

**2002
RESEARCH REPORT**

**Extension Potato
Disease Control Project**



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**Colorado State University
SLV Research Center**

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Summary of Results for Foliar Fungicide Trials, 2002

Thanks to the generous support of the Colorado Potato Administrative Committee (Area II) and several agricultural companies, full season comprehensive fungicide efficacy trials were conducted this past summer at the San Luis Valley Research Center (see protocol). Over the course of the growing season thirty-two different fungicide programs were assessed for blight control (Table 1). The trials depended on natural infection, early blight (*Alternaria solani*) developed within the trial, however, late blight (*Phytophthora infestans*) did not.

The incidence of early blight within the trials was natural and similar to what occurred in commercial potato production across the San Luis Valley. At the time of final disease readings on August 29, early blight incidence had reached 100 percent in the untreated control. AUDPC values provide clear separation among fungicide programs. In general, disease suppression by fungicide program can be grouped into four categories. Early blight disease development was significantly reduced by all treatments over the untreated control. Treatments 8 and 9 reduced disease by less than 60%. Treatments 3-5, 7, 11, 12, 18, 22, 23, and 24 reduced disease from 60-65%. Treatments 2, 6, 10, 14, 15, 17, 19-21, 25, 29, 32 and 33 reduced disease from 65-70%. Treatments 13, 16, 26-28, 30 and 31 reduced disease incidence by more than 70%. In general, the highest degree of early blight control was achieved in programs where Quadris or Headline was utilized (Table 2). Suppression of foliar early blight did not, however, translate directly to increased tuber yields (Table 3).

2002 POTATO - EARLY BLIGHT FUNGICIDE TRIALS

Researchers: Richard T. Zink, Associate Professor, and Andrew Houser, Research Associate,
Department of Horticulture and Landscape Architecture, Colorado State University

Location: San Luis Valley Research Center, Center, CO

Cultivar: Russet Norkotah Selection 8, cut seed, 2-4 oz.

Applications: All treatments applied using an R & D CO₂ charged tractor mounted plot sprayer with four XR 8002VS nozzles spaced seventeen inches apart at 60 psi pressure and applying 40 gallons/acre as a broadcast application.

Spray Dates: July 1 & 2; July 8 & 9; July 15 & 16; July 22 & 23; July 29 & 30; August 5 & 6;
August 12; August 19

Planted: May 9, 2002

Plot Design: Randomized complete block

Plot Size: 4 - 20 foot rows per treatment per replication, treatments applied to center two rows
and data taken on two center rows

Plant Spacing: 12 inches

Row Spacing: 34 inches

Replications: Four

Irrigation: Solid set sprinkler, rate based on ET

Fertilizer: 80N-70P-40K-18S-1Zn, preplant, 40N through sprinkler after tuber set

Herbicide: Matrix, 1.5 oz./A + Eptam, 4.5 pt./A + Poast, 2.0 pt./A

Insecticide: None

Vine Killer: Beat vines on September 3, 2002

Harvested: September 9, 12, & 13, 2002

DATA:

Disease: Early blight disease incidence based on percent leaves infected, readings taken weekly
starting August 2, 2002.

Yield: 2-20 foot rows per treatment per replication, total yield expressed as cwt/A.

Grade: By hand, percent tubers by weight in pounds < 4 oz., 4-10 oz., > 10 oz., US #2's, and culls.

Table 1. Fungicide programs evaluated for early blight control, San Luis Valley, Colorado 2002

<u>Program</u>	<u>Products</u>	<u>Rate</u>	<u>Itinerary/Week</u>	<u>Est. total cost/A*</u>
1	Control, no treatment			
2	Polyram	2.0 lb./A	1,3	\$62.24/A
	Headline (F500)	6.1 oz./A	2,4	
	Polyram + SuperTin	2.0 lb./A + 2.5 oz./A	5,6	
3	Polyram	2.0 lb./A	1,3	NA
	Endura (BAS 510)	2.3 oz./A	2,4	
	Polyram + SuperTin	2.0 lb./A + 2.5 oz./A	5,6	
4	Polyram	2.0 lb./A	1,3	\$76.04/A
	Headline (F500)	9.2 oz./A	2,4	
	Polyram + SuperTin	2.0 lb./A + 2.5 oz./A	5,6	
5	Headline (F500)	6.1 oz./A	1,3	\$62.08/A
	Polyram	2.0 lb./A	2,4	
	Polyram + SuperTin	2.0 lb./A + 2.5 oz./A	5,6	
6	Headline (F500)	6.1 oz./A	1,3	\$86.92/A
	Bravo Ultrex	1.0 lb./A	2,8	
	Polyram + SuperTin	2.0 lb./A + 2.5 oz./A	4,5,6,7	
7	Headline (F500)	6.1 oz./A	1,3	\$63.80/A
	Bravo Ultrex	1.0 lb./A	2,8	
	Polyram	2.0 lb./A	4,5,6,7	
8	Polyram	2.0 lb./A	1,3 (10 day)	\$38.92/A
	Headline (F500)	6.1 oz./A	2,4 (10 day)	
9	Polyram	2.0 lb./A	1,3 (10 day)	\$39.56/A
	Quadris	6.2 oz./A	2,4 (10 day)	
10	Headline (F500)	6.1 fl.oz./A	2,4,6	\$87.48/A
	Polyram	2.0 lb./A	1,3	
	Polyram + SuperTin	2.0 lb./A + 2.5 oz./A	5,7,8	
11	Headline (F500)	6.1 fl.oz./A	2,4	\$85.56/A
	Polyram	2.0 lb./A	1,3	
	Polyram + SuperTin	2.0 lb./A + 2.5 oz./A	5,6,7,8	
12	Endura (BAS 510)	2.3 oz./A	2,4,6	NA
	Polyram	2.0 lb./A	1,3	
	Polyram + SuperTin	2.0 lb./A + 2.5 oz./A	5,7,8	
13	Endura (BAS 510)	2.3 oz./A	2,4	NA
	Polyram	2.0 lb./A	1,3	
	Polyram + SuperTin	2.0 lb./A + 2.5 oz./A	5,6,7,8	
14	Headline (F500)	6.1 fl.oz./A	2,6	NA
	Endura (BAS 510)	2.3 oz./A	4	
	Polyram	2.0 lb./A	1,3	
	Polyram + SuperTin	2.0 lb./A + 2.5 oz./A	5,7,8	
15	Headline (F500)	6.1 fl.oz./A	2	NA
	Endura (BAS 510)	2.3 oz./A	4	
	Polyram	2.0 lb./A	1,3	
	Polyram + SuperTin	2.0 lb./A + 2.5 oz./A	5,6,7,8	
16	Endura (BAS 510)	2.3 oz./A	2,6	NA
	Headline (F500)	6.1 fl.oz./A	4	
	Polyram	2.0 lb./A	1,3	
	Polyram + SuperTin	2.0 lb./A + 2.5 oz./A	5,7,8	

Program	Products	Rate	Itinerary/Week	Est. total cost/A*
17	Endura (BAS 510)	2.3 oz./A	2	NA
	Headline (F500)	6.1 fl.oz./A	4	
	Polyram	2.0 lb./A	1,3	
	Polyram + SuperTin	2.0 lb./A + 2.5 oz./A	5,6,7,8	
18	Endura (BAS 510) + Ranman (BAS 545) + Silwett	2.3 oz./A + 2.69 fl.oz./A + 2.0 fl.oz./A	1,2,3,4,5,6	NA
	Bravo WS	24.0 fl.oz./A	7	
19	Endura (BAS 510) + Bravo WS	2.3 oz./A + 16.0 fl.oz./A	1,3,5	NA
	Bravo WS	24.0 fl.oz./A	2,4,6,7	
20	Headline (BAS 500)	6.1 oz./A	1,4	NA
	Endura (BAS 510) + Ranman (BAS 545) + Silwett	2.3 oz./A + 2.69 fl.oz./A + 2.0 fl.oz./A	2,5	
	Acrobat + Bravo WS	0.4 lb./A + 16 fl.oz./A	3,6	
	Bravo WS	24 fl.oz./A	7	
21	Quadris + Bravo WS	9.2 oz./A + 16.0 fl.oz./A	1,3,5	\$117.19/A
	Bravo WS	24.0 fl.oz./A	2,4,6,7	
22	Headline (BAS 500) + Bravo WS	6.1 oz./A + 16.0 fl.oz./A	1,3,5	\$96.04/A
	Bravo WS	24.0 fl.oz./A	2,4,6,7	
23	Bravo Ultrex	1.4 lb./A	1,2,3,4,5,6,7,8	\$73.44/A
24	Previcur N + Bravo Ultrex	0.7 pt./A + 0.7 lb./A	1	NA
	Bravo Ultrex	0.7 lb./A	2,3	
	Reason + Bond	8.2 oz./A + 4.0 fl.oz./A	4,5,6,7	
	Previcur N + Bravo Ultrex	1.2 pt./A + 0.9 lb./A	8	
25	Previcur N + Bravo Ultrex	0.7 pt./A + 0.7 lb./A	1	NA
	Bravo Ultrex	0.7 lb./A	2,3	
	Previcur N + Reason	0.7 pt./A + 5.5 oz./A	4,5,6,7	
	Bravo Ultrex	1.4 lb./A	8	
26	KQ667	11.0 oz.ai./A	1,2,3,4	NA
	KQ667	16.5 oz.ai./A	5,6,7,8	
27	KQ667	16.5 oz.ai./A	1,2,3,4	NA
	KQ667	22.0 oz.ai./A	5,6,7,8	
28	KP481 + Manzate	3.0 oz.ai./A + 12.0 oz.ai./A	1,2,3,4	NA
	KP481 + Manzate	4.0 oz.ai./A + 18.0 oz.ai./A	5,6,7,8	
29	DPX-JE874 + Bravo WS	1.5 oz.ai./A + 9.0 oz.ai./A	1,2,3,4	NA
	DPX-JE874 + Bravo WS	2.0 oz.ai./A + 12.0 oz.ai./A	5,6,7,8	
30	KP481 + Bravo WS	3.0 oz.ai./A + 9.0 oz.ai./A	1,2,3,4	NA
	KP481 + Bravo WS	4.0 oz.ai./A + 12.0 oz.ai./A	5,6,7,8	
31	Bravo WS	18 oz.ai./A	1	\$151.10/A
	Quadris	1.6 oz.ai./A	2	
	Curzate + Bravo WS	2.0 oz.ai./A + 18.0 oz.ai./A	3,4,5,6,7,8	
32	Quadris + Bravo Ultrex	6.2 oz./A + 0.7 lb./A	1,3,5	\$73.83/A
	Bravo Ultrex	0.7 lb./A	2,4,6,7	
33	Quadris	6.2 oz./A	2,4	\$36.98/A
	Bravo Ultrex	0.7 lb./A	1,3	

*These prices do not include application costs.

Table 2. Effects of fungicide programs on the incidence of early blight in the cultivar Russet Norkotah Selection 8, San Luis Valley, Colorado, 2002; No Late Blight occurred within the trial.

Treatment	Percent Leaves Infected					AUDPC ^a
	August 2	August 7	August 14	August 21	August 29	
1	8.7	38.0	78.8	94.2	99.5	1117.0 a
2	2.7	4.3	12.0	28.2	59.0	371.5 d-j
3	3.1	4.0	12.0	33.4	67.0	418.1 b-f
4	2.2	4.5	14.5	31.0	69.5	426.0 b-e
5	2.0	3.8	14.3	31.3	67.5	415.7 b-f
6	3.0	4.0	14.3	37.1	50.5	381.0 c-h
7	3.2	3.5	13.0	28.2	67.5	403.8 b-g
8	3.3	5.5	13.0	37.9	75.8	474.1 b
9	2.5	4.8	10.8	39.6	74.5	462.3 bc
10	1.5	4.3	11.0	28.7	51.3	338.6 f-j
11	1.7	4.5	15.0	30.0	72.5	432.9 b-d
12	2.6	5.3	15.0	39.2	57.0	416.6 b-f
13	2.1	4.0	14.3	25.3	49.5	332.9 f-j
14	3.2	4.5	11.5	26.5	53.5	347.2 d-j
15	1.4	3.8	11.8	22.2	61.5	352.0 d-j
16	3.1	2.8	10.0	24.0	52.5	323.2 g-j
17	3.3	3.3	10.3	32.9	51.3	353.4 d-j
18	1.5	5.0	11.5	31.3	69.5	415.7 b-f
19	3.1	3.8	9.8	31.3	60.0	377.5 c-I
20	3.0	4.0	10.5	23.8	56.0	340.4 e-j
21	2.6	4.8	11.8	31.7	55.0	370.2 d-j
22	2.3	3.8	11.5	33.4	66.5	410.9 b-f
23	2.4	4.5	16.5	30.5	61.5	403.6 b-g
24	2.8	3.8	19.0	31.7	58.3	404.2 b-g
25	1.7	3.5	14.5	30.0	54.5	364.7 d-j
26	1.7	3.5	10.3	28.0	48.5	321.9 g-j
27	1.9	4.3	11.0	25.8	41.3	294.6 ij
28	1.8	4.3	13.0	25.4	43.3	306.8 h-j
29	2.2	3.8	11.0	35.8	56.3	381.6 c-h
30	2.0	4.5	14.8	25.6	44.5	319.8 g-j
31	1.9	4.0	11.0	24.6	41.8	291.3 j
32	2.2	3.5	11.0	32.1	49.8	344.9 e-j
33	2.4	4.3	12.5	27.2	53.8	350.3 d-j
LSD(P=0.05)	1.09	2.21	4.95	14.01	14.13	85.72

^aAUDPC is the Area Under the Disease Progress Curve.

Means followed by the same letters are not significantly different at P=0.05 for AUDPC.

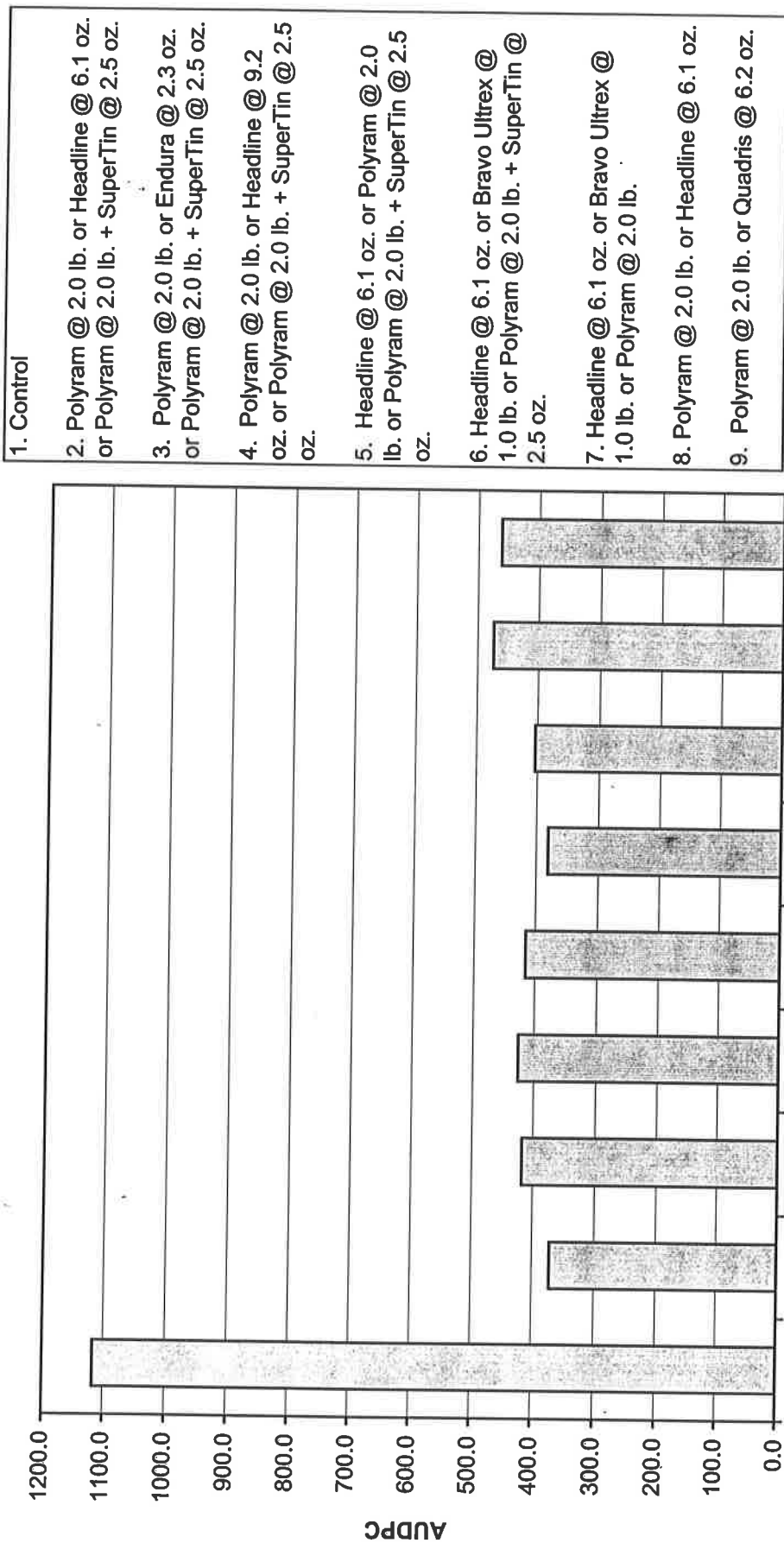
Table 3. Effects of fungicide programs on tuber yield and quality in the cultivar Russet Norkotah Selection 8, San Luis Valley, Colorado, 2002

