

ANNUAL PROGRESS REPORT 1991

Evaluation of Advanced Clones for Reaction to Bacterial Ring Rot Infection

Robert Davidson

Summary:

Twenty numbered clones and four control cultivars/clones were evaluated in the field in the San Luis Valley for their reaction to inoculation with bacterial ring rot. The timing of the symptom development, the height of the plants, the type of expression, both in the foliage and in tubers, and the number of plants out of each clone or cultivar exhibiting symptoms was measured.

All of the clones and cultivars were susceptible to infection by bacterial ring rot. Symptoms on the controls appeared between 67 days after planting (DAP) in the case of Russet Burbank to 107 DAP for Centennial. The clones fell in between these two extremes. Three clones, AC83068-1, AC83306-1 and AC84638-1 did not show initial symptoms until 107 DAP. CO84111-6 died before showing symptoms because of its sensitivity to Turbo herbicide. Several clones had a very low number of plants expressing symptoms over the season (see Table 1). Two of the clones in question, AC83064-6 and CO83027-2 did show good symptom expression in the 1990 testing. The range of plants (percentage) positive for symptoms 100 DAP was 20% for AC83064-6 to 100% for several others. Symptom type was quite consistent between clones and all but AC83064-6 showed a wide range of symptom characteristics.

Two clones have been in the testing program for three years, AC75430-1 and CO82124-4. Both show adequate symptom expression and timing under San Luis Valley conditions and are satisfactory for release to the growers.

Not all tubers from the various clones showed good symptoms. Two clones, AC83044-1 and AC83044-2 exhibited few tuber symptoms two years in a row. Most of the other clones tested for the first time this year exhibited low levels of tuber symptoms as well.

Plant height measurements taken mid-July showed some significant reductions in height between the controls and the infected plants. Only 3 out of 24 cases had infected plants which were taller than the controls. This may be a valuable observation for use in diagnosing BRR symptoms in some clones.

Materials & Methods: Tubers of the clones and cultivars to be tested were obtained from the SLV Research Center Cultivar Development Program in April, 1991. Bacterial ring rot inoculum was prepared using a mixture of ground up infected tubers and cultured bacteria (CIC24) washed from plates. This slurry was placed into a 5 gallon bucket. In addition, distilled water was placed in another 5 gallon bucket for use on the controls. The plot was pre-irrigated and appropriate rows opened up 48 hours prior to planting. Forty two tubers of each clone were selected in the 4-6 oz. range. These tubers were cut in half at the field. Each

clone had twenty one of the seedpieces used as controls. These were placed in the bucket containing the water while the other twenty one were reserved for use with the inoculum. Seedpieces were left in the water for 2 minutes and then placed in the plot. All controls were treated and laid out in the plot prior to any work with the ring rot inoculum. Upon completion of the controls, the remaining twenty one seedpieces from each clone were used for inoculation. These were placed in the bucket with the ring rot slurry for 2 minutes and then placed in the plot. The inoculum was changed after each 12 treatments. All potatoes were handplanted and mechanically covered. The potatoes were planted on May 9, 1991 in a randomized complete block plot design. Three blocks were used with seven seedpieces (replications) each for the control and inoculated treatment per block. Control and infected seedpieces from the same clone were planted in the same row within the block with a three foot space between the two sets of seven seedpieces. This aided in comparison evaluations of the plants during the growing season. A spacing of 12" was used between seedpieces within a given replication. A six foot blank space was left between blocks and one blank row was left between each planted row to separate treatments, minimize potential cross contamination and create conditions for easy viewing of plant symptoms.

The plot was irrigated by overhead sprinkler and weeds were controlled with a pre-emergence herbicide application of Turbo. Early blight and insects were controlled throughout the season with timed fungicide and insecticide applications as necessary.

Plant emergence was recorded and plants were examined for foliar symptoms of bacterial ring rot at weekly intervals beginning on July 15 (51 DAP) until August 30 (113 DAP), at which time plant maturity and other factors would not allow further reading. Date of first symptom expression, number of plants in each plot showing symptoms on each reading date and the types of symptoms showing were recorded. Also, at harvest, 10 tubers randomly selected from each replication (30 total for each clone) were examined to determine what symptoms might be present.

Results and Discussion: Data is presented in three tables, field symptom information, tuber symptom information and plant count/height measurements. Please see the summary on page one for a summary of the results for 1991. It is interesting to note that all of the clones except C084116-6 which died prematurely did exhibit BRR symptoms. Many clones have adequate symptom expression, timing, etc. for BRR under SLV conditions after two years of testing. Those clones which do not need further testing include A80559-2, AC83044-1, AC83044-2, AC83068-1 and AC83306-1. All other clones except AC75430-1 and C082142-4 need to be repeated in 1992.

