

Alaska Certified Seed Potato Project

Project Summary

Alaska is one of 17 states that grow certified seed potatoes and has a state certified seed potato program. Necrotic strains of Potato Virus Y are a current threat to the potato industry since these new strains affect tuber quality and production, causing significant losses for tablestock and seed potato producers. Producers of certified seed potatoes in Alaska, continue to expand the production of different varieties, to meet the demand of the home gardening markets and maintain adequate seed stocks for tablestock producers. Currently, Alaska's disease tolerances, in certification, are measured during the summer field readings with tolerances for virus at 0.1% for Potato Virus Y (PVY) and 0.1% for Potato Leaf Roll Virus (PLRV) and 0.2% PVX (visible). These tolerances are the strictest in the nation. Prior to 2014, Alaska was at a competitive advantage with rare to little known occurrences of PVY, PLRV and Potato Virus X (PVX). Table 1 describes the lots rejected, acreage amount, % entered and viruses found in 2014-2015: Table 1

Crop Year	Lots Rejected	Acres Reject	% entered	Virus
2014	17	4.7	14%	PLRV, PVX (visible), PVY
2015	7	5.5	11%	5 lots PLRV, 2 lots PLRV/PVY

In 2014, Alaska certification rejected 14% of the seed potato acreage, primarily due to PLRV. Also discovered was PVY in two of the certified, seed potato fields, which was a first occurrence in Alaska. In 2013, PVY was discovered in a tablestock field, which imported and planted seed from Montana. Montana currently has necrotic strains of PVY and allows seed to be certified in their state with up to 0.5% virus (90 diseased plants per acre) and up to 2% for export to other states. These necrotic strains were first found in Europe and now are currently spreading through North America, mostly due to the difficulty to detect visually (latent) in the field. Oregon State University (OSU) with the cooperation of state seed potato certification agencies generated a list of latent varieties: <http://seedcert.oregonstate.edu/sites/default/files/potato/paalatentvarieties.pdf>. In 2014, the total of AK certified seed potato acreage grown, consisted of 38% of these latent varieties. Today, most states require mandatory testing, in addition to, visual inspections within certification. Alaska certification does not require mandatory testing since, historically, Alaska has little to no prevalence of disease and the testing would be cost prohibitive. At the time of this project proposal, it was critical to test due to the recent disease issues, to determine if the visual diagnostics in the field are enough within the AK Seed Potato Certification or if a mandatory testing component should be developed.

Project Approach

During FY 2016- FY 2018, the Leaf Sampling Program (LSP) activities and tasks performed consisted of hiring an intern, ordering field and laboratory supplies, reviewing seed potato applications, identifying grower participation, latent varieties, Alaska (AK) named and experimental lines to be tested, creating a database for sample determination, collecting samples in the field, diagnostic processing and testing those samples, and creating a database for data

entry and results. During the project period, latent varieties tested were Calwhite, French Fingerling, Pink Fir Apple, Russet Norkotah and Shepody and 10 Alaska named lines were Delta Reds (22-1), AK Frostless, AK Red, Bush's Peanut, Denali, Fiesta (29-6), Haida, Iditared, Magic Molly, Magic Myrna (8-3) and 8 AKTSP experimental lines. Leaf samples were collected at a 1% level or minimum of 10 leaves per lot. Table 2 summarizes the total data, consisting of the number of Certified Seed Potato Producer who participated, leaf samples collected, # Lots, # Varieties tested and the Results.

Table 2

Crop Year (CY)	# Seed Producers	#Leaf Samples	# Lots	#Varieties
2018	12	2,060	65	17
2017	13	1,950	72	17
2016	13	1,996	65	23

Goals & Outcomes Achieved

During the FY 2016- FY 2018 project year, the leaf samples were collected during the first field inspection and results were provided in time for second field inspections. The varieties that were identified were tested for PVY, PLRV and PVX in 5 leaf composites on a sap extractor tested by ELISA (Enzyme Linked Immunosorbent Assay). Table 3 summarizes the total number of lots that were positive for each virus type:

Table 3

Crop Year (CY)	Total # of lots positive	PVY	PLRV	PVX
2018	4	0	1	3
2017	8	1	3	2 (latent), 2 (visual)**
2016	5	0	2	3 (latent)
Total	17	1	6	10

It should be noted that although these lots were found to be positive for disease, they were not rejected. The amount of diseased plants was minimal and the PVY and PLRV were able to be detected visually and removed (rogued) from the field, in time for the final field inspection. The PVX is only measured visually within certification, so lots considered to be determined latent for PVX were not rejected. The lots that were detected visually were removed (rogued) from the field in time for the final field inspection.