Treatment	Percent ^a					
	< 4 oz.	4-10 oz.	> 10 oz.	US #2s	Culls	Cwt/A ^b
1	11.6	58.5	28.7	0.4	0.8	374.5
2	8.6	57.8	32.7	0.5	0.5	387.4
3	9.2	54.7	33.8	1.3	1.0	375.9
4	12.1	64.4	22.3	0.6	0.6	375.8
5	8.4	56.2	34.1	0.7	0.6	402.8
6	11.8	59.8	25.1	0.9	2.5	337.7
7	8.6	51.3	38.8	1.1	0.3	428.6
8	13.0	62.6	22.6	1.3	0.5	342.9
9	8.3	54.1	36.5	0.7	0.4	416.3
10	9.0	55.2	34.8	0.4	0.6	380.2
11	10.2	53.0	35.4	0.7	0.6	395.7
12	13.2	61.1	24.8	0.4	0.4	347.4
13	10.0	55.9	31.9	1.2	0.9	374.3
14	9.3	52.2	36.8	1.3	0.4	421.5
15	8.8	54.6	34.0	1.8	0.8	391.7
16	11.9	53.7	33.1	0.7	0.5	402.3
17	8.5	49.3	39.7	1.4	1.1	385.0
18	7.9	59.4	29.7	1.8	1.3	401.4
19	8.9	52.0	36.8	1.4	1.0	376.4
20	8.4	52.4	37.0	0.7	1.5	405.3
21	10.2	58.3	30.4	0.6	0.5	352.9
22	8.4	62.0	28.4	0.8	0.3	392.6
23	13.1	58.9	25.9	0.9	1.2	324.7
24	13.0	56.3	29.3	0.7	0.7	376.3
25	11.7	60.0	26.7	0.5	1.1	314.5
26	9.7	52.1	36.2	0.2	1.7	392.0
27	9.2	56.5	33.2	0.8	0.3	367.5
28	11.0	56.0	31.4	0.0	1.6	380.8
29	9.9	53.9	33.8	1.4	1.1	350.0
30	10.7	56.3	32.5	0.0	0.5	387.5
31	12.4	59.1	27.3	1.1	0.1	326.8
32	10.0	52.0	36.1	0.7	1.2	393.1
33	9.6	53.1	35.1	1.5	0.8	364.7
LSD(P=0.05)	NS	NS	NS	NS	NS	NS

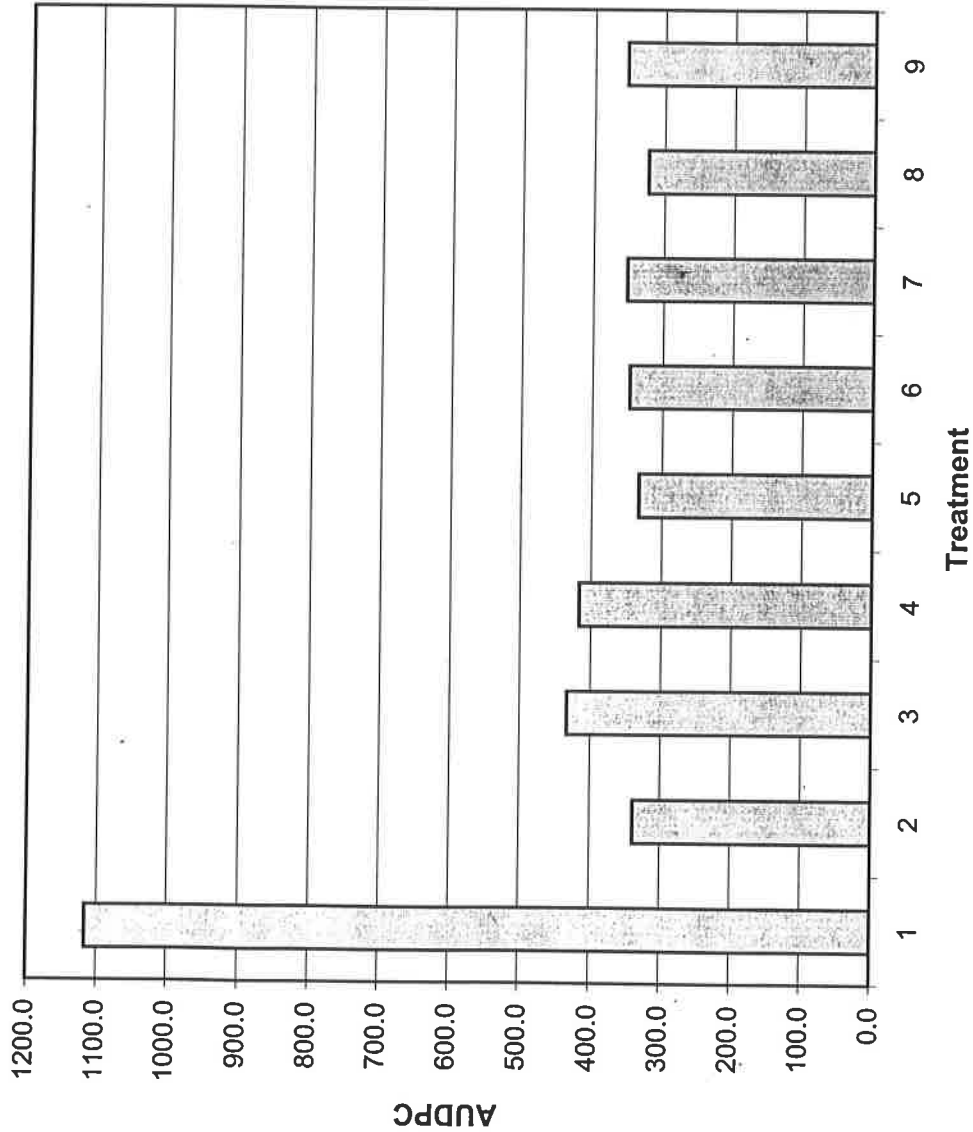
^a Based on tuber weight in pounds, mean of four replications.

^b Total yield expressed as hundred weight per acre, 2-20 foot rows per treatment per replication, mean of four replications.

**Area Under the Disease Progress Curve for Early Blight
2002 Fungicide Trial, Colorado State University
San Luis Valley Research Center, Center, CO**

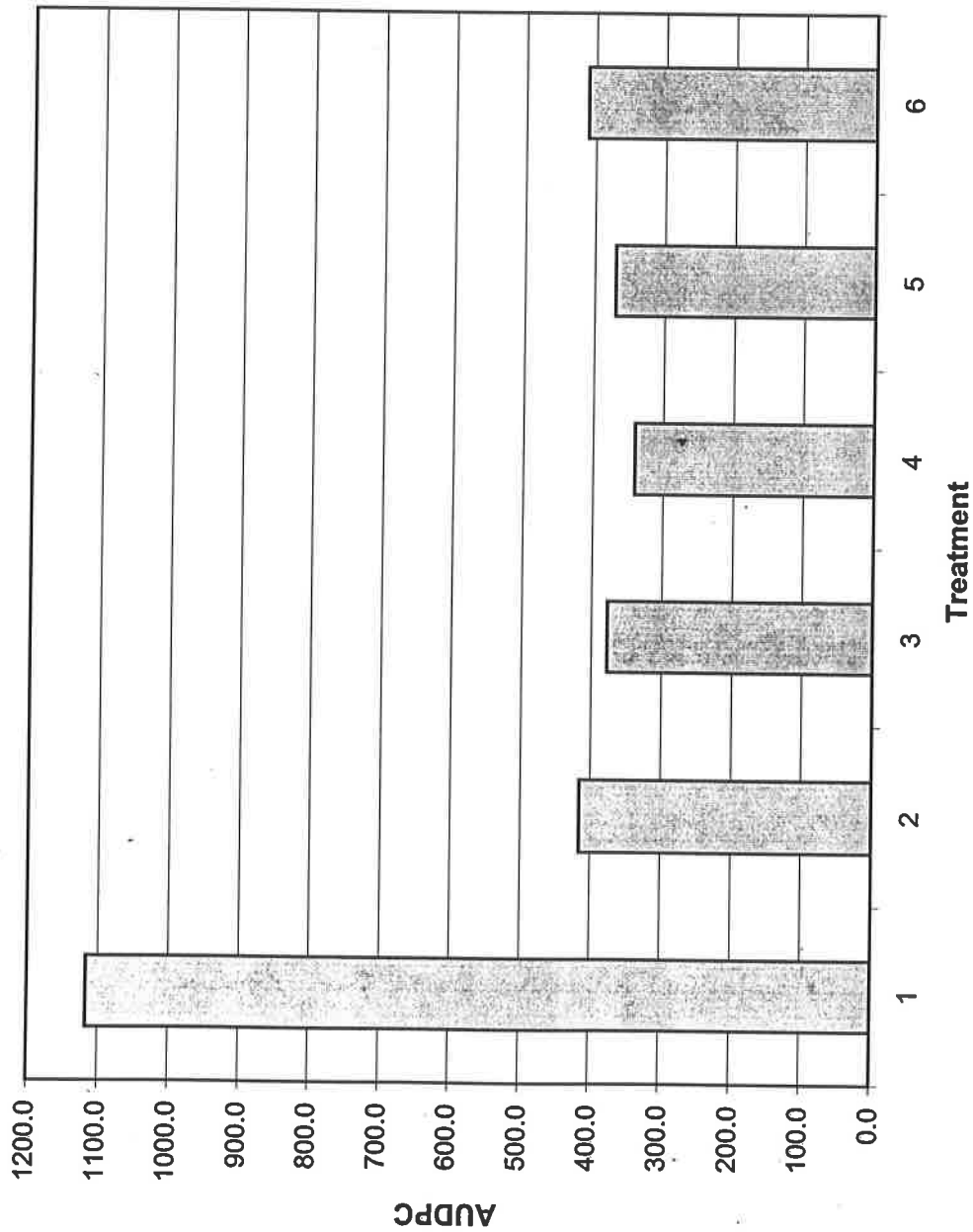


**Area Under the Disease Progress Curve for Early Blight
2002 Fungicide Trial, Colorado State University
San Luis Valley Research Center, Center, CO**



1. Control
2. Headline @ 6.1 oz. or Polyram @ 2.0 lb. or Polyram @ 2.0 lb. + SuperTin @ 2.5 oz.
3. Headline @ 6.1 oz. or Polyram @ 2.0 lb. or Polyram @ 2.0 lb. + SuperTin @ 2.5 oz.
4. Endura @ 2.3 oz. or Polyram @ 2.0 lb. or Polyram @ 2.0 lb. + SuperTin @ 2.5 oz.
5. Endura @ 2.3 oz. or Polyram @ 2.0 lb. or Polyram @ 2.0 lb. + SuperTin @ 2.5 oz.
6. Headline @ 6.1 oz. or Endura @ 2.3 oz. or Polyram @ 2.0 lb. or Polyram @ 2.0 lb. + SuperTin @ 2.5 oz.
7. Headline @ 6.1 oz. or Endura @ 2.3 oz. or Polyram @ 2.0 lb. or Polyram @ 2.0 lb. + SuperTin @ 2.5 oz.
8. Endura @ 2.3 oz. or Headline @ 6.1 oz. or Polyram @ 2.0 lb. or Polyram @ 2.0 lb. + SuperTin @ 2.5 oz.
9. Endura @ 2.3 oz. or Headline @ 6.1 oz. or Polyram @ 2.0 lb. or Polyram @ 2.0 lb. + SuperTin @ 2.5 oz.

**Area Under the Disease Progress Curve for Early Blight
2002 Fungicide Trial, Colorado State University
San Luis Valley Research Center, Center, CO**



1. Control

2. Endura @ 2.3 oz. + Ranman @ 2.7 oz. + Silwett @ 2:0 oz. or Bravo WS @ 24 oz.

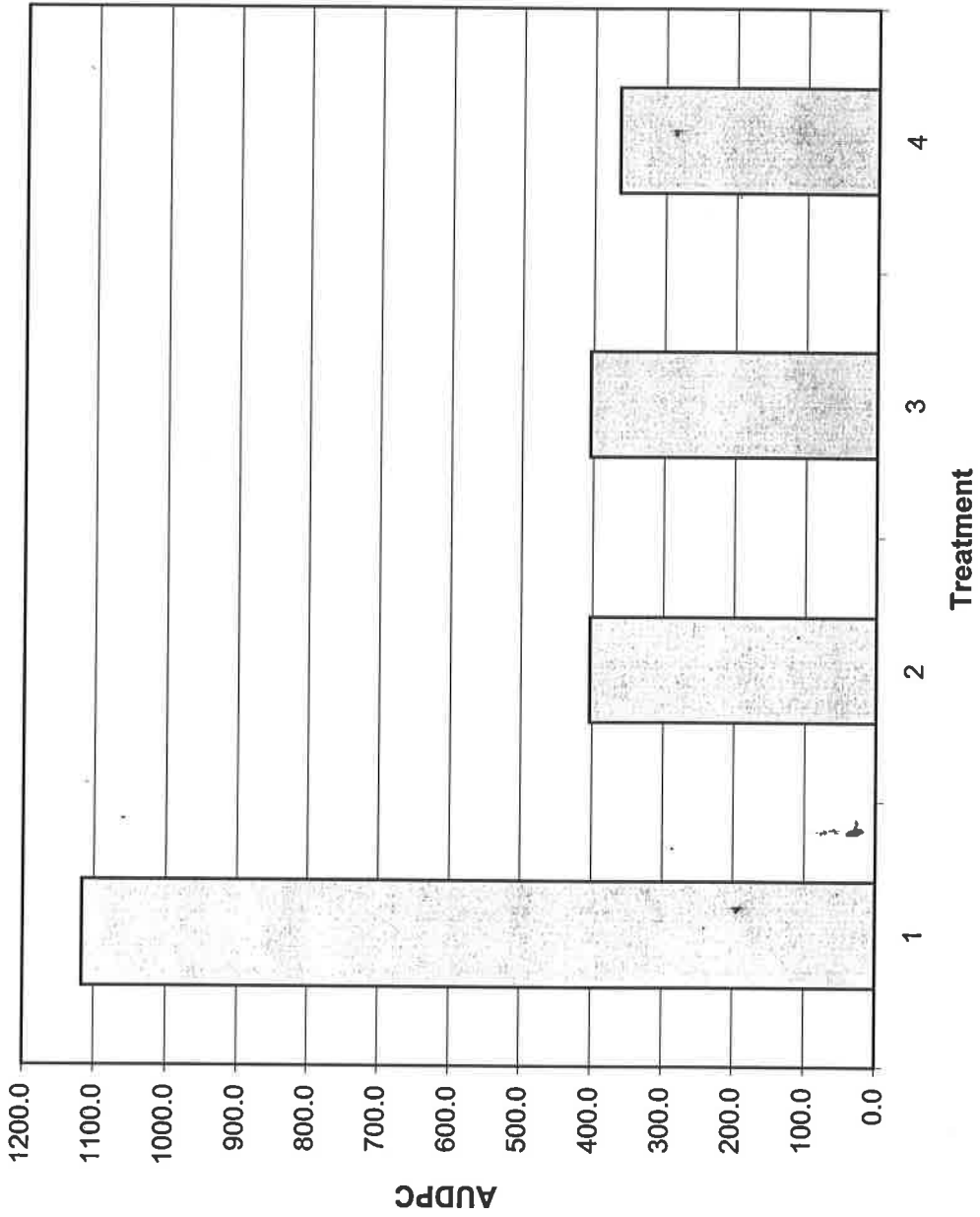
3. Endura @ 2.3 oz. + Bravo WS @ 16 oz. or Bravo WS @ 24 oz.

4. Headline @ 6.1 oz. or Endura @ 2.3 oz. + Ranman @ 2.7 oz. + Silwett @ 2.0 oz. or Acrobat @ 0.4 lb. + Bravo WS @ 16 oz. or Bravo WS @ 24 oz.

5. Quadris @ 9.2 oz. + Bravo WS @ 16 oz. or Bravo WS @ 24 oz.

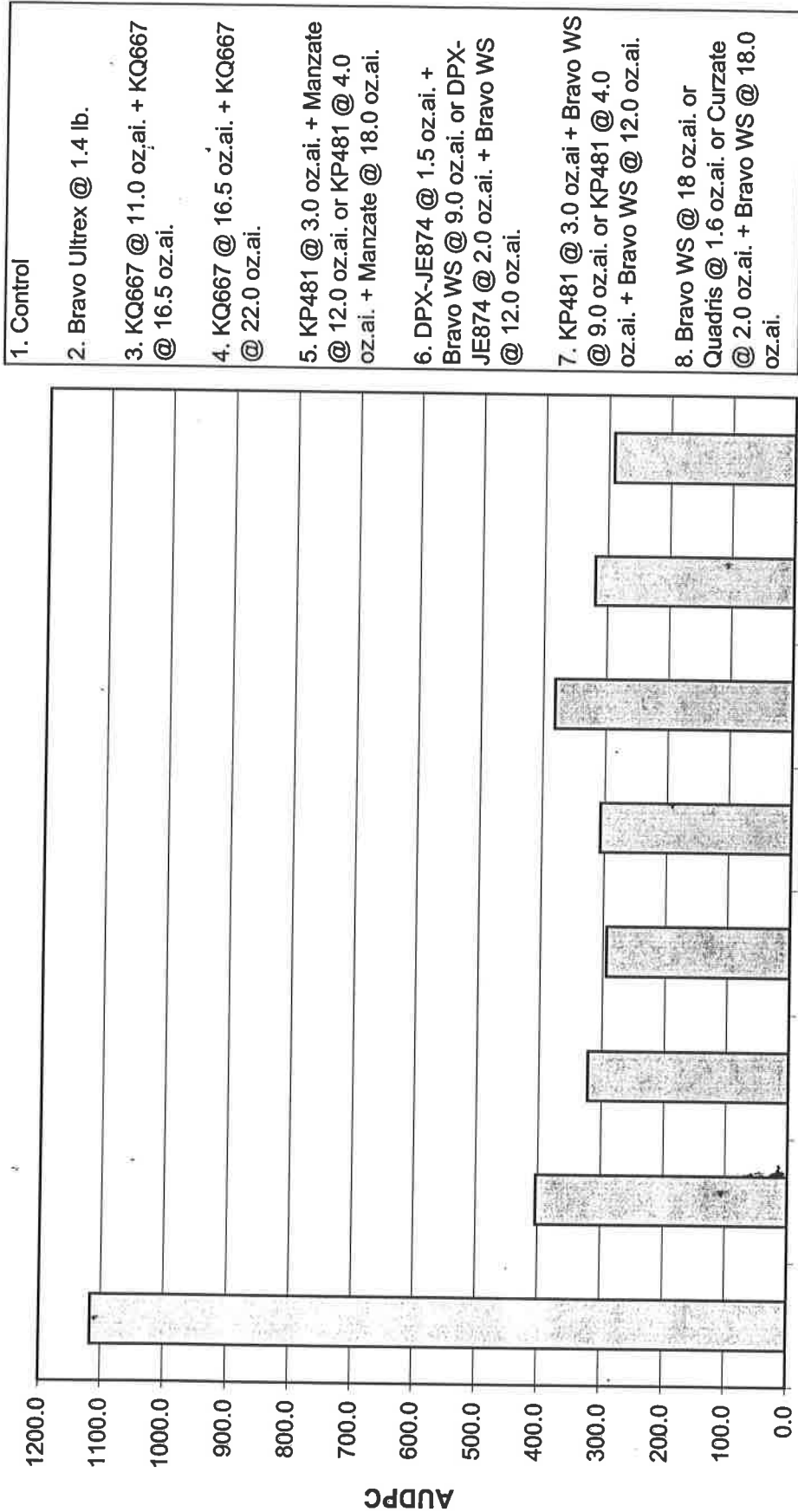
6. Headline @ 6.1 oz. + Bravo WS @ 16 oz. or Bravo WS @ 24 oz.