BACTERIAL RINGROT CLONAL EVALUATION STUDY 1991
FIELD SYMPTOM INFORMATION

CLONE # AND NAME	DATE FIRST:		# OF		% PLANTS POSITIVE	DATE 50% OR MORE PLANTS POSITIVE	% PLANTS POSITIVE	100 DAP	SUMMARY OF SYMPTOMS OVER SEASON
	SYMPTOMS APPEARED	REPS	PLANTS	PLANTS					
* 1 A80559-2	7/15	2	5	27.7%	7/22	88.9%	R, IVY, IVC, IVN, MN		
* 2 AC75430-1	7/15	1	1	4.8%	8/24	90.5%	ED, R, W, IVC, IVN, MN		
* 3 AC83044-1	7/15	1	1	4.8%	8/5	100.0%	ED, R, W, IVC, IVN, MN		
* 4 AC83044-2	7/15	2	5	45.5%	8/24	60%	ED, R, W, IVY, IVC, IVN, MN		
* 5 AC83064-1	8/5	1	4	25.0%	8/30	50%	IVC, IVN, MN		
* 6 AC83064-6	7/22	1	1	20.0%	NEVER HIT 50%	20%	ED, R,		
* 7 AC83068-1	8/24	3	7	50.0%	8/24	71.4%	R, W, IVC, IVN, MN		
* 8 AC83172-1	7/15	2	3	21.4%	8/24	50.0%	ED, R, IVC, MN		
* 9 AC83306-1	8/24	1	1	100.0%	8/24	100.0%	IVC, IVN, MN		
10 AC84028-4	7/15	1	2	9.5%	8/24	100.0%	ED, R, IVC, IVN, MN		
11 AC84069-3	7/15	1	1	4.8%	8/24	76.5%	ED, R, W, IVY, IVC, IVN, MN		
12 AC84413-4	7/15	1	1	8.3%	8/24	58.3%	ED, R, W, IVC, IVN, MN		
13 AC84487-1	7/15	1	1	5.0%	NEVER HIT 50%	30.8%	ED, R, IVY, IVC, IVN, MN		
14 AC84638-1	8/24	3	7	38.9%	8/30	61.1%	IVC, IVN, MN		
* 15 C082142-4	7/15	2	4	19.0%	8/5	76.2%	ED, R, IVC, IVN, MN		
* 16 C083027-2	7/15	1	2	11.1%	NEVER HIT 50%	33.3%	ED, W, IVC, IVN, MN		
17 C084074-2	7/15	1	2	10.5%	NEVER HIT 50%	25.0%	ED, R, W, IVC, IVN, MN		
18 C084111-6	ALL DEAD								
19 C084205-5	7/15	3	10	50.0%	7/15	55.0%	ED, R, W, IVC, IVN, MN		
20 C00814-1	7/15	3	6	28.6%	7/22	90.5%	ED, R, W, IVC, IVN, MN		
* 21 CENTENNIAL	8/24	1	1	7.1%	NEVER HIT 50%	7.7%	IVC, IVN, MN		
* 22 RUSSET BURBANK	7/15	3	10	52.6%	7/15	94.4%	ED, R, W, IVY, IVC, IVN, MN		
* 23 SANGRE	7/15	3	5	23.8%	7/22	76.2%	W, IVC, IVN, MN		
* 24 WNC230-14	7/15	1	1	5.3%	NEVER HIT 50%	5.3%	ED, R		

KEY TO SYMPTOMS: ED-early dwarf, R-rosette, IVC-interveinal chlorosis, IVN-interveinal necrosis, MN-marginal necrosis, W-wilt, IVY-interveinal yellowing. Planting date on 5/9/91 and 5/10/91. Last reading taken on 8/30/91 approximately 100 DAP.

* INDICATES CLONES PREVIOUSLY TESTED

BACTERIAL RINGROT CLONAL EVALUATION STUDY 1991
 TUBER SYMPTOM DATA EVALUATED ON 9/9/91 (8/30/91 FOR STEM SQUEEZE)

