

Midwest Study Highlights Viability of Organic Certified Potato Seed Production

Organic certified potato seed production in the Midwest

Unlike most crops, potatoes are propagated vegetatively from seed potatoes rather than from true seed. In contrast to true seed, in which most pathogens are excluded, infected potato plants transmit many pathogens to progeny plants through seed tubers. This poses a significant disease management problem. Use of certified seed potatoes which meet low tolerances for disease significantly reduces tuber-borne diseases in potatoes and has measurable economic benefits for growers.

Wisconsin produces a large amount of potatoes, ranking third nationally in total amount of potatoes produced, yet produces only 2% of organic potatoes grown in the U.S. Over 94% of organically-grown potatoes are produced in Western states, with California, Colorado, Washington and Idaho leading organic production. Thus, in the Midwest, there is a regional shortage of locally produced organic potatoes. Meanwhile, all U.S. organic potato growers face a shortage of organically produced certified seed potatoes.

Our project goal was to assess the feasibility of certified seed potato production on organic farms in Wisconsin. In this project we evaluated strategies to limit the spread of Potato Virus Y (PVY), which causes the majority of rejections from potato seed

In Brief:

Potato producers benefit from the use of certified seed—meaning seed tubers that are certified as disease-free. In this project, University of Wisconsin researchers studied ways to address disease issues in Midwest organic certified seed potato production. Field trials confirmed that certified seed potato production is feasible for Wisconsin organic potato growers.



Cut seed tubers ready for planting day at Aue farm, 2007.

certification in Wisconsin. PVY is an aphid-transmitted virus that is also carried in seed potatoes. We trialed two strategies aimed at reducing aphid landing within potato crops and transmission of the virus.

Field trials were established at six organic farm sites in 2007, and at two organic farm sites and one field station site (the Hancock Agricultural Research station, or HARS) in 2008.

Strategies tested at these sites were:

1) Surround seed potato plots with a border of winter wheat. Aphids tend to alight at the edges of fields using the contrast between soil and plant foliage as a target. PVY is carried on the aphid's mouthparts and is lost when the aphid probes an uninfected plant. Use of a border crop around potato plots has been shown to reduce PVY incidence, presumably due to discharge of PVY from the aphid's stylet as it probes

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The complete project report (23 pages) is available at ofrf.org



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PROJECT SUMMARY

for feeding sites in the border plants. This strategy was trialed at all sites both years. In the second year, this strategy was expanded to include intercropping with winter wheat and also with red clover.

2) Spray potato plots with mineral oil. Mineral oil on leaf surfaces has been shown to interfere with transmission of PVY by green peach aphid. This treatment was trialed at one site (Igl farm) in the first year. An OMRI-approved mineral oil, Organic Stylet-Oil, was used.

Project methods

At the beginning of the trials, farmers were provided with foundation-class seed which has extremely low disease incidence.

Treatments were applied in a split-plot randomized block design. In 2007, border treatments (winter wheat or bare earth) were applied at the whole plot level, while potato varieties and mineral oil treatments were tested at the sub-plot level. Varieties tested at the six organic farms were Adirondack Blue, Adirondack Red, Red Norland, Dark Red Norland, Goldrush and Magic Molly. Aphid populations in seed potato plots were monitored, and at harvest, tubers were sampled, replanted at grow-out sites, and these plants were tested for PVY incidence.

In 2008, two varieties, Red Norland and Yukon Gold, a PVY susceptible variety, were tested at three sites (two organic farms and at HARS). During this season, we trialed two strategies for control of PVY spread by aphids: winter wheat borders and interplanting red clover or winter wheat between potato rows. Intercrops have been shown to reduce spread of stylet-borne viruses, which includes PVY. Again, aphid populations were monitored. At harvest, tubers were sampled and allowed to sprout naturally and were tested for PVY.

Project results

In both the 2007 and 2008 field trials at organic sites, we saw that the majority of potato lots met certification standards for PVY: 121 of 135 lots in 2007 (89.6%) and 100 of 118 lots in 2008 (84.7%). Our field trials confirmed that certified seed potato production is feasible for Wisconsin organic potato growers. However, the two

strategies for limiting the spread of PVY--use of border crops and intercrops--did not affect PVY incidence.

PVY incidence was higher in 2008 than in 2007, and at one of the farm sites

and at HARS, high PVY incidence was seen for some lots of the susceptible variety Yukon Gold. This contrasts with the very low incidence of PVY in 2007, too low to assess the strategies trialed to control PVY (borders and mineral oil).

Although slightly lower aphid landing rates were seen for potato plots surrounded by a winter wheat border at the Igl farm in 2007 and at HARS in 2008, this effect was not always observed. The presence of a winter wheat border did not affect the incidence of PVY in the harvested potatoes.

Winter wheat and red clover intercrops also produced no effect on PVY incidence or aphid landing. But there was a trend for higher yield in plots with red clover intercropping at one farm.

Variety selection makes a clear impact on successful production of seed potatoes that meet certification standards for PVY, with PVY resistant varieties such as Red Norland performing better than PVY susceptible varieties such as Yukon Gold.

The year-to-year variation in PVY incidence and thus in the risk that seed lots may not meet certification standards underlines the need for field trials over multiple years, allowing a more comprehensive evaluation of the feasibility and economics of seed potato production on organic farms in Wisconsin. We intend to continue our research into organic seed potato production and will include an economic analysis in our assessment of its feasibility.

We conclude that organic production of seed potatoes is feasible in the Midwest but further research is needed both into PVY control strategies useful for organic farmers and to understand the landing behavior of the aphid vector of PVY.



Green tile traps painted with Tanglefoot™ were placed within potato rows at canopy height.



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