**Area Under the Disease Progress Curve for Early Blight
2002 Fungicide Trial, Colorado State University
San Luis Valley Research Center, Center, CO**

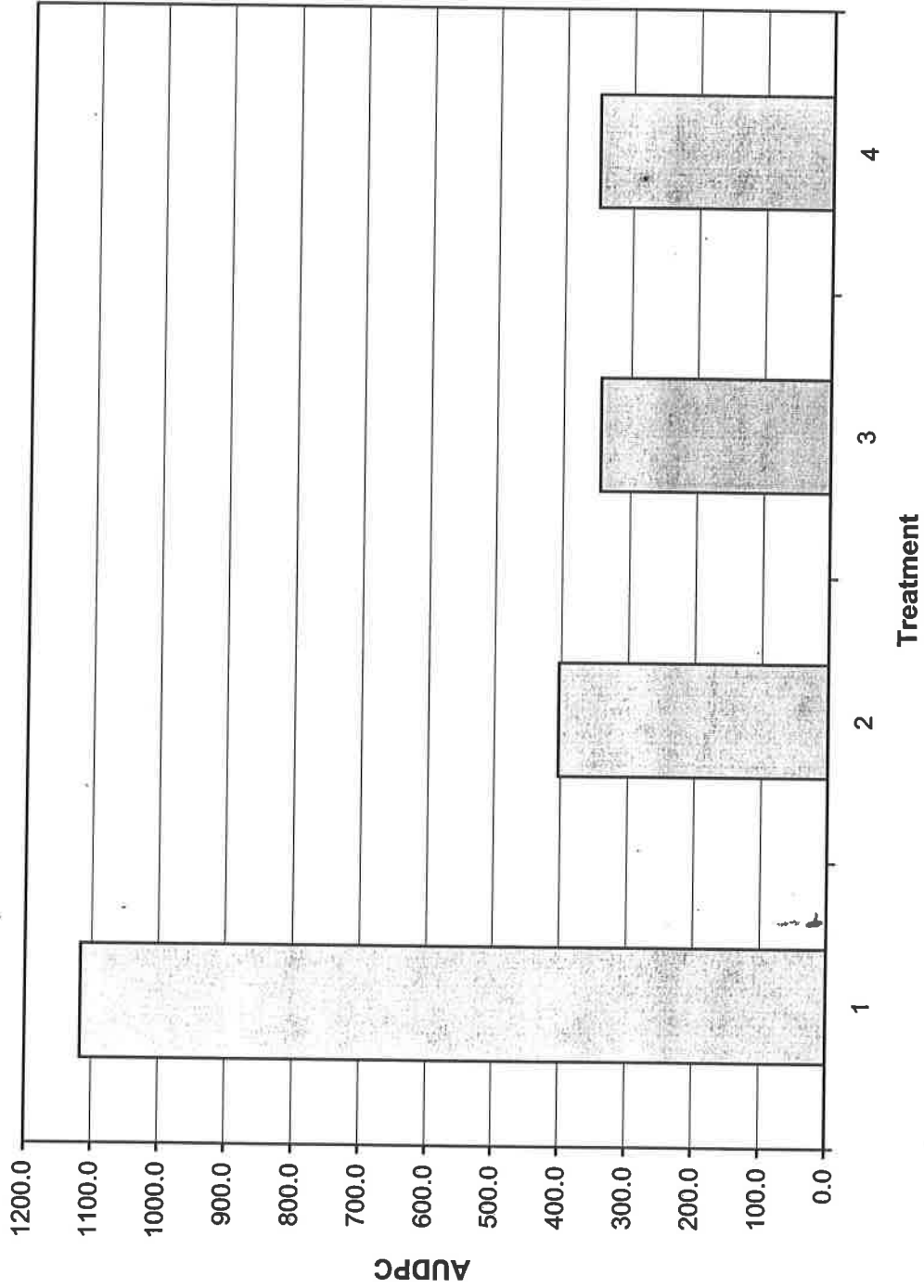


1. Control
2. Bravo Ultrex @ 1.4 lb.
3. Previcur N @ 0.7 pt. + Bravo Ultrex @ 0.7 lb. or Bravo Ultrex @ 0.7 lb. or Reason @ 8.2 oz. + Bond @ 4.0 oz. or Previcur N @ 1.2 pt. + Bravo Ultrex @ 0.9 lb.
4. Previcur N @ 0.7 pt. + Bravo Ultrex @ 0.7 lb. or Bravo Ultrex @ 0.7 lb. or Previcur N @ 0.7 pt. + Reason @ 5.5 oz. or Bravo Ultrex @ 1.4 lb.

**Area Under the Disease Progress Curve for Early Blight
2002 Fungicide Trial, Colorado State University
San Luis Valley Research Center, Center, CO**

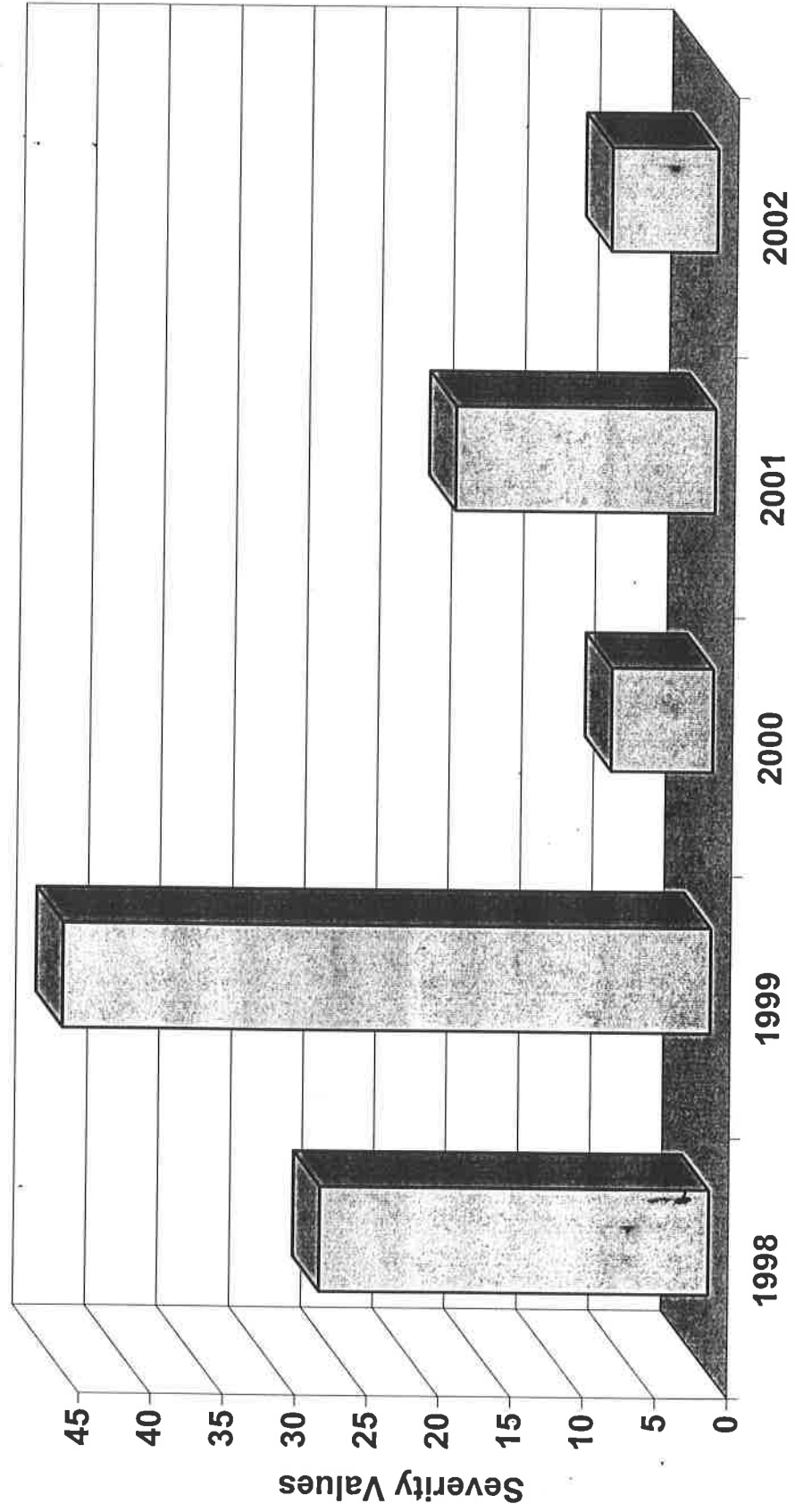


**Area Under the Disease Progress Curve for Early Blight
 2002 Fungicide Trial, Colorado State University
 San Luis Valley Research Center, Center, CO**

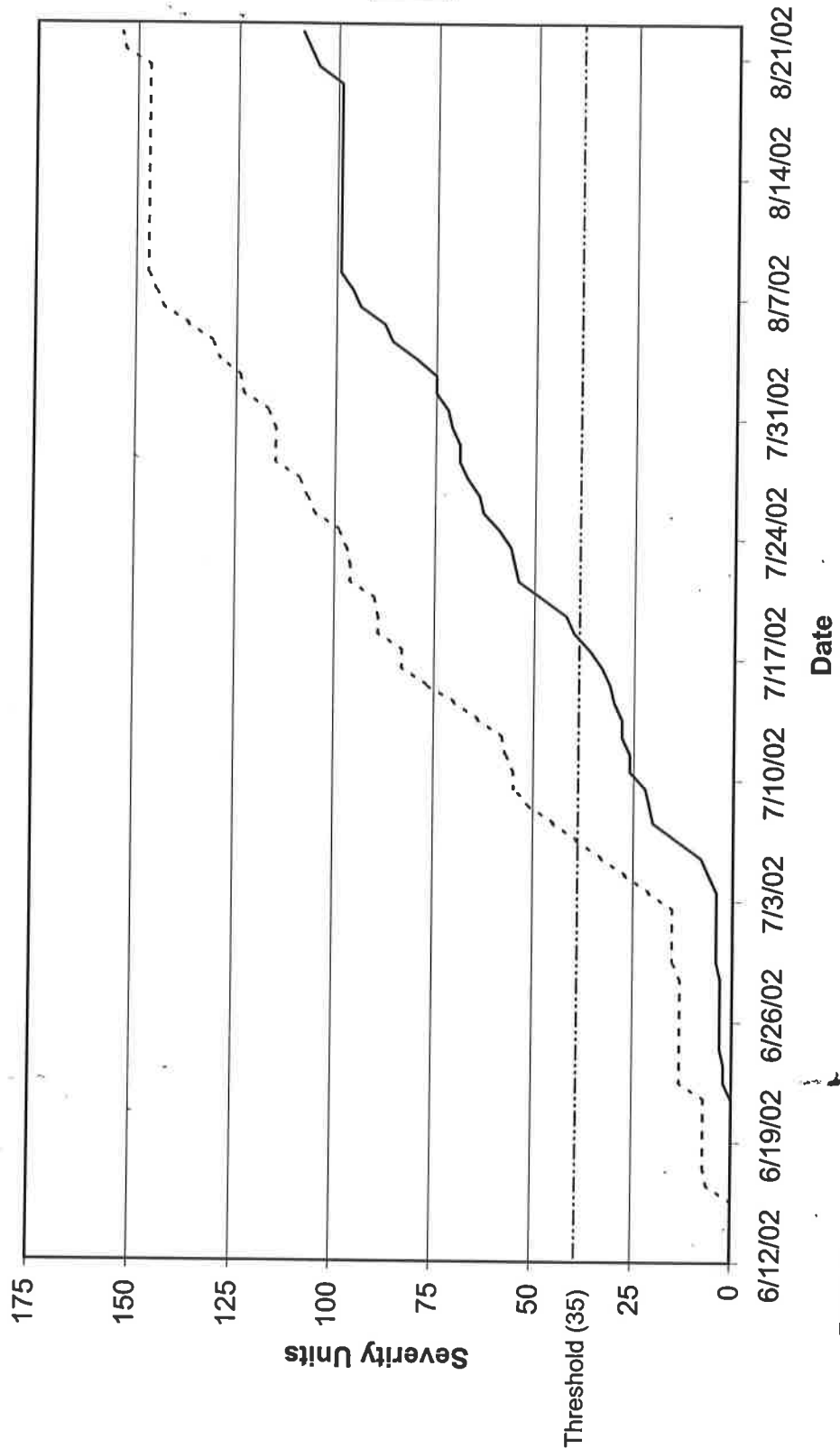


1. Control
2. Bravo Ultrex @ 1.4 lb.
3. Quadris @ 6.2 oz. +
Bravo Ultrex @ 0.7 lb. or
Bravo Ultrex @ 0.7 lb.
4. Quadris @ 6.2 oz. or
Bravo Ultrex @ 0.7 lb.

SLV Late Blight Severity Values



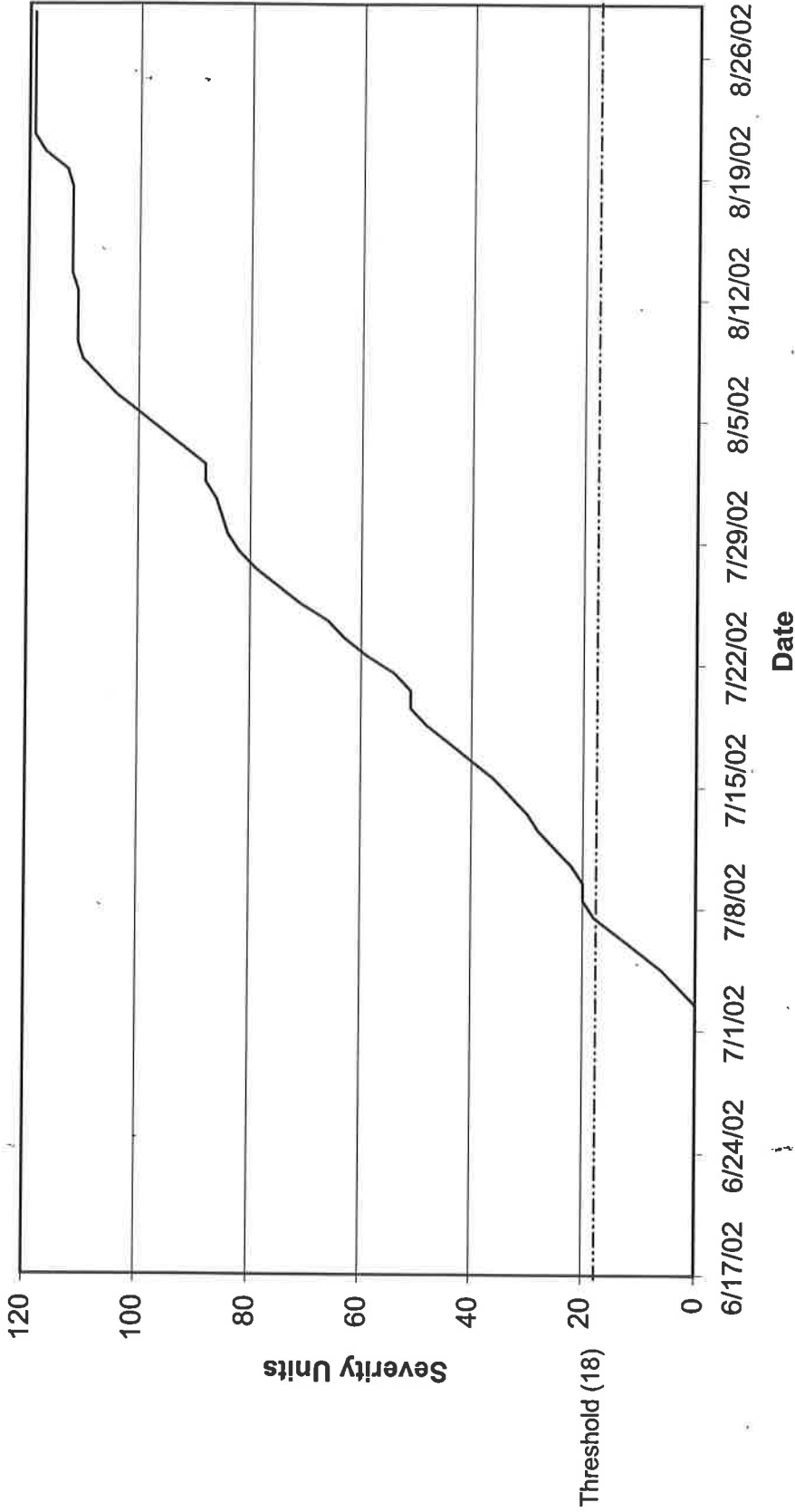
Potato Late Blight Fry Units, San Luis Valley, Colorado, 2002
 Moderate Susceptible Varieties



Footnote:

- The Fry Late Blight model was used to calculate the severity units.
- The Blanca weather station was set up on June 14, the Hooper weather station was set up on June 12; some differences between the sites may be a result of starting the data collection at different dates.

**Potato Late Blight Severity Values - Wallin Model,
San Luis Valley, Colorado, Sargent Site, 2002**



Footnote:
-The Sargent weather station was set up on July 2.

