

ANNUAL PROGRESS REPORT 1990

Evaluation of Advanced Clones for Potato Leafroll Expression

Robert Davidson

Summary:

Eleven advanced clones were screened for symptom expression to leafroll (PLRV), timing of symptom development and the extent of the spread which occurred. Symptom expression was good to excellent in all clones tested except AC75430-1. There were no detectable symptoms to PLRV evident in any of the trials. This clone must be screened further to see if indeed it has leafroll resistance or the virus inoculation was faulty. All clones with visible leafroll symptoms were expressing at the time of the first reading in Oceanside, Ca., 1/25/91. Some clones such as AC83044-2, AC83064-6 and CO82142-4 had extremely intense symptoms by this time. The other clones demonstrated greater intensity as the readings progressed. By 3/4/91 all of the clones were expressing adequate symptom intensity. There does not appear to be a major difference in timing of symptom development among clones. All of the clones which showed symptoms should be readable in the San Luis Valley by the time symptoms would normally develop in Russet Burbank or Centennial Russet.

All clones but the AC75430-1 showed some leafroll spread in the natural in-field spread (NIFS) plots. The extent of leafroll spread over three replications of twelve plants/clone ranged from 1.6% in AC83306-1 to 25.8% in AC83068-1. The control clones were quite similar to past years. It appears that to obtain meaningful data on the extent of leafroll spread, at least three years data will be needed with each clone.

Materials and Methods: The clonal evaluation consisted of four tubers of each clone to be tested planted in two separate rows with a one row division between them and other plants. Viruliferous green peach aphid vectors (aphids which have been feeding on PLRV positive Russet Burbank plants in the field and have acquired PLRV) were transferred to one row of plants at the rate of approximately ten aphids per plant when the plants were 6-12" high. The vectors were allowed to feed on the plants for 3 days. Plants were then sprayed with Pydrin to kill the aphids and prevent further spread in the plot. Plants were allowed to grow and die naturally. Insecticide and fungicide applications were made as appropriate to reduce the threat of further aphid infestations or early blight damage. At harvest a total of six tubers were harvested from the four plants of each clone in each row (healthy and PLRV infected). These tubers were placed in labelled bags and treated to break dormancy. They were transported to Oceanside, CA. and planted in the winter test plots the first week of November, 1990. Readings for PLRV symptom expression and timing of this expression were made on 1/25/91, 2/12/91 and 3/4/91.

The natural in-field spread consisted of twelve tubers per clone planted in three blocks (rows) side by side in a randomized complete block design. At the ends and between each group of twelve tubers in each block was placed a PLRV positive Russet Burbank tuber to provide a source of inoculum for naturally infesting aphids. These plots were isolated from

other plants by two blank rows. Plants were allowed to grow through the season without insecticides, but were sprayed with fungicides to reduce threat from early blight. After natural vine death, a total of two tubers per plant for 24 tubers total were harvested from each clone in each block. These were placed in labelled bags and treated in a manner similar to the clonal evaluation. Readings in Oceanside, CA. were made on the same dates as above. Plants with leafroll symptoms were tallied and a percentage infected over the three blocks was figured by dividing the number positive by the total stand count.

Results and Discussion: Table 1 shows the clonal symptom expression of the advanced clones. All clones demonstrated adequate symptom intensity to PLRV except AC75430-1. Further testing is needed for this clone and will be conducted in 1991. The other clones do not need further testing, but will be examined in the field in 1991 for observation of any different leafroll symptom development.

Table 2 contains the data for the NIFS plots. It is of interest to note that over a period of four years of testing the control clones and cultivars, the results appear to be reasonably close. A minimum of three years of data will be necessary to have meaningful information about leafroll spread in any clone. All clones but AC75430-1 showed some PLRV spread during the season. Two clones, AC83068-1 and AC83172-1, stand out from the others when looking at total PLRV spread. The two had spread rates of 25.8% and 13.5% respectively. When compared with the controls ranging from 0 to 17.7%, these two clones may fall into the higher risk category for leafroll spread. Many of the other clones have the potential for leafroll spread and will be placed in risk categories based on what happens in the next two years. Any of these clones moving through the Cultivar Development program for grower release should be continued in the NIFS to obtain three years of data (similar to what is currently done in the BRR evaluation of the advanced clones). By doing this, growers should have a much better idea of what will be necessary in handling these clones upon release and reducing the threat of PLRV.

Table 1: Clonal symptom expression for leafroll (1990 readings)

<u>Clone #</u>	<u>Symptom expression (0-3)</u>	<u>#pos/#emerged</u>
A80559-2	2 CC, LL (strong lower leaf roll) NIFS*	0/5
AC75430-1	0 No symptoms seen either in CE or NIFS	0/3
AC83044-1	2-3 CC, LL, WP (late emerging) NIFS*	0/5
AC83044-2	3 CC, LL (very strong lower leaf roll)	2/6
AC83064-1	2 light CC, LL (purpling on margins)	1/6
AC83064-6	3 CC, LL (very strong lower leaf roll)	3/6
AC83068-1	2 LL, no CC (purpling on margins)	1/5
AC83172-1	3 CC, LL, WP (purpling on margins)	3/5
AC83306-1	3 CC, LL, WP (purpling on margins) NIFS*	0/6
CO82142-4	3 CC, LL, WP 1/2 up (strong lower leaf roll)	3/6
CO83027-2	3 CC, LL, WP	1/6
Centennial	3 CC, LL, WP NIFS*	0/6
Sangre	3 CC, LL (purpling on margins) NIFS*	0/5
Russet Burbank	3 CC, LL, WP NIFS*	0/4
Russet Nugget	3 CC, LL, WP NIFS*	0/6

Rating for the symptom expression is 0 for no symptoms to 3 for strong typical symptoms. WP indicates whole plant involvement, LL indicates only lower leaf rolling and CC indicates good color change evident (yellowing, bronzing and some purpling on leaf edges) as compared to the healthy controls.

* Plants of the given clones or cultivars seen in the natural in-field spread (NIFS) plots showing leafroll symptoms.

Table 2: 1990 Clonal evaluation for natural in-field leafroll spread in the SLV

Clone #	#pos/#emerged	Percent spread	(1989)	(1988)	(1987)
A80559-2	3/65	4.6			
AC75430-1	0/46	0	0		
AC83044-1	1/25	4.0			
AC83044-2	6/63	9.5			
AC83064-1	2/64	3.1			
AC83064-6	5/67	7.5			
AC83068-1	17/66	25.8			
AC83172-1	7/52	13.5			
AC83306-1	1/61	1.6			
CO82142-4	7/72	9.7			
CO83027-2	6/73	8.2			
AC79100-1	11/62	17.7	21.6	14.0	10.0
Green Mountain	9/51	17.6	0	8.5	1.6
Houma	0/65	0	0	0	0
Katahdin	0/51	0	0	0	2.9
Keswick	5/60	8.3	10.2	0	6.4
Penobscot	1/64	1.6	0	0	0
Russet Burbank	4/58	6.9	0	0	10.5
Sangre	3/61	4.9	0	3.0	3.4
Centennial	1/64	1.6	0	0	6.4
WNC230-14	0/56	0	0	0	0
Ute Russet	3/66	4.5	2.2	0	12.7
Russet Nugget	0/63	0	8.8	18.1	0

Cummulative data collected represents two tubers/plant, 12 plants/replication and three replications for a total of 72 tubers planted/clone.