

A COMPARISON OF TWO WINTER TESTING SCHEMES FOR CERTIFYING SEED POTATO LOTS

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Abstract

Greenhouse and outdoor winter testing schemes for certifying seed potato lots were compared between 1995 and 1998. Samples taken from seed lots produced during the 1995, 1996, and 1997 growing seasons were obtained from central Oregon growers and divided into two size ranges. The 2-3 ounce tubers were planted at Oceanside, California (outdoor site), and the 4-6 ounce tubers were planted at Corvallis, Oregon (greenhouse site) and rated for viral infection by certifying agencies in Idaho and Oregon, respectively. The percentage of plants visually observed to be infected with Potato Virus Y (PVY) or Potato Leafroll Virus (PLRV) was nearly identical at each testing location in 1995-1996 and 1996-1997. In 1997-1998, PVY infection was detected in the same lots at both winter testing sites; however, the percentage of infected plants varied inconsistently. Emergence averaged 73 percent at Oceanside and 96 percent at Corvallis over the three seasons the study was conducted.

Introduction

Seed potato certification agencies require seed lots to be inspected during the growing season for various pathogens, chemical injury, and other varieties. In addition, many agencies require all seed lots passing growing season inspections to be winter tested prior to sale as certified seed potatoes. Some certifying agencies winter test outdoors at southern sites such as Oceanside, California or Homestead, Florida. Other agencies winter test seedlots in greenhouses in more northern climates. Seed growers in Oregon (and perhaps other states) have wondered if the two winter testing methods are equivalent. This study was designed to evaluate samples from the same potato seedlot under two winter testing schemes.

Materials and Methods

1995-1996 Experiment

'Russet Burbank' (*Solanum tuberosum L.*), 'Ranger Russet', and 'Shepody' tubers used for the study were collected from an experiment planted at Madras in 1995 by Mary Powelson and Meghan Arbogast, Oregon State University Plant Pathology Department, to evaluate the effects of cultivar and irrigation rate on *Verticillium* infection. The 'Katandin' seedlot used for that study was 40-50 percent infected with Potato Virus Y (PVY). The other seedlots used in that study ('Russet Burbank', 'Ranger Russet', 'Shepody', 'Viking', and 'Red Lasoda') were not initially infected with PVY but became infected with PVY during the growing season. Late blight was also present in that study during the later part of the growing season.

Tubers from each lot were collected and sorted into three groups: 1) single drop seed weighing 2-3 ounces, 2) small tubers weighing 4-6 ounces, and 3) tubers weighing over 6 ounces. The single drop seed was packaged and sent to the Idaho Crop Improvement Association for planting

and evaluation in Oceanside, California. The 'Russet Burbank', 'Ranger Russet', and 'Shepody' lots were subjected to the same winter testing protocol as seedlots submitted from other seed growers except that the samples arrived too late to receive the normal dormancy breaking treatment. The 4-6 ounce tubers were submitted to the Oregon State University Seed Certification Service, and tubers were subjected to the same winter testing protocol as seedlots submitted from other seed growers. The tubers weighing over 6 ounces were discarded. The seedlots were scored by certification personnel from each respective location for the presence of PVY, potato leafroll virus (PLRV), and any "other varieties" that may have been present in the seedlot.

1996-1997 and 1997-1998 Experiments

Five 'Norkotah' seed lots from the 1996 crop were obtained from local growers and divided into two size ranges. The 2-3 ounce tubers were planted at Oceanside, California (outdoor site), in November and the 4-6 ounce tubers were planted at Corvallis, Oregon (greenhouse site), in November by certifying agencies in Idaho and Oregon, respectively. Submitted seed lots included three lots grown for seed, one commercial lot, and one lot from research trials grown at Central Oregon Agricultural Research Center (COARC). The same procedure was repeated with the 1997 crop. The commercial and COARC lots were expected to contain higher levels of PVY than the lots grown for seed. Seed certification personnel handled the submitted seedlots in the same fashion as lots received from seed growers. Once plants had emerged and grown to sufficient size, they were rated for viral and bacterial diseases by personnel from each certifying agency.