2002 PROTOCOL FOR EVALUATION OF SEED PIECE TREATMENTS FOR CONTROL OF SEED PIECE DECAY ON POTATO

- Researchers:** Richard T. Zink, Associate Professor, and Andrew Houser, Research Associate, Department of Horticulture and Landscape Architecture, Colorado State University
- Location:** San Luis Valley Research Center, Center, CO
- Cultivar:** Russet Norkotah Selection 8, cut seed, 2-4 oz.
- Objective:** To evaluate the efficacy of various seed piece treatments in preventing disease and seed piece decay.
- Treatments:**
1. Control, no treatment
 2. A12534 @ 4 oz.wt.pr./cwt (on seed)
 3. A12534 @ 8 oz.wt.pr./cwt (on seed)
 4. A12534 @ 4 oz.wt.pr./cwt (on seed) + Quadris @ 25 oz./A (In-Furrow)
 5. Quadris @ 25 oz./A (In-Furrow)
 6. Tops MZ 8.5 DS (on seed)
 7. Moncoat MZ 7.5 DP (on seed)
 8. PCC553-1 (on seed)
 9. PCC553-1 Mixed Blend (on seed)
 10. PCC553-1 Mixed Blend Plus (on seed)
 11. Blocker @ 7.5 pt./A (In-Furrow)
- Application:** In-Furrow treatments were applied using an R & D CO₂ charged backpack sprayer at 35 PSI, with one XR 8002VS nozzle, at 10 gallons/acre as a directed in-furrow application. On seed treatments were applied directly to fresh cut seed and planted within twenty-four hours.
- Planted:** May 8, 2002
- Plot Design:** Randomized complete block
- Plot Size:** 1 - 40 foot row per treatment per replication
- Plant Spacing:** 12 inches
- Row Spacing:** 34 inches
- Replications:** Four
- Irrigation:** Solid set sprinkler, rate based on ET
- Fertilizer:** 80N-70P-40K-18S-1Zn, preplant, 40N through sprinkler after tuber set
- Herbicide:** Matrix, 1.5 oz./A + Eptam, 4.5 pt./A
- Insecticide:** None
- Fungicide:** Quadris, 8.0 oz./A + Dithane, 2.0 lb./A (2 applications)
- Vine Killer:** Beat vines on September 3, 2002
- Harvested:** September 16, 2002

DATA

- Stand:** 1-40 foot row/treatment/replication, counts taken 41 days after planting.
- Seed piece decay:** Soft-rot and dry-rot combined rated 0-100, where 0 = no decay and 100 = complete decay; 5 seed pieces/treatment/replication.
- Rhizoctonia stem canker:** Percent stems infected; 5 plants/treatment/replication.
- Blackleg:** Percent stems infected; 5 plants/treatment/replication.
- Plant vigor:** Rated 1-5, where 1 = poor and 5 = good; 5 plants/treatment/replication.
- Stems:** Average number of stems per plant; 5 plants/treatment/replication.
- Tuber set:** Average number of tubers per plant at full set; 5 plants/treatment/replication.
- Yield:** 1-30 foot row per treatment per replication, total yield expressed in cwt/A.
- Grade:** By hand, percent tubers by weight in pounds and tuber no. < 4 oz., 4-6 oz., 6-10 oz., > 10 oz., US #2's, and culls.
- Black scurf severity index:** Mean percent of the affected tuber surface area, 10 8-10 oz. tubers per treatment per replication multiplied by the severity of the sclerotia, where 1 = small sclerotia and 3 = large sclerotia.

Table 1. Effects of seed treatments on plant development and incidence of disease in the cultivar Russet Norkotah Selection 8, San Luis Valley, Colorado, 2002

Treatment/Rate ^a	Stand ^b	Vigor ^c	Stems ^d	%Stems with Rhizoctonia ^e	Stolons ^f	%Stolons with Rhizoctonia ^g	Seed piece decay ^h	No. tubers per plant ⁱ	Black scurf severity index ^j
1. Control	98.8	3.0	4.2	91.3	18.8	5.3	17.5	9.8	19.1 a
2. A12534 @ 4 oz./cwt	95.0	3.3	3.4	78.8	17.8	7.7	2.5	11.6	19.1 a
3. A12534 @ 8 oz./cwt	100.0	3.1	3.7	96.3	17.6	3.8	3.5	11.0	7.6 a-c
4. A12534 @ 4 oz./cwt + Quadris @ 25 oz./A IF	97.0	3.4	4.3	84.9	24.5	3.1	7.5	11.1	1.3 c
5. Quadris @ 25 oz./A IF	98.8	3.2	3.8	75.2	22.0	1.7	14.5	9.8	1.2 c
6. Tops MZ 8.5DS	96.3	3.1	4.2	95.8	22.1	2.2	1.0	9.8	14.8 ab
7. Moncoat MZ 7.5DP	97.5	3.1	3.6	93.4	22.0	4.8	1.5	9.0	7.3 a-c
8. PCC553-1	97.0	3.1	4.1	90.9	21.7	5.2	1.5	10.6	4.3 bc
9. PCC553-1 Mixed Blend	97.0	2.7	4.6	96.7	16.5	2.7	5.0	10.0	11.2 a-c
10. PCC553-1 Mixed Blend Plus	100.0	3.2	3.8	89.1	21.1	2.6	2.5	9.6	4.5 bc
11. Blocker @ 7.5 pt./A IF	97.5	2.8	4.4	98.0	18.7	4.1	1.5	9.4	3.0 bc
LSD(P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	12.65

^a All treatments were applied according to the manufacturer's recommendations.

^b Percentage of plants emerged 41 days after planting; four replications.

^c Mean percent vigor, where 1 = poor, 5 = good; 5 plants/treatment/replication.

^d Mean number of stems per seed piece 43 days after planting; 5 plants/treatment/replication.

^e Mean percent stems with Rhizoctonia canker 43 days after planting; 5 plants/treatment/replication.

^f Mean number of stolons per seed piece 43 days after planting; 5 plants/treatment/replication.

^g Mean percent stolons with Rhizoctonia canker 43 days after planting; 5 plants/treatment/replication.

^h Mean percent incidence of disease combined soft-rot and dry-rot 43 days after planting; rated 0-100, where 0 = no decay, 100 = complete decay; 5 seed pieces/treatment/replication.

ⁱ Mean number of tubers per plant 71 days after planting; 5 plants/treatment/replication.

^j Mean percent of the affected tuber surface area, 10 8-10 oz. tubers per treatment per replication multiplied by the severity of the sclerotia, where 1 = small sclerotia and 3 = large sclerotia.

Means followed by the same letters are not significantly different at P=0.05 for black scurf severity index.

Table 2. Effects of seed treatments on tuber yield and quality in the cultivar Russet Norkotah Selection 8, San Luis Valley, Colorado, 2002

Treatment/Rate	Percent ^a											Cwt/A ^b	
	< 4 oz.	No.	4-6 oz.	No.	6-10 oz.	No.	>10 oz.	No.	US #2s	No.	Culls		No.
1. Control	11.6	24.1	19.4	24.8	35.5	30.2	25.4	12.9	7.2	6.9	1.0	1.2	461.6
2. A12534 @ 4 oz./cwt	9.3	22.6	19.0	24.2	32.7	29.1	28.3	14.0	9.5	8.5	1.2	1.7	471.7
3. A12534 @ 8 oz./cwt	8.1	20.6	19.7	26.1	32.5	28.0	25.7	12.9	11.5	9.9	2.4	2.5	534.3
4. A12534 @ 4 oz./cwt + Quadris @ 25 oz./A IF	12.0	26.9	19.3	23.0	33.9	28.9	26.1	13.4	7.6	6.4	1.1	1.3	515.7
5. Quadris @ 25 oz./A IF	9.0	23.6	18.0	22.8	32.0	28.0	30.3	16.1	9.5	8.3	1.3	1.2	454.6
6. Tops MZ 8.5DS	8.2	19.5	18.9	25.6	33.8	29.3	29.2	16.1	8.8	8.0	1.1	1.4	479.8
7. Moncoat MZ 7.5DP	7.4	19.6	19.6	26.3	33.4	28.3	27.4	15.0	11.3	9.7	0.8	1.1	442.7
8. PCC553-1	9.0	22.0	17.1	22.3	38.1	33.9	28.5	14.5	6.3	5.8	1.0	1.6	465.7
9. PCC553-1 Mixed Blend	13.1	28.0	23.1	27.0	33.9	26.7	22.2	10.7	6.5	6.3	1.2	1.4	400.4
10. PCC553-1 Mixed Blend Plus	10.9	25.3	22.5	26.8	34.4	28.9	22.6	11.7	7.7	5.3	1.8	2.0	437.6
11. Blocker @ 7.5 pt./A IF	12.8	28.5	19.5	23.5	34.2	27.9	23.3	11.4	8.7	7.4	1.4	1.2	446.1
LSD(P=0.05)	3.92	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

^a Based on tuber weight in pounds and tuber number, mean of four replications.

^b Total yield expressed as hundred weight per acre, 1-30 foot row per treatment per replication, mean of four replications.

2002 PROTOCOL FOR EVALUATION OF FUNGICIDES APPLIED AT PLANTING FOR CONTROL OF POWDERY SCAB ON POTATO

- Researchers:** Richard Zink, Robert Davidson, and Andrew Houser, Colorado State University
- Location:** Mitchell Farms, Monte Vista, CO
- Cultivar:** Cherry Red, whole seed
- Objective:** To evaluate the efficacy of various fungicide treatments in preventing powdery scab on potato.
- Treatments:**
1. Control, no treatment
 2. Omega @ 3 pt./A, In-furrow
 3. Omega @ 6 pt./A, In-furrow
 4. Evolve on seed
 5. Quadris @ 4 pt./A, In-furrow
 6. Quadris @ 8 pt./A, In-furrow
 7. Quadris @ 12 pt./A, In-furrow
 8. Blocker @ 5 gal./A, In-furrow
 9. Evolve on seed + Omega @ 3 pt./A, In-furrow
 10. Omega @ 3 pt./A, In-furrow + Quadris @ 8pt./A, In-furrow
 11. Evolve on seed + Omega @ 3 pt./A, In-furrow + Quadris @ 8pt./A, In-furrow
 12. Zinc EDTA @ 13.23 lb.ai./A, In-furrow
 13. Planting date May 17
 14. Planting date May 24
 15. Planting date May 31
 16. Planting date June 7

Application: In-furrow treatments were applied using an R & D CO₂ charged backpack sprayer at 35 PSI, with one XR 8002VS nozzle, at 10 gallons/acre. On-seed treatments were applied directly to whole seed and planted within twenty-four hours.

- Planted:** May 9, 2002
- Plot Design:** Randomized
- Plot Size:** 1 - 20 foot row per treatment per replication
- Plant Spacing:** 12 inches
- Row Spacing:** 34 inches
- Replications:** Three
- Irrigation:** Center pivot sprinkler, rate based on ET
- Fertilizer:** 60N-140P-0K-43S preplant, 95N-15S topdress
- Herbicide:** Eptam 7E, 4.5 pt./A + Sencor DF, 0.25 lb./A
- Insecticide:** Asana XL, 8 oz./A
- Fungicide:** Dithane DF, 1.5 lb./A + Quadris, 6.2 oz./A
- Vine Killer:** Reglone on August 16, 2002
- Harvested:** September 17, 2002

DATA

Disease: Mean percent of the number of tubers showing one or more powdery scab lesions at harvest multiplied by the severity of the lesions, where 1 = not severe and 5 = very severe.

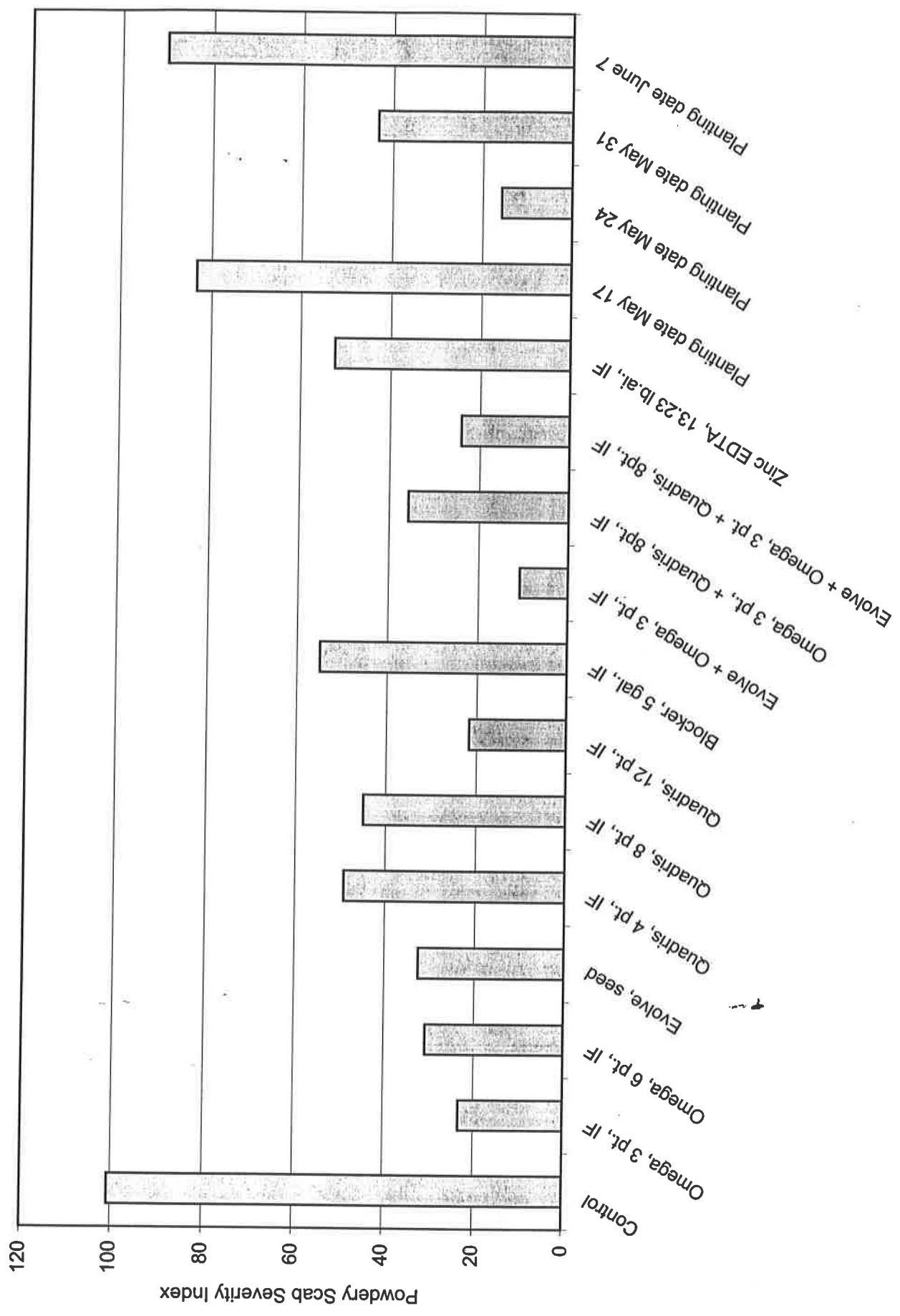
Table 1. Effect of fungicides applied at planting on the incidence of powdery scab on tubers in the cultivar Cherry Red, San Luis Valley, Colorado, 2002

Cultivar	Percent Incidence	Percent Healthy	Severity Index ^a
1. Control, no treatment	30.8	69.2	100.8
2. Omega @ 3 pt./A, In-furrow	12.5	87.5	23.3
3. Omega @ 6 pt./A, In-furrow	10.8	89.2	30.8
4. Evolve on seed	15.0	85.0	32.5
5. Quadris @ 4 pt./A, In-furrow	18.3	81.7	49.2
6. Quadris @ 8 pt./A, In-furrow	19.2	80.8	45.0
7. Quadris @ 12 pt./A, In-furrow	16.7	83.3	21.7
8. Blocker @ 5 gal./A, In-furrow	21.7	78.3	55.0
9. Evolve on seed + Omega @ 3 pt./A, In-furrow	7.5	92.5	10.8
10. Omega @ 3 pt./A, In-furrow + Quadris @ 8pt./A, In-furrow	13.3	86.7	35.8
11. Evolve on seed + Omega @ 3 pt./A, In-furrow + Quadris @ 8pt./A, In-furrow	15.8	84.2	24.2
12. Zinc EDTA @ 13.23 lb.ai./A, In-furrow	20.8	79.2	52.5
13. Planting date May 17	30.0	70.0	83.3
14. Planting date May 24	9.2	90.8	15.8
15. Planting date May 31	15.8	84.2	43.3
16. Planting date June 7	35.0	65.0	90.0
LSD(P=0.05)	NS	NS	NS

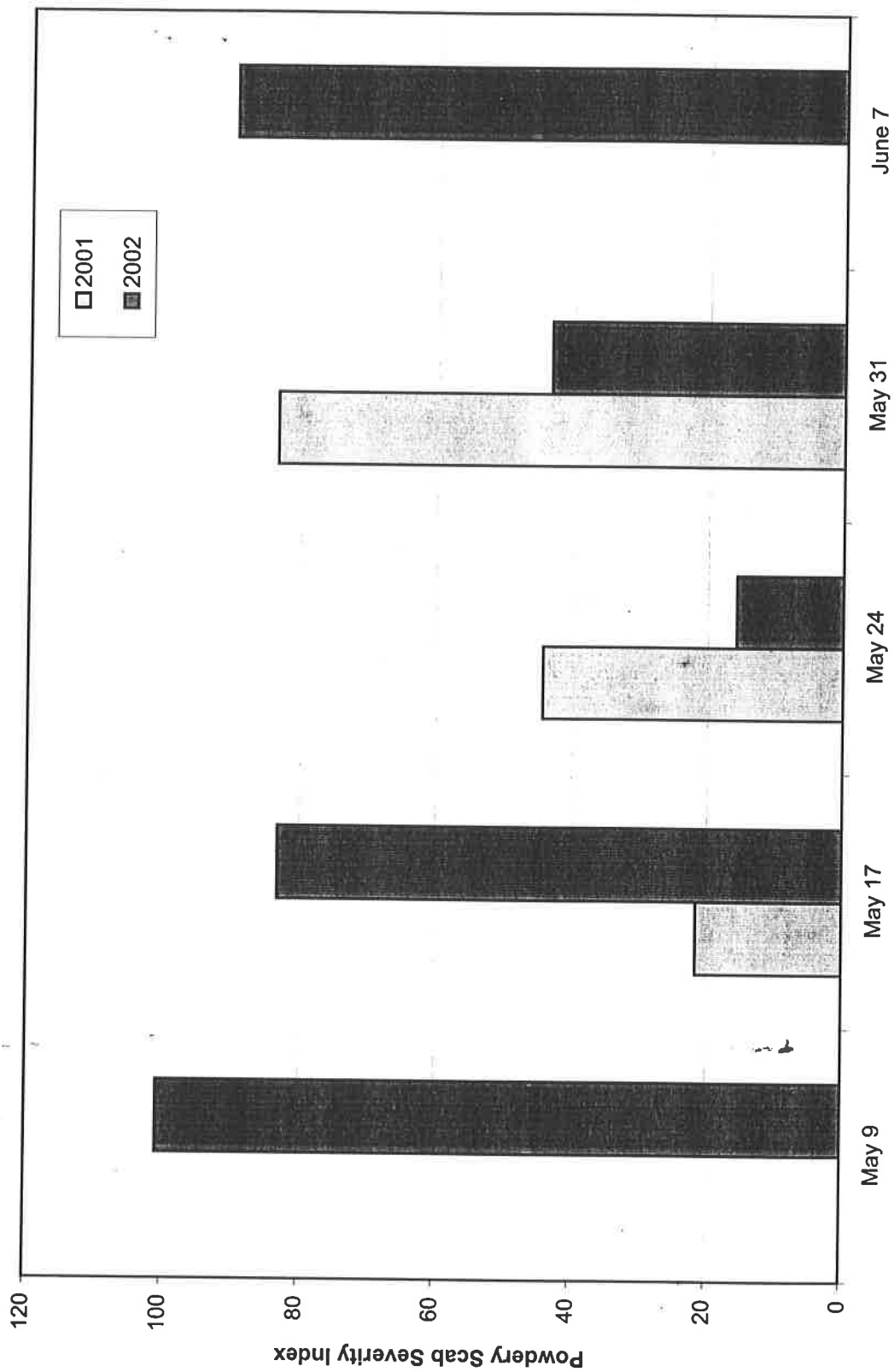
^a Severity Index = mean percent of the number of affected tubers, 40 tubers/treatment/replication multiplied by the severity of the lesions, where 1 = not severe and 5 = very severe.