CLONE # AND NAME	STEM SQUEEZE :(# + REPS :OUT OF 3)	TUBERS W/:TUBERS W/:		TUBERS W/:TUBERS W/:		TUBERS W/:TUBERS W/:	
		EXTERNAL :SYMPTOMS	INTERNAL :SYMPTOMS	EXTERNAL :SYMPTOMS	INTERNAL :SYMPTOMS	EXTERNAL :SYMPTOMS	INTERNAL :SYMPTOMS
* 1 A80559-2	3	26.7%	6.7%	33.3%	33.3%	66.7%	66.7%
* 2 AC75430-1	3	6.7%	33.3%	40.0%	40.0%	60.0%	60.0%
* 3 AC83044-1	2 - 3	6.7%	16.7%	23.3%	23.3%	76.7%	76.7%
* 4 AC83044-2	1 - 3	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%
* 5 AC83064-1	3	10.0%	0.0%	10.0%	10.0%	90.0%	90.0%
* 6 AC83064-6	0 OUT OF 2 REPS:	6.7%	0.0%	6.7%	6.7%	93.3%	93.3%
* 7 AC83068-1	3	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%
* 8 AC83172-1	1 OUT OF 2 REPS:	8.7%	0.0%	8.7%	8.7%	91.3%	91.3%
* 9 AC83306-1	1 OUT OF 2 REPS:	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%
10 AC84028-4	1 OUT OF 1 REP	26.7%	0.0%	26.7%	26.7%	73.3%	73.3%
11 AC84069-3	2 - 3	3.3%	0.0%	3.3%	3.3%	96.7%	96.7%
12 AC84413-4	3	10.0%	10.0%	20.0%	20.0%	80.0%	80.0%
13 AC84487-1	2 - 3	6.6%	3.3%	10.0%	10.0%	90.0%	90.0%
14 AC84638-1	2	6.7%	0.0%	6.7%	6.7%	93.3%	93.3%
* 15 C082142-4	2	16.7%	0.0%	16.7%	16.7%	83.3%	83.3%
* 16 C083027-2	2 - 3	26.9%	3.8%	30.8%	30.8%	69.2%	69.2%
17 C084074-2	1	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%
18 C084111-6	ALL DEAD	ALL DEAD	ALL DEAD	ALL DEAD	ALL DEAD	ALL DEAD	ALL DEAD
19 C084205-5	3	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%
20 C00814-1	3	33.3%	3.3%	36.7%	36.7%	63.3%	63.3%
* 21 CENTENNIAL	0	6.7%	0.0%	6.7%	6.7%	93.3%	93.3%
* 22 RUSSET BURBANK:	3	20.0%	3.3%	23.3%	23.3%	76.7%	76.7%
* 23 SANGRE	3	43.3%	10.0%	53.3%	53.3%	46.7%	46.7%
* 24 WNC230-14	0	6.7%	0.0%	6.7%	6.7%	93.3%	93.3%

30 TUBERS WERE RANDOMLY PICKED AND ASSAYED PER CLONE

* INDICATES CLONES PREVIOUSLY TESTED

BACTERIAL RINGROT CLONAL EVALUATION STUDY 1991
STAND COUNT AND HEIGHT MEASUREMENTS

CLONE # AND NAME	HEALTHY	INFECTED	HEALTHY	INFECTED
	STAND COUNT	STAND COUNT	AVERAGE	AVERAGE
	ON 7/15/91	ON 7/15/91	PLANT HEIGHT	PLANT HEIGHT
	(OUT OF 21)	(OUT OF 21)	ON 7/16/91	ON 7/16/91
			(INCHES)	(INCHES)
* 1 A80559-2	18	13	11.7	13.4
* 2 AC75430-1	21	21	17.3	17.2
* 3 AC83044-1	21	21	12.1	11.8
* 4 AC83044-2	11	8	5.6	6
* 5 AC83064-1	16	15	10.8	6.8
* 6 AC83064-6	5	5	11.5	8.3
* 7 AC83068-1	14	14	10.6	6.4
* 8 AC83172-1	14	19	9.1	7.7
* 9 AC83306-1	1	9	8.6	6
10 AC84028-4	21	21	14.9	11.3
11 AC84069-3	21	21	13.8	13.1
12 AC84413-4	12	19	12	8.4
13 AC84487-1	20	19	11	6.4
14 AC84638-1	18	21	11.8	9.7
* 15 CO82142-4	21	21	14.3	10.9
* 16 CO83027-2	18	20	11.6	8.9
17 CO84074-2	19	21	10.4	11
18 CO84111-6	1	1	6.5	4
19 CO84205-5	20	21	15.9	13.1
20 CO0814-1	20	21	17.4	14.2
* 21 CENTENNIAL	15	20	9.9	7.7
* 22 RUSSET BURBANK	19	21	16.9	14.4
* 23 SANGRE	21	21	15.3	13.4
* 24 WNC230-14	19	21	10.4	7.9

THE HEIGHT OF 3 PLANTS WITHIN EACH REP WERE MEASURED, THE TALLEST, THE SHORTEST AND ONE OF AVERAGE SIZE.

* INDICATES CLONES PREVIOUSLY TESTED