Aphid Numbers:

	Total Aphids	
	Control	Straw
July 8	2	6
July 11	2	1
July 15	1	1
July 18	2	1
July 22	0	0
July 25	0	1
July 29	0	0
August 1	0	0
August 5	0	0
August 8	0	1
August 12	0	0
August 15	0	0
Total	7	11

Aphid numbers were monitored twice per week using pan traps. Only in the first week of collection was there a difference of more than one aphid per collection. Only one aphid was collected in total after July 29th. Other Aphid Alert collection sites in Central and Eastern PEI also had low numbers of aphids collected after the last week of July. Given the low numbers of aphids collected, we can't come to any conclusions regarding the relative attraction or deterrence for aphid visitation due to the presence of the straw mulch. Repeated use of aphicide and mineral oils by the grower are also likely to contribute to the low number of aphids observed.

	PVY %
Control	0.5
Straw Mulch	2.0
p value	0.287

From the samples submitted to PQI for PVY testing (by ELISA), we see a numerical difference in PVY percentage between the two treatments, favouring the control. However, this difference is not statistically significant ($p=0.287$). A larger tuber sample would possibly help determine whether there is a true difference in PVY transmission, but the costs for that testing was outside of the scope of the current project.

Potato Yield and Quality:

Weights

Treatment	Total Yield	Seed Size (mm)			Off Type/Culls	Marketable Yield
		<40	40-55	>55		
	lbs/10 ft.	lbs/10ft.				cwt/ac.
Mulch	25.6	1.1	16.8	7.7	0	332.8
Check	22.6	1.3	14.6	6.7	0.03	293.8
Difference	3	-0.2	2.2	1	-0.03	39
p-value	0.17	0.37	0.12	0.62	0.34	0.16

Tuber Counts

	Seed Size (mm)			Off Type/Culls
	<40	40-55	>55	
	(#)			
Mulch	11	67	16	0
Check	14	63	13	0.2
Difference	-3	4	3	-0.2
p-value	0.33	0.56	0.53	0.34

June 26





Key Findings:

- The collaborating grower reported that establishing the trial required more straw than initially planned. Approximately three bales per acre were used, but even more straw would be required to get a more even distribution of straw over the treatment area. As it was breezy on the day of application, it was difficult to get consistency in straw application. Choosing a calmer day would be advised if repeating this trial.
- Applying the straw mulch a month after planting lead to some challenges in physically operating the straw chopper in the field without travelling on potato rows. This field was chosen in part to take advantage of a field layout with roadways and berms that allowed for easier application of the straw. This would have to be a consideration for future field application.
- There appeared to be slightly fewer weeds in the portion of the field where the straw mulch was applied. This data was not recorded but could be measured in future similar trials.
- There was no significant difference in tuber count between treatment and control.
- There was no significant difference in yield; however, there was a 13.3% yield increase observed for the mulch treatment. With additional replication, it would be interesting to see if this trend was observed again. Given that the growing season was relatively dry in August, the straw mulch may have helped to conserve soil moisture compared to the control treatment.
- There was no obvious difference between treatment and control in terms of aphid numbers; however, frequent application of aphicide in-season may mask any significant difference in aphid numbers through the Aphid Alert system.
- PVY % was higher in the control (2.0 vs 0.5) but this was not statistically significant.

Thank you to David & Brett Francis for participating in this on-farm trial. Thanks also to Pat Quilty and staff at the Potato Quality Institute for assistance with PVY testing.