Richard T. Zink, Associate Professor, Colorado State University

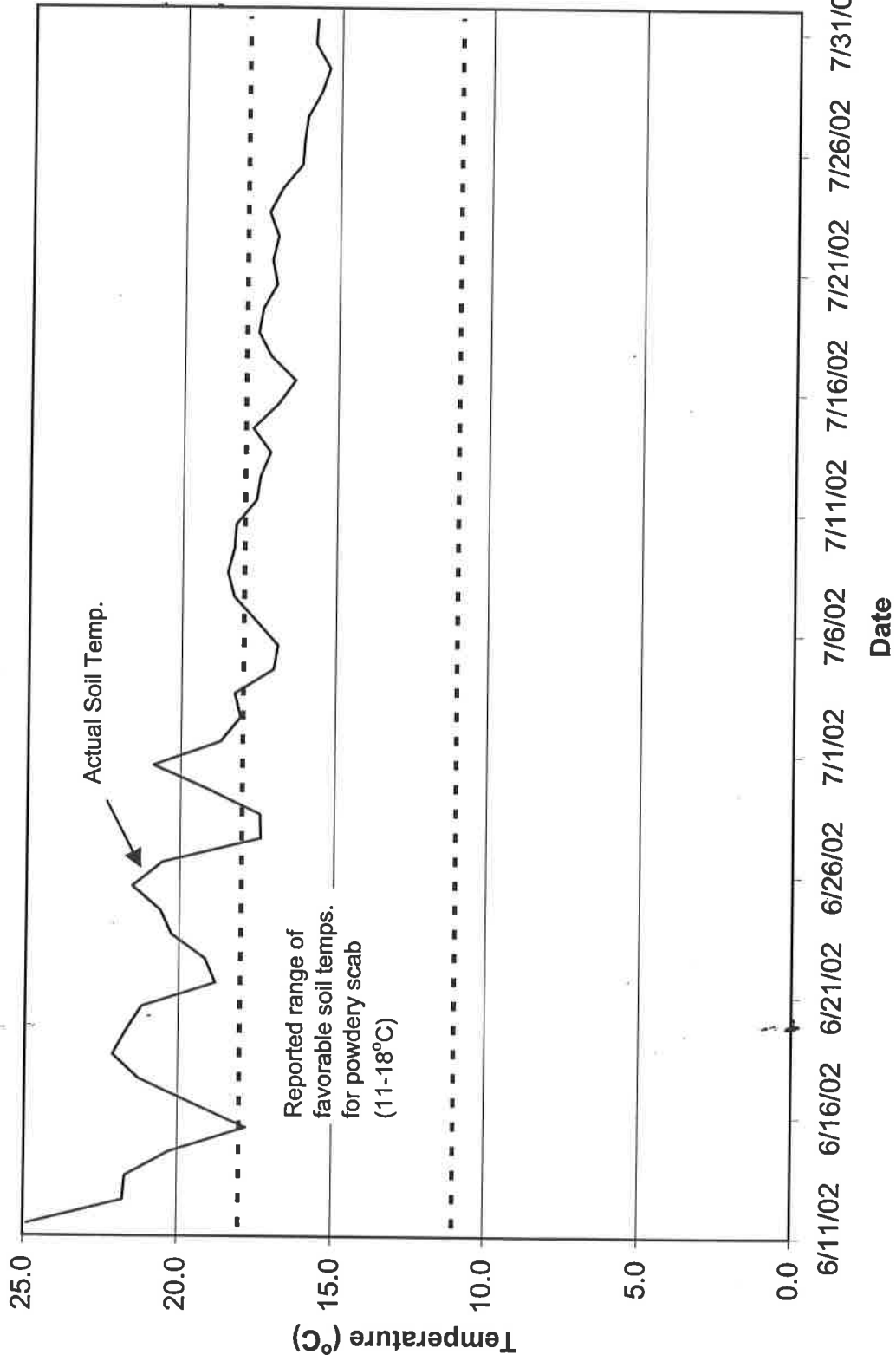
Effect of fungicides applied at planting on the incidence of powdery scab on tubers of the cultivar Cherry Red, San Luis Valley, Colorado, 2002



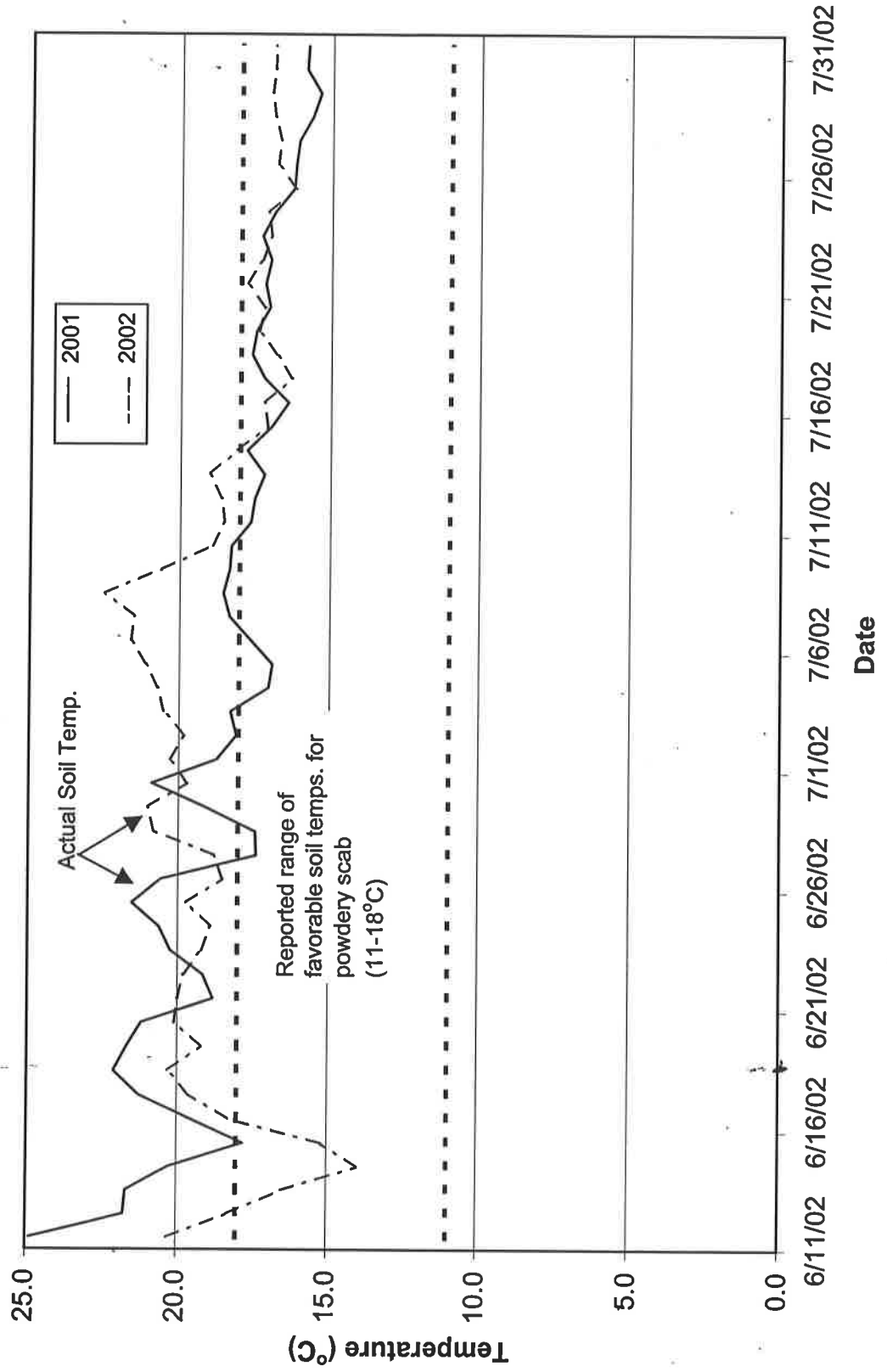
**Effect of planting date on the incidence of powdery scab on tubers of the cultivar
Cherry Red, San Luis Valley, Colorado**



Soil temperature readings at 8" under potato plant canopy, powdery scab trial, San Luis Valley, Colorado, 2002



Soil temperature readings at 8" under potato plant canopy, powdery scab trial, San Luis Valley, Colorado



2002 PROTOCOL FOR EVALUATION OF ADVANCED CLONES FOR SUSCEPTIBILITY TO POWDERY SCAB

Researchers: Robert Davidson, Richard Zink, and Andrew Houser, Colorado State University

Location: Mike Mitchell's Farm, Monte Vista, CO

Objective: To evaluate the susceptibility of advanced potato clones to powdery scab.

Clones:

1. AC92009-4RU	17. A90586-11
2. CO92077-2RU	18. A84118-3
3. NDC5281-2R	19. Bannock Russet
4. NDC5372-1RU	20. Gem Russet
5. TC1675-1RU	21. Ivory Crisp
6. AC89536-5RU	22. Alturas
7. CO85026-4RU	23. AF1758-7
8. CO86218-2R	24. B0564-8
9. CO89097-2R	25. MSG227-2
10. AC87340-2W	26. Atlantic
11. BC0894-2W	27. Superior
12. Russet Burbank	28. B1240-1
13. Durango	29. Liberator
14. Satina	30. B0766-3
15. CalRed	31. SC8801-2
16. DT6063-1R	32. Ranger Russet

Planted: May 10, 2002

Plot Design: Randomized

Plot Size: 1 - 10 foot row per treatment per replication

Plant Spacing: 12 inches

Row Spacing: 34 inches

Replications: Four

Irrigation: Center pivot sprinkler, rate based on ET

Fertilizer: 60N-140P-0K-43S preplant, 95N-15S topdress

Herbicide: Eptam 7E, 4.5 pt./A + Sencor DF, 0.25 lb./A

Insecticide: Asana XL, 8 oz./A

Fungicide: Dithane DF, 1.5 lb./A + Quadris, 6.2 oz./A

Vine Killer: Reglone on August 16, 2002

Harvested: September 17, 2002

DATA

Disease: Galls on roots rated 0 to 4, 0 = none, 4 = heavily infected, readings taken August 1. Mean percent of the number of tubers showing one or more powdery scab lesions at harvest multiplied by the severity of the lesions, where 1 = not severe and 5 = very severe.

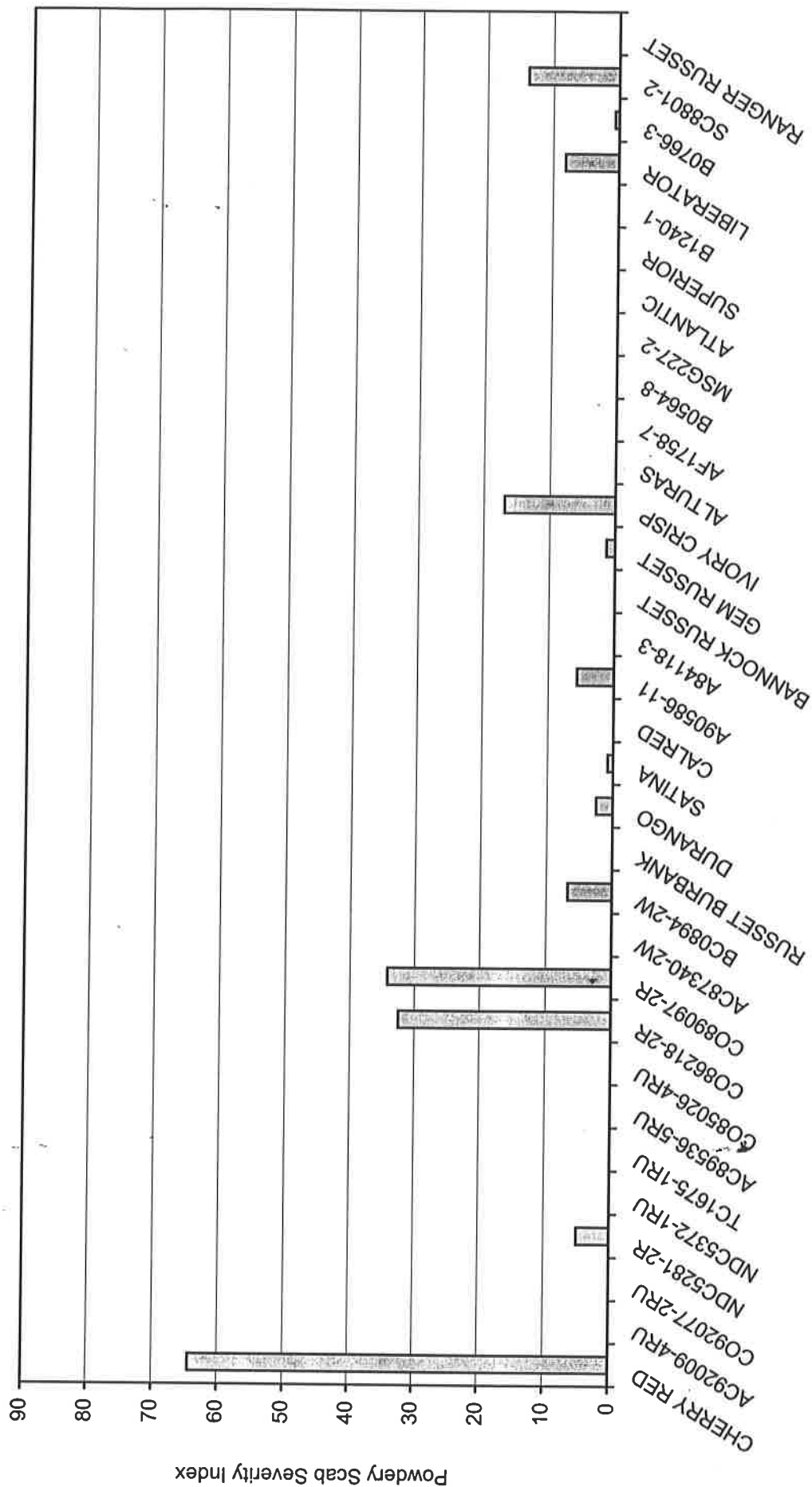
Table 1. Evaluation of advanced clones for tuber susceptibility to powdery scab, San Luis Valley, Colorado, 2002

Cultivar	Tuber symptoms			Root Gall Rating ^b
	Percent Incidence	Percent Healthy	Severity Index ^a	
1. AC92009-4RU	0.0 f	100.0	0.0 c	0.0 g
2. CO92077-2RU	0.0 f	100.0	0.0 c	0.0 g
3. NDC5281-2R	1.7 ef	98.3	5.0 c	1.3 c-g
4. NDC5372-1RU	0.0 f	100.0	0.0 c	1.5 b-g
5. TC1675-1RU	0.0 f	100.0	0.0 c	0.0 g
6. AC89536-5RU	0.0 f	100.0	0.0 c	1.0 d-g
7. CO85026-4RU	0.0 f	100.0	0.0 c	1.5 b-g
8. CO86218-2R	10.8 bcd	89.2	32.5 b	2.0 a-e
9. CO89097-2R	15.8 b	84.2	34.2 b	1.5 b-g
10. AC87340-2W	0.0 f	100.0	0.0 c	0.3 fg
11. BC0894-2W	3.3 def	96.7	6.7 c	1.5 b-g
12. RUSSET BURBANK	0.0 f	100.0	0.0 c	2.0 a-e
13. DURANGO	2.5 ef	97.5	2.5 c	1.0 d-g
14. SATINA	0.8 ef	99.2	0.8 c	0.5 efg
15. CALRED	0.0 f	100.0	0.0 c	0.5 efg
16. DT6063-1R	27.2 a	72.8	64.5 a	2.6 abc
17. A90586-11	4.4 c-f	95.6	5.6 c	2.0 a-e
18. A84118-3	0.0 f	100.0	0.0 c	0.0 g
19. BANNOCK RUSSET	0.0 f	100.0	0.0 c	0.5 efg
20. GEM RUSSET	1.3 ef	98.7	1.3 c	0.0 g
21. IVORY CRISP	11.3 bc	88.7	16.9 bc	3.3 a
22. ALTURAS	0.0 f	100.0	0.0 c	0.0 g
23. AF1758-7	0.0 f	100.0	0.0 c	0.0 g
24. B0564-8	0.0 f	100.0	0.0 c	1.0 d-g
25. MSG227-2	0.0 f	100.0	0.0 c	0.0 g
26. ATLANTIC	0.0 f	100.0	0.0 c	0.0 g
27. SUPERIOR	0.0 f	100.0	0.0 c	0.8 d-g
28. B1240-1	0.0 f	100.0	0.0 c	2.3 a-d
29. LIBERATOR	8.1 cde	91.9	8.1 c	3.0 ab
30. B0766-3	0.6 ef	99.4	0.6 c	1.3 c-g
31. SC8801-2	6.9 c-f	93.1	13.8 c	2.3 a-d
32. RANGER RUSSET	0.0 f	100.0	0.0 c	1.8 a-f
LSD(P=0.05)	7.67		17.60	0.5 efg
				1.54