Results and Discussion

1995-1996 Experiment

Table 1 summarizes the winter test results from the 1995-1996 Oceanside and Corvallis plantings. The percent leafroll, PVY, and other varieties observed at each location were nearly identical for each of the varieties tested except 'Shepody'. Fewer PVY infected 'Shepody' plants were reported for Oceanside because the 'Shepody' lot was observed only one time on January 23, 1996. Dr. Richard G. Clarke reported concerning the 'Shepody' lot planted at Oceanside: "I'm sure that I would have scored more visually positive plants if I had read it again on the second inspection. Virtually every plant was probably PVY-infected." ELISA tests performed on 100 'Shepody' leaves at Oceanside showed 99 percent were PVY-positive.

The percentage of plants that emerged and were observed at Corvallis was greater than that observed at Oceanside. The Oceanside samples were not submitted in time to receive the customary dormancy breaking treatment. They were also planted about six weeks earlier than the Corvallis samples, and this likely resulted in a greater number of dormant seed pieces.

1996-1997 Experiment

Results of the 'Norkotah' seedlots planted at Oceanside and Corvallis during the winter of 1996-1997 are shown in Table 2. The percentage of plants visually observed to be infected with PVY was very similar for each testing location, although infection levels varied from zero to over 50 percent infected. No PLRV was observed in any of the submitted samples at either location.

Relatively poor stand counts were recorded at the Oceanside location, possibly because some plants had not broken dormancy and emerged by the first inspection date (January 26-30, 1997) when stand counts were taken.

1997-1998 Experiment

Table 3 summarizes the disease evaluations from the 1997-1998 winter tests. Better emergence was observed at the Corvallis location than at the Oceanside site. Both winter testing sites detected PVY infection in the same lots; however, the percentage of infected plants differed widely. At Oceanside, 100 plants were sampled and ELISA tested for PVY. For 'Norkotah' seed lots one through five, ELISA test results were 63, 11, 0, 80, and 0 percent PVY infected, respectively. Visual PVY symptoms were not apparently discernable in a large percentage of the infected plants.

Observed PVY infection levels may differ because in Idaho, 'Norkotah' certification is based on ELISA tests, so inspectors are less concerned with visual readings. Also, individual 'Norkotah' lots may vary in their expression of PVY symptoms. One PLRV plant (0.66 percent) was detected in 'Norkotah' lot 3 at Corvallis. No PLRV was detected in any of the submitted lots at Oceanside.

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Table 1. Summary of winter test results for three potato cultivars grown at Oceanside, CA, and Corvallis, OR, 1995-1996.

Cultivar	Plant Count ¹		PLRV (%) ²		PVY (%) ²	
	Ocean	Corvallis	Ocean	Corvallis	Ocean	Corvallis
Russet Burbank	305/370	361/400	0.33	0.00	42.30	44.60
Ranger Russet	315/427	430/450	0.00	0.00	41.00	38.37
Shepody	247/400	398/450	0.00	0.00	89.07	98.99

¹ Number of plants observed/number of tubers submitted

² Percent of plants observed with visual symptoms

Table 2. Summary of winter test results for five Norkotah seedlots grown at Oceanside, CA, and Corvallis, OR, 1996-1997.

Cultivar	Plant Count ¹		PLRV (%) ²		PVY (%) ²	
	Ocean	Corvallis	Ocean	Corvallis	Ocean	Corvallis
Norkotah Lot 1	122/200	198/200	0.00	0.00	0.00	0.00
Norkotah Lot 2	69/200	192/194	0.00	0.00	56.52	47.40
Norkotah Lot 3	138/200	209/209	0.00	0.00	0.00	2.87
Norkotah Lot 4	122/150	203/207	0.00	0.00	0.00	0.00
Norkotah Lot 5	140/200	221/223	0.00	0.00	13.71	12.67

¹ Number of plants observed/number of tubers submitted

² Percent of plants observed with visual symptoms

Table 3. 1997-1998 summary of winter test results.

Cultivar	Plant Count ¹		PLRV (%) ²		PVY (%) ²	
	Ocean	Corvallis	Ocean	Corvallis	Ocean	Corvallis
Norkotah Lot 1	166/200	204/204	0.00	0.00	28.92	13.24
Norkotah Lot 2	185/200	152/160	0.00	0.66	0.54	6.58
Norkotah Lot 3	132/150	194/200	0.00	0.00	0.00	0.00
Norkotah Lot 4	142/200	195/200	0.00	0.00	2.11	28.21
Norkotah Lot 5	180/200	204/204	0.00	0.00	0.00	0.00

¹ Number of plants observed/number of tubers submitted

² Percent of plants observed with visual symptoms