Due to the timing of the leaf collection coinciding with the field inspections we were able to draw a comparison of the LSP and the visual inspections in certification. Table 4 and 5

demonstrates this comparison:

Table 4

Crop Year (CY)	LSP Detections	PVY variety	Not detected visually in the field	Varieties determined to be PVX latent
2018	PVX, PLRV	NA	NA	NA
2017	PVY*, PLRV, PVX	French Fingerling	PVX	Magic Molly and Delta Reds
2016	PLRV, PVX	NA	PVX	Iditared, Magic Molly and Delta Reds

*During the second inspection, PVY was observed in two plants and confirmed via PVY immunostrip (see picture in additional information). These plants were rogued and the producer did not replant the lot the following year.

Also, to be noted is that the French Fingerling did visually express symptoms during second inspections, which according to the OSU list it is considered a latent variety.

The PVX that was not visually detected during the field inspection was in the Iditared, Magic Molly and Delta Reds. Please note Magic Molly and Iditared** were seen visually and rogued in 2 different lots (see table 3).

Table 5

Crop Year (CY)	Visual Detection of PVY in the field	Detected in the LSP?	Variety
2018	1	No	Shepody
2017	0	NA	NA
2016	0	NA	NA

In 2018 there was a PVY visual detection (3 plants) in Shepody, confirmed by immunostrip during the second field inspection. This lot was sampled and tested in the LSP, but it was not detected. It is to be noted that sampling protocols were to collect at a rate of 1% of the lot or a minimum of 10 leaves, where the visual inspection was the entire lot.

This project had success in confirming whether PVY was existent in the Alaska's certified seed potato fields. It was determined that this virus was found in one lot out of the 202 that were

tested. In addition to the PVY, we were able to confirm the presence of PVX and PLRV. PLRV was found to be in 6 lots out of the 202 tested and PVX was found to be in 10 lots of 202 tested.

The goal and outcomes of this project initially were to identify Alaska PVY latent varieties and whether to develop testing protocols in certification based on what was detected by the LSP. This goal was not achieved since this could not be measured, due to the low incidence of PVY discovered in the fields from 2016- 2018.

Beneficiaries

The potato industry continues to be significant in Alaska, accounting for \$2.7 million on 450 acres in tablestock and seed potato production with sales at \$2 million. Over the project period certified seed potatoes average 41 acres (16 growers, 295 lots, 84 different varieties) in production to be sold to tablestock growers for seed and the home garden market. If a seed lot is rejected due to exceeding the tolerances, they are not allowed to be sold as seed, which affects all potato growers who buy certified seed as well as the garden market. The State of Alaska currently has a regulation in place that states that "all potatoes for sale represented as seed potatoes must be certified." This project confirmed little incidence of potato disease in certified seed potato fields which is a benefit for the health of the industry.

Lessons Learned

The lessons learned from the project:

Currently, PVY incidence is not at a level where lots are being rejected in Alaska PVY was symptomatic in the French Fingerling variety, that was considered latent, according to the list. The positive test results were provided prior to the second inspection, did this information influence the inspection since PVY was detected by the LSP?

Was the LSP sampling protocols adequate at 1%, since PVY was found visually (confirmed via immunostrip in the field) during second inspections, in the Shepody variety that was LSP tested? Shepody also was also symptomatic, considered latent, according to the list. Are other factors influencing this: Alaska's growing conditions, adequate watering, fertilization, strain-type?

PVX, although does not cause necrosis in tubers, was latent in AK varieties, Magic Molly, Delta Reds, Iditared.

In conclusion, mandatory testing in certification is not recommended due to the low incidence of disease in Alaska's potato fields. If disease incident increases, testing should be considered and testing protocols developed, following a disease outbreak.

Additional Information:



Photograph of PVY plant with visual symptoms in French Fingerling