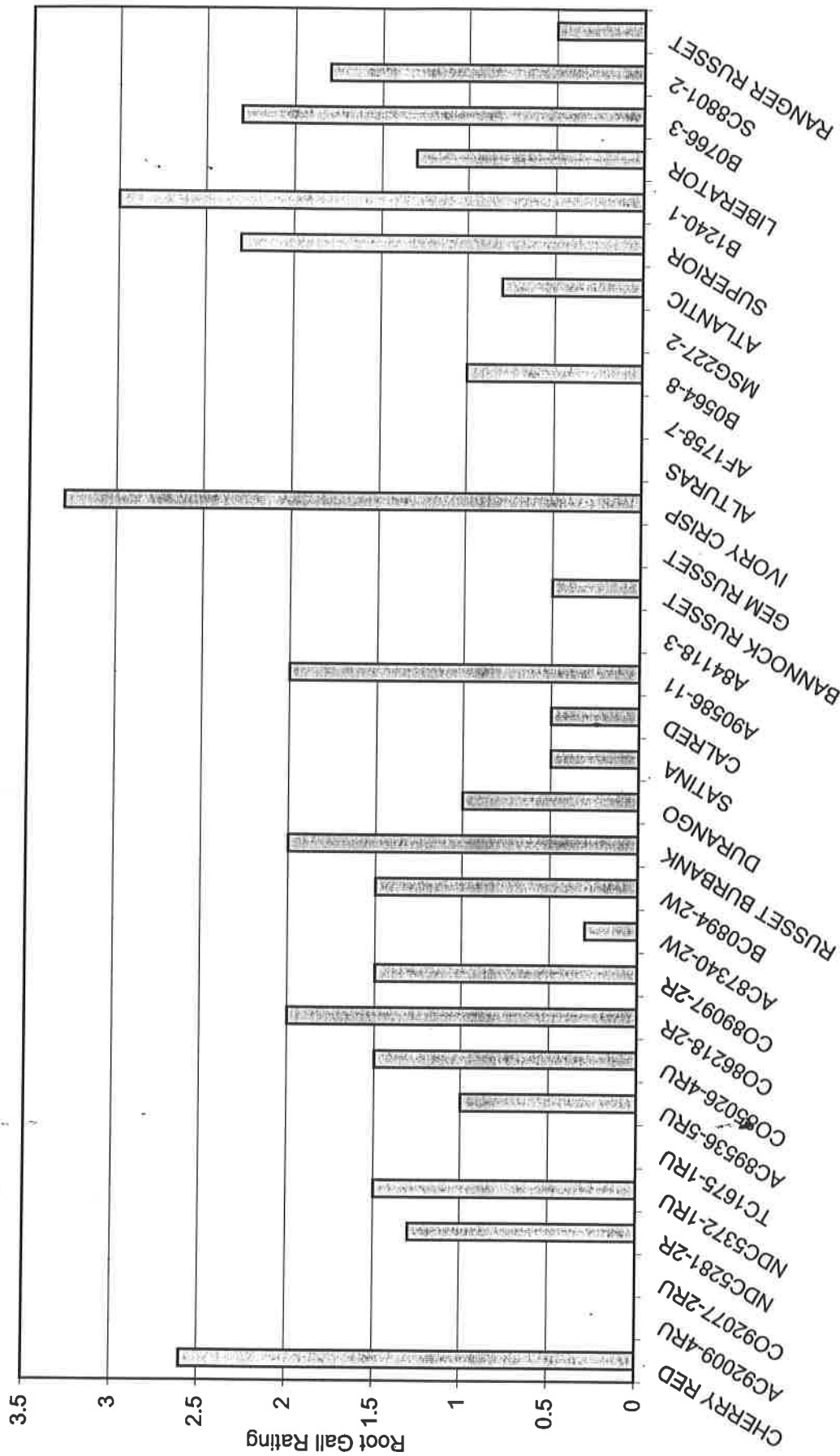
^a Severity Index = mean percent of the number of affected tubers, 40 tubers/treatment/replication multiplied by the severity of the lesions, where 1 = not severe and 3 = very severe.

^b Root Gall Rating = mean percent of plants infected with powdery scab root galls, where 0 = no root galls and 4 = extensive root galls. Means followed by the same letter are not significantly different at P=0.05.

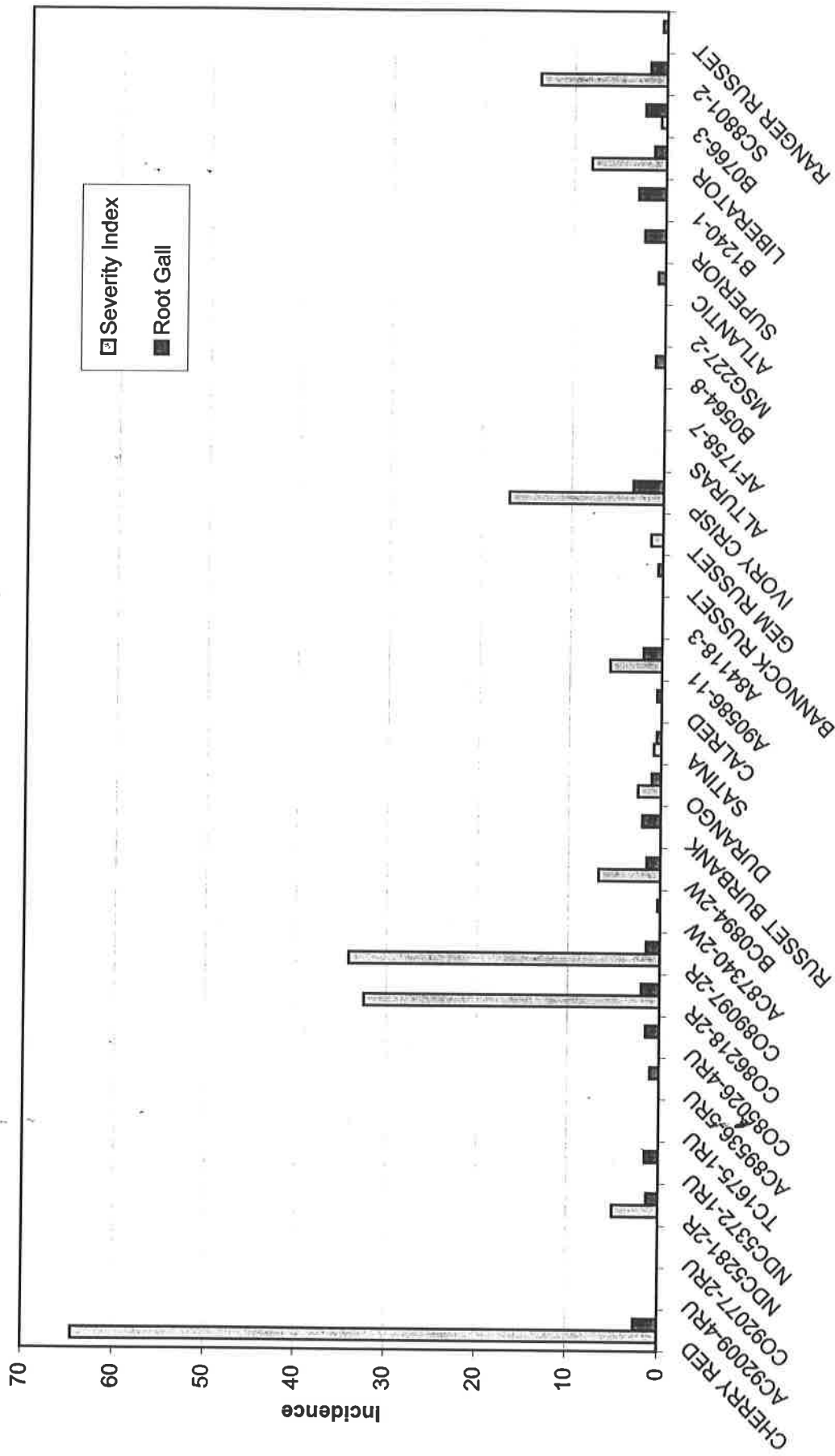
Evaluation of advanced clones for tuber susceptibility to powdery scab
 San Luis Valley, Colorado, 2002



Evaluation of advanced clones for severity of powdery scab root galls
 San Luis Valley, Colorado 2002



**Evaluation of advanced clones for tuber susceptibility to powdery scab
San Luis Valley, Colorado, 2002**



2002 PROTOCOL FOR EVALUATION OF FUNGICIDES APPLIED AT PLANTING FOR CONTROL OF RHIZOCTONIA ON POTATO

- Researchers:** Richard T. Zink, Associate Professor, and Andrew Houser, Research Associate, Department of Horticulture and Landscape Architecture, Colorado State University
- Location:** San Luis Valley Research Center, Center, CO
- Cultivar:** Russet Norkotah selection 8, cut seed, 2-4 oz.
- Objective:** To evaluate the efficacy of various In-furrow treatments in preventing disease and seed piece decay.
- Treatments:**
1. Control, no treatment
 2. Maxim 4FS @ 0.04 fl.oz./cwt (on seed)
 3. Maxim 4FS @ 0.08 fl.oz./cwt (on seed)
 4. Maxim MZ 10.1 DP (on seed)
 5. Moncoat MZ 7.5 DP (on seed)
 6. Tops MZ 8.5 DS (on seed)
 7. Maxim 4FS @ 0.04 fl.oz./cwt (on seed) + Mancozeb (on seed)
 8. Maxim MZ 10.1 DP (on seed) + Quadris @ 25 oz./A (In-furrow)
 9. Moncoat MZ 7.5 DP (on seed) + Quadris @ 25 oz./A (In-furrow)
 10. Tops MZ 8.5 DS (on seed) + Quadris @ 25 oz./A (In-furrow)
 11. Moncut 70 DF @ 0.75 lb./A (In-furrow)
 12. Moncut 70 DF @ 1.0 lb./A (In-furrow)
- Application:** In-Furrow treatments were applied using an R & D CO₂ charged backpack sprayer at 35 PSI, with one XR 8002VS nozzle, at 10 gallons/acre as a directed in-furrow application. On seed treatments were applied directly to fresh cut seed and planted within twenty-four hours.
- Planted:** May 7, 2002
- Plot Design:** Randomized complete block
- Plot Size:** 1 - 40 foot row per treatment per replication
- Plant Spacing:** 12 inches
- Row Spacing:** 34 inches
- Replications:** Four
- Irrigation:** Solid set sprinkler, rate based on ET
- Fertilizer:** 80N-70P-40K-18S-1Zn, preplant, 40N through sprinkler after tuber set
- Herbicide:** Matrix, 1.5 oz./A + Eptam, 4.5 pt./A
- Insecticide:** None
- Fungicide:** Quadris, 8.0 oz./A + Dithane, 2.0 lb./A (2 applications)
- Vine Killer:** Beat vines on September 3, 2002
- Harvested:** September 13 & 16, 2002

DATA

- Stand:** 1-40 foot row/treatment/replication, counts taken 41 days after planting.
- Seed piece decay:** Soft-rot and dry-rot combined rated 0-100, where 0 = no decay and 100 = complete decay; 5 seed pieces/treatment/replication.
- Rhizoctonia stem canker:** Percent stems infected; 5 plants/treatment/replication.
- Blackleg:** Percent stems infected; 5 plants/treatment/replication.
- Plant vigor:** Rated 1-5, where 1 = poor and 5 = good; 5 plants/treatment/replication.
- Stems:** Average number of stems per plant; 5 plants/treatment/replication.
- Tuber set:** Average number of tubers per plant at full set; 5 plants/treatment/replication.
- Yield:** 1-30 foot row per treatment per replication, total yield expressed in cwt/A.
- Grade:** By hand, percent tubers by weight in pounds and tuber no. < 4 oz., 4-6 oz., 6-10 oz., > 10 oz., US #2's, and culls.
- Black scurf severity index:** Mean percent of the affected tuber surface area, 10 8-10 oz. tubers per treatment per replication multiplied by the severity of the sclerotia, where 1 = small sclerotia and 3 = large sclerotia.

Table 1. Effects of products applied at planting on plant development and incidence of disease in the cultivar Russet Norkotah Selection 8, San Luis Valley, Colorado, 2002

Treatment/Rate ^a	Stand ^b	Vigor ^c	Stems ^d	%Stems with Rhizoctonia ^e	Stolons ^f	%Stolons with Rhizoctonia ^g	Seed piece decay ^h	No. tubers per plant ⁱ	Black scurf severity index ^j
1. Control	99.5	3.3	3.8	94.8	21.7	13.4	12.3 bc	10.4	18.6
2. Maxim 4FS @ 0.04 fl.oz./cwt on seed	98.3	3.3	3.9	72.9	20.0	7.0	12.5 bc	9.2	16.2
3. Maxim 4FS @ 0.04 f.oz./cwt on seed	97.0	3.6	3.7	71.7	20.7	10.2	35.8 a	9.5	12.8
4. Maxim MZ 10.1DP on seed	99.5	3.3	3.6	92.3	22.6	11.3	1.0 c	10.1	12.1
5. Moncoat MZ 7.5DP on seed	98.3	3.5	4.8	91.7	23.2	8.8	2.5 c	10.3	16.3
6. Tops MZ 8.5DS on seed	98.8	3.1	3.9	87.5	19.5	9.1	5.5 c	9.4	21.4
7. Maxim 4FS @ 0.04 fl.oz./cwt on seed + Mancozeb on seed	97.5	3.3	3.9	94.2	22.1	11.7	12.0 bc	11.3	24.7
8. Maxim MZ 10.1DP on seed + Quadris @ 25 oz./A IF	98.8	3.4	4.5	96.7	22.3	8.5	0.3 c	10.6	13.6
9. Moncoat MZ 7.5DP on seed + Quadris @ 25 oz./A IF	98.8	3.4	3.9	91.9	23.8	5.3	6.0 c	9.8	14.1
10. Tops MZ 8.5DS on seed + Quadris @ 25 oz./A IF	98.8	3.3	3.8	100.0	22.9	8.6	7.0 c	10.8	14.4
11. Moncut 70DF @ 0.75 lb./A IF	98.8	3.3	3.9	95.7	22.0	17.5	28.5 ab	10.1	16.2
12. Moncut 70DF @ 1.0 lb./A IF	98.3	2.9	3.6	97.5	18.8	9.1	30.0 ab	9.8	10.6
LSD(P=0.05)	NS	NS	NS	NS	NS	NS	18.75	NS	NS

^a All treatments were applied according to the manufacturer's recommendations.

^b Percentage of plants emerged 41 days after planting; four replications.

^c Mean percent vigor, where 1 = poor, 5 = good; 5 plants/treatment/replication.

^d Mean number of stems per seed piece 43 days after planting; 5 plants/treatment/replication.

^e Mean percent stems with Rhizoctonia canker 43 days after planting; 5 plants/treatment/replication.

^f Mean number of stolons per seed piece 43 days after planting; 5 plants/treatment/replication.

^g Mean percent stolons with Rhizoctonia canker 43 days after planting; 5 plants/treatment/replication.

^h Mean percent incidence of disease combined soft-rot and dry-rot 43 days after planting; rated 0-100, where 0 = no decay, 100 = complete decay; 5 seed pieces/treatment/replication.

ⁱ Mean number of tubers per plant 71 days after planting; 5 plants/treatment/replication.

^j Mean percent of affected tuber surface area, 10 8-10 oz. tubers per treatment per replication multiplied by the severity of the sclerotia, where 1 = small sclerotia and 3 = large sclerotia.

Means followed by the same letters are not significantly different at P=0.05.

Table 2. Effects of products applied at planting on tuber yield and quality in the cultivar Russet Norkotah Selection 8, San Luis Valley, Colorado, 2002

Treatment/Rate	Percent ^a										Cwt/A ^b		
	< 4 oz.	No.	4-6 oz.	No.	6-10 oz.	No.	>10 oz.	No.	US #2s	No.		Culls	No.
1. Control	13.8	29.0	18.9	22.8	30.8	26.3	28.8	14.6	6.1	5.5	1.6	1.8	458.9
2. Maxim 4FS @ 0.04 fl.oz./cwt on seed	12.6	27.2	17.9	22.1	31.4	26.2	31.0	16.8	5.3	4.7	1.8	2.8	474.5
3. Maxim 4FS @ 0.04 fl.oz./cwt on seed	12.8	29.6	14.3	16.6	28.9	24.9	33.6	18.5	7.0	6.3	3.3	4.1	434.4
4. Maxim MZ 10.1DP on seed	19.8	36.3	19.9	21.9	28.2	22.8	25.8	13.7	5.0	3.9	1.3	1.4	498.8
5. Moncoat MZ 7.5DP on seed	16.2	29.8	19.0	21.8	30.3	25.7	27.7	15.6	5.1	4.7	1.7	2.4	438.2
6. Tops MZ 8.5DS on seed	14.8	30.8	18.7	23.2	32.1	26.0	28.4	14.1	4.3	4.1	1.8	1.8	398.9
7. Maxim 4FS @ 0.04 fl.oz./cwt on seed + Mancozeb on seed	13.2	26.2	19.2	23.7	36.0	30.9	24.6	13.3	5.9	5.1	1.1	0.9	500.0
8. Maxim MZ 10.1 DP on seed + Quadris @ 25 oz./A IF	14.3	28.4	19.3	22.6	33.7	28.2	26.9	14.8	4.5	4.4	1.2	1.6	492.4
9. Moncoat MZ 7.5DP on seed + Quadris @ 25 oz./A IF	10.9	23.3	19.4	24.3	27.7	24.3	36.7	22.5	4.4	4.5	0.9	1.2	501.8
10. Tops MZ 8.5DS on seed + Quadris @ 25 oz./A IF	9.5	22.3	17.5	22.1	34.2	30.2	34.2	20.9	4.0	3.8	0.7	0.7	557.0
11. Moncut 70DF @ 0.75 lb./A IF	13.4	28.8	17.6	21.5	30.8	24.7	29.6	17.1	5.5	4.3	3.1	3.6	446.3
12. Moncut 70DF @ 1.0 lb./A IF	13.1	27.7	17.7	21.2	24.5	21.8	38.6	22.6	5.0	5.2	1.2	1.5	420.3
LSD (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

^a Based on tuber weight in pounds and tuber number, mean of four replications.

^b Total yield expressed as hundred weight per acre, 1-30 foot row per treatment per replication, mean of four replications.

2002 PROTOCOL FOR EVALUATION OF FUNGICIDES APPLIED FOR CONTROL OF PINK ROT ON POTATO

- Researchers:** Richard T. Zink, Associate Professor, and Andrew Houser, Research Associate, Department of Horticulture and Landscape Architecture, Colorado State University
- Location:** San Luis Valley Research Center, Center, CO
- Cultivar:** Russet Norkotah Selection 8, cut seed, 2-4 oz.
- Objective:** To evaluate the efficacy of various fungicide treatments in preventing pink rot on potato.
- Treatments:**
1. Control, no treatment
 2. FAC 321 2EC @ 25.9 fl.oz./A (In-furrow)
 3. Ridomil Gold 4EC @ 6.46 fl.oz./A (In-furrow)
 4. FAC 321 2EC @ 12.8 fl.oz./A (2 Foliar – At flowering and 14 days later)
 5. Ridomil Gold 4EC @ 3.2 fl.oz./A (2 Foliar – At flowering and 14 days later)
- Application:** Treatments were applied using an R & D CO₂ charged backpack sprayer at 35 PSI, with one XR 8002VS nozzle, at 10 gallons/acre.
- Planted:** May 8, 2002
- Plot Design:** Randomized complete block
- Plot Size:** 1 - 30 foot row per treatment per replication
- Plant Spacing:** 12 inches
- Row Spacing:** 34 inches
- Replications:** Four
- Irrigation:** Solid set sprinkler, rate based on ET
- Fertilizer:** 80N-70P-40K-18S-1Zn, preplant, 40N through sprinkler after tuber set
- Herbicide:** Matrix, 1.5 oz./A + Eptam, 4.5 pt./A
- Insecticide:** None
- Fungicide:** Quadris, 8.0 oz./A + Dithane, 2.0 lb./A (2 applications)
- Vine Killer:** Beat vines on September 3, 2002
- Harvested:** September 16, 2002

DATA

- Disease:** Percent tubers with pink rot at harvest and after harvest by challenge inoculation. The plot was flooded to induce pink rot on August 13th & 26th.
- Yield:** 1-30 foot row per treatment per replication, total yield expressed as cwt/A.
- Grade:** By hand, percent tubers by weight in pounds < 4 oz., 4-10 oz., > 10 oz., US #2's, and culls.

Table 1. Effects of products applied at planting and in season for control of pink rot on tuber yield and quality in the cultivar Russet Norkotah Selection 8, San Luis Valley, Colorado, 2002

Treatment/Rate	Percent ^a					Cwt/A ^b
	< 4 oz.	4-10 oz.	> 10 oz.	US #2s	Culls	
1. Control, no treatment	10.9	56.2	30.0	0.2	1.1	427.3
2. FAC 321 2EC @ 25.9 fl.oz./A (In-furrow)	18.3	56.6	23.7	0.2	0.9	372.6
3. Ridomil Gold 4EC @ 6.46 fl.oz./A (In-furrow)	10.5	54.4	31.9	0.5	2.3	433.9
4. FAC 321 2EC @ 12.8 fl.oz./A (2 Foliar – At flowering and 14 days later)	13.0	53.0	29.4	0.6	3.2	447.7
5. Ridomil Gold 4EC @ 3.2 fl.oz./A (2 Foliar – At flowering and 14 days later)	13.1	51.9	30.1	0.5	2.5	445.5
LSD(P=0.05)	NS	NS	NS	NS	NS	NS

^a Based on tuber weight in pounds, mean of four replications.

^b Total yield expressed as hundred weight per acre, 1-30 foot row per treatment per replication, mean of four replications.

Table 2. Effect of products applied at planting and in season for control of pink rot in the cultivar Russet Norkotah Selection 8, San Luis Valley, Colorado, 2002

Treatment	Rate	Incidence of tuber rot ^a	Pink Rot ^b
1. Control, no treatment		0.0	8.50 a
2. FAC 321 2EC	25.9 fl.oz./A (In-furrow)	0.0	4.75 b
3. Ridomil Gold 4EC	6.46 fl.oz./A (In-furrow)	0.0	4.75 b
4. FAC 321 2EC	12.8 fl.oz./A (2 Foliar – At flowering and 14 days later)	0.0	3.25 b
5. Ridomil Gold 4EC	3.2 fl.oz./A (2 Foliar – At flowering and 14 days later)	0.0	2.50 b
LSD(P=0.05)		NS	3.0

^a Mean percent by weight of tubers showing water rot at harvest, 4 replications.

^b Pink Rot severity index, post harvest tuber inoculation, assays conducted by Dr. Gary Secor at North Dakota State University- Fargo.

Means followed by the same letters are not significantly different at P=0.05.

**Utilization of Compost made from Agricultural and Forestry Wastes for
Improving the Economic and Ecological Sustainability of Agronomic Crop Production
on Low Organic Matter Soils in the San Luis Valley of Colorado.**

Project Leaders: Richard Zink, Merlin Dillon, and Andrew Houser, CSU

Project Description: The main objective of this study is to improve water conservation and sustainability of crop production on the low organic matter soils of the San Luis Valley, Colorado. This will be accomplished through on-farm demonstrations that will examine the impact of field incorporated compost made from agricultural and forestry wastes has on: 1.) reducing the use of synthetic fertilizers and fungicides, by improving nutrient retention in the root zone and the health and diversity of the soil's biomass, 2.) improving water utilization, thereby reducing water and power use in center-pivot irrigation systems, 3.) crop yields and costs of production for potatoes, barley and alfalfa.

Two agricultural waste streams, sawdust and cull potatoes, being generated in the San Luis Valley have become problematic for their local industries. Logs harvested from the National Forests surrounding the San Luis Valley are milled locally, generating sawdust for which there are very few feasible uses. In a 1997 Colorado State University (CSU) survey of western Colorado mill operators, the second most mentioned problem was that of mill residues (sawdust). Most of this sawdust has been stockpiled at locations near the mills. Potatoes are the area's most economically important crop, and the foundation of the local economy. On average, about 9.6% of each year's potato crop is not marketable, due to size, appearance or presence of disease. This study looks at using cull potatoes in combination with sawdust to create a dry compost that can be used on agronomic crops in the San Luis Valley, Colorado.

This is a three-year study that looks at applying compost to potato, alfalfa, and barley crops. Rates of 0, 4, 8, and 12 tons of compost/acre have been applied to six different sites around the San Luis Valley in the falls of 2000, 2001, and 2002. Four of the sites will grow potatoes rotated with barley and the two remaining sites have been planted in alfalfa. Crop disease, crop yield, and soil readings were taken at each of the six sites during the 2001 and 2002 growing season to determine the effect compost had on the soil and crops. This is the second year of a three-year project. Therefore, no conclusions or predictions can be made in such a study until data from all three years has been gathered and analyzed.

Table 1. Effects of different rates of compost on potato plant development and incidence of disease, San Luis Valley, Colorado, 2002

Field	Treatment ^a	Vigor ^b	Stems ^c	% Rhizoctonia ^d	Stolons ^e	% Rhizoctonia ^f	Black scurf severity index ^g
6A	0	5.0	4.1	45.6	28.0	3.0	0.5
	4	4.8	4.2	41.0	24.5	1.5	2.8
	8	4.9	3.5	49.9	19.4	6.0	0.6
	12	4.9	3.9	39.8	24.7	1.4	8.6
6B	0	4.9	4.2	72.2	24.4	9.6	1.0
	4	4.9	3.9	71.5	23.1	6.7	3.4
	8	4.9	4.0	61.4	23.6	7.1	1.1
	12	4.8	3.7	74.5	20.9	19.3	0.9
Overall Mean	0	4.9	4.1	58.9	26.2	6.3	0.8
	4	4.9	4.1	56.2	23.8	4.1	3.1
	8	4.9	3.7	55.7	21.5	6.5	0.9
	12	4.9	3.8	57.1	22.8	10.3	4.8
LSD(P=0.05)		NS	NS	NS	NS	NS	NS

^aRate of compost applied in tons/acre.

^bMean plant growth rated 1 – 5, where 1 = poor and 5 = good; five plants/treatment/replication.

^cMean number of stems per plant; five plants/treatment/replication.

^dMean percent stems with Rhizoctonia canker; five plants/treatment/replication.

^eMean number of stolons per plant; five plants/treatment/replication.

^fMean percent stolons with Rhizoctonia canker; five plants/treatment/replication.

^gBlack scurf severity index = mean percent of the affected tuber surface area, 10 8-10oz. tubers per treatment per replication multiplied by the severity of the sclerotia, where 1 = small sclerotia and 3 = large sclerotia.

Table 2. Effects of different rates of compost on the incidence of potato early blight, San Luis Valley, Colorado, 2002

Field	Treatment	Percent Leaves Infected	
		August 9	August 26
6A	0	1.4	-
	4	2.9	-
	8	2.5	-
	12	1.8	-
6B	0	2.3	72.9
	4	2.0	73.3
	8	1.7	72.9
	12	3.1	73.8
Overall Mean	0	1.9	72.9
	4	2.5	73.3
	8	2.1	72.9
	12	2.5	73.8
LSD(P=0.05)		NS	NS

In Field 6A the vines were removed before foliar early blight readings could be taken on August 26th.

Table 3. Effects of different rates of compost on potato tuber number, size, and quality, San Luis Valley, Colorado, 2002

Field	Treatment ^a	Percent ^b										Total lbs.	Total no.	Cwt/A ^d
		< 4 oz.	No.	4-10 oz.	No.	> 10 oz.	No.	MS ^c	No.	Total	no.			
6A	0	14.0	35.6	34.8	34.6	48.5	26.6	2.8	3.2	51.5 a	115.0	528.4 a		
	4	11.4	31.5	33.6	35.6	51.3	29.6	3.7	3.3	49.5 a	106.0	507.2 a		
	8	9.6	27.6	36.2	40.0	49.8	29.3	4.5	3.2	50.3 a	101.3	515.6 a		
	12	7.4	23.0	27.9	34.8	60.7	39.3	4.0	3.0	45.4 b	90.3	465.5 b		
6B	0	8.9	30.5	36.7	39.0	48.2	25.8	6.2	4.8	54.8	130.5	562.4		
	4	5.4	23.8	31.0	38.0	56.0	32.3	7.6	6.0	56.6	112.0	579.7		
	8	5.3	24.2	37.2	40.1	52.7	30.7	4.8	4.9	54.1	112.3	554.7		
	12	5.4	19.6	36.0	44.8	53.2	30.5	5.5	5.1	51.8	100.0	531.0		
Overall mean	0	11.4 a	33.0 a	35.7	36.8	48.3	26.2	4.5	4.0	53.2 a	122.8 a	545.4 a		
	4	8.4 ab	27.7 ab	32.3	36.8	53.7	31.0	5.6	4.6	53.0 a	109.0 ab	543.5 a		
	8	7.4 b	25.9 b	36.7	40.1	51.2	30.0	4.7	4.0	52.2 a	106.8 b	535.1 a		
	12	6.4 b	21.3 b	31.9	39.8	56.9	34.9	4.8	4.0	48.6 b	95.1 b	498.3 b		
LSD(P=0.05)		3.20	6.77	NS	NS	NS	NS	NS	NS	3.19	15.41	32.69		

^a Rate of compost applied in tons/acre.

^b Based on tuber weight in pounds and tuber number, mean of four replications.

^c Misshaped tubers.

^d Total yield expressed as hundred weight per acre, 1-15 foot row per treatment per replication, mean of four replications. Means followed by the same letter are not significantly different at P=0.05.



Soil Foodweb Inc.
 1128 NE 2nd St. Ste 120
 Corvallis, OR 97330
 Phone: 541-752-5066
 FAX 541-752-5142

Soil and Compost Foodweb Analysis

Client: Bob Wall
 Monte Vista Coop
 PO Box 111
 Monte Vista, Colorado 81144
 Fax: (719) 852-2577

E-Mail: info@soilfoodweb.com

Sample Received: Nov 1, 2002
 Plant: Equal Bacteria-Fungi
 Invoice #
 Date Mailed: Nov 19, 2002
 Equal Bacteria-Fungi

Organism Biomass Data

Sample #	Treatment	Dry Weight of 1 gram Fresh Material	Active Bacterial Biomass (µg/g)	Total Bacterial Biomass (µg/g)	Active Fungal Biomass (µg/g)	Total Fungal Biomass (µg/g)	Hypthal Diameter (µm)	Flagellates	Amoebae	Protozoa Numbers /g	Ciliates	Total Nematode Numbers (#/g)	Percent Mycorrhizal Colonization of Root
95106	McCull A 0-4	0.89	41.8	121	10.0	98.1	2.5	2,084	39,941	65	1.35	0.0	
95107	McCull A 0	0.90	38.1	120	9.9	56.0	2.5	4,734	6,388	51	0.71	0.0	
95108	McCull A 8	0.89	43.5	119	11.3	71.1	2.5	6,433	30,998	310	3.06	0.0	
95109	McCull A 12	0.89	53.4	138	16.9	77.2	2.5	15,561	64,582	311	0.81	0.0	
95110	McCull A 4	0.91	54.5	136	10.4	58.5	2.5	6,315	15,214	50	1.69	0.0	

Low

Very dry, need organic matter added to grow soil organisms which build soil structure and thus build water holding capacity

Excellent

All in good range

Mixt low for equal ratio F:B plants

All low

OK

Lacking nutrient cycling in most samples. Need good compost or compost tea to replace protozoa and improve nutrient cycling

Low numbers, bacterial-feeder diversity ok, others too low, switchers and root-feeders present

No roots to examine

If you send some roots, we'll run them

Desired Range

Field Capacity

15 - 25

100 - 300

15 - 25

100 - 300

10,000+ 10,000+

50 - 100

20 - 30

80%

40%

(A)

(A) Hyphal diameter of 2.0 indicates mostly actinomycete hyphae, 2.5 indicates community is mainly ascomycete, typical soil fungi for grasslands, diameters of 3.0 or higher indicate community is dominated by highly beneficial fungi, a Basidiomycete community.

Season, moisture, soil and organic matter must be considered in determining optimal foodweb structure. If sample information, such as pesticide, fertilizer tillage, irrigation are not included on the submission form, sender's locale is used. One report is sent to the mailing address on the submission form.



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Soil and Compost Foodweb Analysis

Client: Bob Wall
 PO Box 111
 Monte Vista, CO 81144

Sample Received: Nov 1, 2002 Date Mailed: Nov 19, 2002
 Plant: Equal Bacteria-Fungi
 Invoice # 5313
 Grower:

Organism Biomass Data

Sample #	Treatment	Dry Weight of 1 gram Fresh Material	Active		Total		Hypthal Diameter (µm)	Protozoa Numbers /		Total Nematode Numbers	Percent Mycorrhizal Colonization of Root
			Bacterial Biomass (µg/g)	Fungal Biomass (µg/g)	Bacterial Biomass (µg/g)	Fungal Biomass (µg/g)		Flagellates	Amoebak Ciliates		
95111	McCull B 0-4	0.91	46.8	19.7	64.4	2.5	15,274	15,260	64	1.75	0.0
95112	McCull B 0	0.90	48.8	21.1	57.2	2.5	6,379	39,630	307	1.66	0.0
95113	McCull B 12	0.90	54.6	23.6	57.3	2.5	6,392	39,715	64	3.01	0.0
95114	McCull B 8	0.89	51.8	22.6	79.2	2.5	52,116	40,093	140	0.80	0.0
95115	McCull B 4	0.90	44.2	26.6	48.2	2.5	636	6,365	31	0.48	0.0

Very dry, need organic matter added to grow soil organisms which build soil structure and bus build wate holding capacity

Excellent All in good range

OK

Lacking nutrient cycling in most samples. Need good compost or compost tea to replace protozoa and improve nutrient cycling

Low numbers, bacterial-feed diversity ok, others too low. If you send switchers some roots, and root-feed we'll run them present

low

Desired Range	Field Capacity	15 - 25	100 - 300	15 - 25	100 - 300	10,000+ (A)	50 - 100	20 - 30	40% - 80%
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(A) Hyphal diameter of 2.0 indicates mostly actinomycete hyphae, 2.5 indicates community is mainly ascomycetes, typical soil fungi for grasslands, diameters of 3.0 or higher indicate community is dominated by highly beneficial fungi, a Basidiomycete community.

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Soil and Compost Foodweb Analysis

Client: Monte Vista Coop 2
 Bob Wall
 2490 E Rd. 3N
 Monte Vista, Colorado 81144
 bwazz@mvcoop.com

Sample Received: 11/13/02 Date Mailed:
 Plant: grain/potato Equal Bacteria-Fungi plants
 Invoice # 5376 Fall
 Grower:

Organism Biomass Data

Sample #	Treatment	Dry Weight of 1 gram Fresh Material	Active		Total		Fungal Biomass (µg/g)	Hypthal Diameter (µm)	Protozoa Numbers /g			Total Nematode Numbers (#/g)	Percent Mycorrhizal Colonization of Root
			Bacterial Biomass (µg/g)	Fungal Biomass (µg/g)	Bacterial Biomass (µg/g)	Fungal Biomass (µg/g)			Flagellates	Amoebae	Ciliates		
95285	3S A0	0.96	46.6	12.3	66.6	51.6	2.5	602	6,025	34	0.25	3.3	
95286	3S A4	0.95	37.1	15.5	75.0	93.8	2.5	4,472	1,454	48	0.60	6.9	
95287	3S A8	0.95	40.9	6.5	59.4	72.2	2.5	4,478	8,009	15	0.62	4.0	
95288	3S A12	0.95	45.8	6.5	72.8	54.3	2.5	8,026	4,848	45	0.24	4.0	
95289	3S B0	0.95	43.7	4.7	93.8	75.6	2.5	4,466	22,583	6	0.66	12.0	
95290	3S B4	0.95	62.6	4.7	96.0	87.0	2.5	1,460	606	45	0.58	0.0	
95291	3S B8	0.93	38.3	10.8	161.3	85.8	2.5	4,928	14,831	46	0.56	0.0	
95292	3S B12	0.94	22.8	6.8	74.9	152	3	3,781	4,515	0	0.57	0.0	
		Too dry, need organic matter to grow soil life, improve soil structure, water retention	All in good to excellent range	A few too low, need fungal inoculum	All low	Mostly too low, need fungal inoculum	OK, to B12 with excellent community structure	Protozoa too low to provide needed nutrient cycling for plants. Fertilizer will be needed until dweb is improv			Too low numbers, decent to good beneficials, a few root-feeders left	Too low, need VAM inoculum, but the little colonization helps	
Desired Range		0.45 - 0.85	15 - 25	15 - 25	100 - 300	100 - 300	(A)	10,000+	10,000+	50 - 100	10 - 20	40%-80%	

(A) Hyphal diameter of 2.0 indicates mostly actinomycete hyphae, 2.5 indicates community is mainly ascomycete, typical soil fungi for grasslands, diameters of 3.0 or higher indicate community is dominated by highly beneficial fungi, a Basidiomycete community.

Season, moisture, soil and organic matter must be considered in determining optimal foodweb structure. If sample information, such as pesticide, fertilizer tillage, irrigation are not included on the submission form, sender's locale is used. One report is sent to the mailing address on the submission form.

Percent disease 95285 17%, 95286 11%, 95287 12%, 95288 16%, 95289 galls on roots 28%, 95290 18% disease, galls on 11%, 95291 8% disease, galls on 4%, 95292 16% disease, gallon on 12%.



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Soil and Compost Foodweb Analysis

Client: Bob Wall
 PO Box 111
 Monte Vista, CO 81144
 FAX (719) 852-2577

Sample Received: Nov 1, 2002 Date Mailed: Nov 19, 2002
 Plant: Equal Bacteria-Fungi
 Invoice # 5313
 Grower:

Organism Biomass Data

Sample #	Treatment	Dry Weight of 1 gram Fresh Material	Active		Total		Hyphal Diameter (µm)	Protozoa		Nematode Numbers (#/g)	Percent Mycorrhizal Colonization of Root
			Bacterial Biomass (µg/g)	Fungal Biomass (µg/g)	Bacterial Biomass (µg/g)	Fungal Biomass (µg/g)		Flagellates	Amoebae/Ciliates		
95116	Entz 4	0.89	63.0	18.3	108	182	2.5	15,651	65	0.80	0.0
95117	Entz 3	0.88	56.4	26.0	127	193	2.5	6,833	40,592	2.50	0.0
95118	Entz 2	0.94	48.3	31.4	133	149	2.5	6,100	37,902	4.61	0.0
95119	Entz 1	0.89	39.6	15.6	135	181	2.5	51,955	39,969	2.79	0.0

Very dry, need organic matter added to grow soil organisms which build soil structure and thus build water holding capacity

OK

Low flagellates in most samples. Need good compost or compost tea to replace protozoa and improve nutrient cycling

Low numbers, bacterial-feeding diversity ok, but switchers and root-feeders we'll run them present

Bold means low

Desired Range	Field Capacity	15 - 25	100 - 300	100 - 300	15 - 25	10,000+ 50 - 100	10,000+ 100	20 - 30	40% - 80%
							(A)		

(A) Hyphal diameter of 2.0 indicates mostly actinomycete hyphae, 2.5 indicates community is mainly ascomycete, typical soil fungi for grasslands, diameters of 3.0 or higher indicate community is dominated by highly beneficial fungi, a Basidiomycete community.

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Soil and Compost Foodweb Analysis

Client: Bob Wall
 PO Box 111
 Monte Vista, CO 81144
 FAX (719) 832-2577

Date Mailed: Nov 19, 2002
 Equal Bacteria-Fungi
 Fall

Sample Received: Nov 1, 2002

Plant: 5313

Sample #	Treatment	Dry Weight of 1 gram Fresh Material		Total Bacterial Biomass (µg/g)	Active Bacterial Biomass (µg/g)	Total Fungal Biomass (µg/g)	Active Fungal Biomass (µg/g)	Hyphal Diameter (µm)	Protozoa Numbers /g		Total Nematode Numbers (#/g)	Percent Mycorrhizal Colonization of Root
		Flagellates	Amoebae						Ciliates			
95120	Ram 1	0.90	38.0	238	9.29	19.0	4.499	42	42	0.42	41.2	
95121	Ram 2	0.91	60.5	149	6.18	13.3	6.356	306	306	0.34	47.4	
95122	Ram 3	0.90	63.2	182	9.32	14.0	6.394	64	64	0.11	45.0	
95123	Ram 4	0.90	73.8	145	10.5	15.9	51.465	139	139	2.76	41.2	

Very dry, need organic matter added to grow soil organisms which build soil structure and thus build water holding capacity

All in good range
 All extremely low, need to add a fungal inoculum
 All low, need to add fungal foods to balance fungi to bacterial activity

OK
 Low flagellates in most samples. Need good compost or compost tea to replace protozoa and improve nutrient cycling
 Low numbers, bacterial-feeding diversity ok, but switchers present. Lesion nematode not an important component of the community

Bold means low

Desired	Field Capacity	15 - 25	100 - 300	100 - 300	15 - 25	10,000+	10,000+	50 - 100	20 - 30	40%	80%
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(A) Hyphal diameter of 2.0 indicates mostly actinomycete hyphae, 2.5 indicates community is mainly actinomycete, typical soil fungi for grasslands, diameters of 3.0 or higher indicate community is dominated by highly beneficial fungi, a Basidiomycete community.

Season, moisture, soil and organic matter must be considered in determining optimal foodweb structure. If sample information, such as pesticide, fertilizer tillage, irrigation are not included on the submission form, sender's locale is used. One report is sent to the mailing address on the submission form.

Diseased: Ram 1 had 25% of roots with disease; 2 had 18%, 3 and 4 had 10% diseased

Significant Accomplishments for 2002
Advance Clone Disease Assessment Program

Nineteen advanced clones were evaluated for their reaction to potato leafroll virus and PVY, fifty eight advanced clones for their reaction to bacterial ring rot, and forty advanced clones for their reaction to storage rots caused by *Fusarium* spp., *Erwinia carotovora* and, *Alternaria solani*. For the second year in a row, CO94019-1R did not show any symptoms to potato leafroll virus, but did have a hypersensitive type response to PVY. This is of concern since this was the second year of inoculation with no symptoms evident. An additional clone, VC1015-1R/Y did not show symptoms to leafroll. Both clones will be tested one further time in 2003, at which time decisions regarding their continued movement in the Cultivar Development program will be made. All clones showed good symptoms to PVY with one clone, CO95077-3R demonstrating very high levels of mosaic in the leafroll natural-in-field spread trials. This clone also bears further examination in light of the heavy mosaic infestation. Because of the year, many of the advanced selections had very high levels of leafroll spread occurring in the plots. All but three were on the high side for infection levels.

This year testing for bacterial ring rot was conducted not only on Colorado clones, but also on all clones entered into the Western Regional Trials. This should make the data generated from these trials more applicable to Colorado's situation. Two Colorado clones which have been tested for two years, VC0967-5R/Y and VC1002-3W/Y, demonstrated no symptoms to ring rot this year. These will be tested again in 2003. The rest of the two year clones had adequate expression and timing of the expression with the exception of one clone, CO93037-6R. This clone showed no symptoms in 2001 and had very late symptom expression and low number of plants expressing in 2002. It will be tested again in 2003, but should be closely watched. With regard to clones entered for the first time this year, three clones, CO95051-7W, VC1009-1W/Y and, VC1015-1R/Y demonstrated low levels or no level of ring rot symptoms. None of the clones demonstrated excessive tuber decay.

Many clones with resistance to storage rots were tested again in 2002. Overall the relative ranking of clones based upon results were quite similar to 2001. This indicates that much of the resistance seen toward *Fusarium* and *Erwinia* were real and should be noted. One clone, CO96197-3RU, has good resistance toward the previously listed storage decay problems, but does show elevated risk toward early blight tuber decay. It will take some time to fully assess how each clone should fit within a benefit/risk category for the various diseases, but the program does appear to be on track in finding some solid, horticulturally acceptable material with good resistance toward several disease problems.

2002 Potato Leafroll and PVY Clonal Evaluation

Location: NW Corner, Selter's Farm, 9 North, ½ mile east of SLVRC

Treatments: PLRV Infected and Healthy

Plot Design: RCB - 7 seedpieces or reps/cultivar x two treatments

Plant Date: 5/3/02

Plot Size: 12" plant spacing x 34" row spacing

Cultivar:	1. AC94296-5W	13. VC1015-7R/Y
	2. AC95405-2RU	14. VC1075-1R
	3. CO95007-1RU	15. CO94019-1R
	4. CO95007-8RU	16. CO94183-1R/R
	5. CO95051-7W	17. NDC6184-3R
	6. CO95070-7W	18. VC0967-2R/Y
	7. CO95077-3R	19. VC1002-3W/Y
	8. CO95086-8RU	20. Russet Burbank
	9. CO95117-8W	21. Sangre
	10. CO95172-3RU	22. Centennial Russet
	11. VC1009-1W/Y	23. WNC 230-14
	12. VC1015-1R/Y	24. Russet Norkotah

Irrigation: Solid set sprinkler: rate based on ET. Total water for season: 24".

Fertilizer: Planting fertilizer ground applied 66:58:33:15(S):1(Zn), 60 gal/acre; Chemigated 32 N fertilizer (10 lbs/acre) on 7/5, 7/8, 7/10, and 7/17/02, for a season total of 106 N, with 12 N from irrigation water. Total for season = 118:58:33:15(S):1(Zn).

Herbicide: Ground rig application: 6/5/02 - Eptam(6.0 pt/acre) & Matrix (1.5 oz/acre), in 10 gal/acre.

Fungicide: Aerial applications: 7/9/02 - Quadris (4.6 gal/acre); 7/23/02 - Bravo Weatherstick (1.0 pt/acre); 8/8/02 - Dithane (2.0 lbs/acre).

Insecticide: Aerial application: 7/23/02 - Asana Excel (0.375 oz/acre)

Harvest: 9/17/02

Table 1. 2002 Clonal Evaluation for PLRV and PVY Symptom Expression

Cultivar/Clone	PLRV (0-3+)	Symptoms	PVY (0-3+)	Symptoms
1 AC94296-5W	3+	LL,CC,WP	3+	Typical
2 AC95405-2RU	3+	LL,CC,WP	3+	Gem Russet type
3 CO95007-1RU	3+	LL,CC,WP	3+	Silverton Russet type
4 CO95007-8RU	3+	LL,CC,WP	3+	Typical
5 CO95051-7W	3+	LL,CC,WP	3+	Typical
6 CO95070-7W	3+	LL,CC,WP	1+	Leaf vein burning
7 CO95077-3R	3+	LL,CC,WP,P	3+	Purpling, leaf curl
8 CO95086-8RU	3+	LL,CC,WP	3+	Typical
9 CO95117-8W	3+	LL,CC,WP,P	3+	Typical
10 CO95172-3RU	3+	LL,WP,CC	1+	Shepody type
11 VC1009-1W/Y	2+	LL,CC,WP	3+	Typical
12 VC1015-1R/Y	0		3+	Leaf drop
13 VC1015-7R/Y	3+	LL,WP,CC	3+	Typical
14 VC1075-1R	3+	LL,WP,CC	0	Typical
15 CO94019-1R	0		3+	Hyper-sensitive, Ranger Russet type
16 CO94183-1R/R	3+	LL,CC,WP	3+	Typical
17 NDC6184-3R	3+	LL,CC,WP	3+	Typical
18 VC0967-2R/Y	3+	LL,CC	3+	Typical
19 VC1002-3W/Y	3+	LL,CC,WP	N/A	Typical
20 Russet Burbank	3+	LL,CC,WP	3+	Typical
21 Sangre	3+	LL,CC,WP,P	3+	Typical
22 Centennial Russet	3+	LL,CC,WP	3+	Typical
23 WNC230-14RU	0		3+	Typical
24 Russet Norkotah	3+	LL,CC,WP	3+	Typical

Key - Rating for the symptom expression is 0 = No symptoms to 3+ = Strong typical symptoms. % based on the number of plants total versus the number positive.
 LL = lower leaf rolling, CC = good color change evident (yellowing or bronzing),
 WP = whole plant involvement and P = purpling evident on leaf margins.
 PVY symptoms - Typical indicates symptoms readily apparent as mosaic.

2002 POTATO - LEAF ROLL NATURAL IN-FIELD SPREAD

- Location:** NW Corner, Selter's Farm, 9 North, ½ mile east of SLVRC
- Treatments:** Healthy with LR+ between treatments
- Plot Design:** RCB - 12 seedpieces & LR+/cultivar, with no space between LR+ and next cultivar.
- Plot Size:** 12" plant spacing x 34" row spacing.
- Plant Date:** 5/3/02
- Cultivars:**
- | | | |
|-----------------|------------------|---------------------|
| 1. AC94296-5W | 11. VC1009-1W/Y | 21. Ute Russet |
| 2. AC95405-2RU | 12. VC1015-1R/Y | 22. Green Mtn. |
| 3. CO95007-1RU | 13. VC1015-7R/Y | 23. Houma |
| 4. CO95007-8RU | 14. VC1075-1R | 24. Katahdin |
| 5. CO95051-7W | 15. CO94019-1R | 25. Keswick |
| 6. CO95070-7W | 16. CO94183-1R/R | 26. Penobscot |
| 7. CO95077-3R | 17. NDC6184-3R | 27. Rus. Burbank |
| 8. CO95086-8RU | 18. VC0967-2R/Y | 28. Sangre |
| 9. CO95117-8W | 19. VC1002-3W/Y | 29. Centennial Rus. |
| 10. CO95172-3RU | 20. WNC230-14RU | 30. Rus. Nugget |
| | | 31. Rus. Norkotah |
- Irrigation:** Ground sprinkler: rate based on ET; Total water for season 24".
- Fertilizer:** Planting fertilizer, ground rig applied 66-58-33-15(S)-1(Zn) 60 gal/acre. Chemigated 32 N fertilizer (10 lbs/acre) on 7/5, 7/8, 7/10, 7/17/02; for a season total of 106 N, with 12N from irrigation water. Total for season =118:58:33:15(S):1(Zn).
- Herbicide:** Ground rig application: 6/5/02 - Eptam (6 pt/acre) & Matrix (1.5 oz/acre) in 10 gal/acre.
- Fungicide:** Aerial applications: 7/9/02 - Quadris (4.6 gal/acre); 7/23/02- Bravo Weatherstick (1.0 pt/acre); 8/8/02 Dithane (2.0 lbs/acre).
- Insecticide:** Aerial application: 7/23/02 - Asana Excel (0.375 oz/acre)
- Harvest:** 9/17/02

Table 2. 2002 Clonal Evaluation for PLRV - Natural In-Field Spread

Cultivar/Clone	# pos/ # emerged	% Spread		Risk
		2002	13 Year Avg	
1 AC94296-5W	35/44	80.0		High
2 AC95405-2RU	14/63	22.2		High
3 CO95007-1RU	34/60	56.6		High
4 CO95007-8RU	20/57	35.1		High
5 CO95051-7W	13/60	21.7		High
6 CO95070-7W	17/57	29.8		High
7 CO95077-3R	20/54	37.0		High-heavy MO
8 CO95086-8RU	11/66	16.6		High
9 CO95117-8W	34/51	66.6		High
10 CO95172-3RU	45/66	68.2		High
11 VC1009-1W/Y	2/63	3.2		Low
12 VC1015-1R/Y	0/60	0.0		Very Low
13 VC1015-7R/Y	15/61	25.1		High
14 VC1075-1R	26/60	43.3		High
15 CO94019-1R	0/54	0.0		Very Low
16 CO94183-1R/R	6/33	18.2		High
17 NDC6184-3R	35/63	55.5		High
18 VC0967-2R/Y	6/54	11.1		High
19 VC1002-3W/Y	19/63	30.2		High
20 WNC230-14RU	2(+/-) /48	4.2	0.2	Very Low
21 Ute Russet	19/60	31.6	13.2	High
22 Green Mountain	26/48	54.2	16.9	High
23 Houma	15/54	28.0	5.2	Medium
24 Katahdin	0/52	0.0	3.0	Low
25 Keswick	6/45	13.3	5.7	Medium
26 Penobscot	0/43	0.0	0.8	Very Low
27 Russet Burbank	20/51	39.2	9.3	Medium
28 Sangre	4/11	36.4	8.1	Medium
29 Centennial Rus.	7/50	14.0	3.8	Low
30 Russet Nugget	5/48	10.4	11.0	High
31 Russet Norkotah	11/32	34.4	32.0 (3 yr avg)	High

Data is from 2 tubers/plant, 12 plants/rep, and 3 reps/cultivar for a total of 72 tubers planted per clone in each year. Advanced clones have been tested for one year only (1-19).

Risk assessment: Low = 0-4.9%, Medium = 5.0-9.9%, and High = 10% and higher.

2002 Bacterial Ring Rot Evaluation

- Location:** NW Corner, Selter's Farm, 9 North, ½ East of SLVRC
- Treatments:** 54 cultivars - Non-inoculated controls consisted of 21 tubers cut lengthwise with no dipping. Inoculated treatments were obtained by placing 21 seed pieces (fresh cut lengthwise) into one litre of Ringers solution (100 ml of 10x with 900 ml of cold water) for 5 minutes. Three Cms plates exhibiting good bacterial growth, with some agar, were scraped into the Ringers. After four cultivars were dipped, a fourth plate was added to the solution to finish out the last three treatments. Seven cultivars were dipped per batch and the solution was not used for more than 45 minutes total time. Cms plates were started on 4/24/02 and inoculation took place on 5/8/02. Inoculated tubers were allowed to stay moist in paper sack overnight and planted on 5/9/02. After planting, tubers were immediately covered with soil.
- Plot Design:** Randomized complete block - 7 inoculated, 7 non-inoculated seed pieces/cultivar x 3 reps with non-inoculated controls planted south of inoculated treatments.
- Plant Date:** Inoculation 5/8/02; Planting 5/9/02
- Cultivars:**
- | | | |
|-------------------|-----------------------|---------------------|
| 1. CO93037-6R | 19. CO95007-8RU | 37. A84118-3 |
| 2. CO94019-1R | 20. CO95051-7W | 38. A91790-13 |
| 3. CO94024-16RU | 21. CO95070-7W | 39. A9014-2 |
| 4. CO94035-15RU | 22. CO95077-3R | 40. A9045-7 |
| 5. CO94055-8RU | 23. CO95086-8RU | 41. A90586-11 |
| 6. CO94065-2R | 24. CO95117-8W | 42. A8893-1 |
| 7. CO94084-12RU | 25. CO95172-3RU | 43. ATX9202-1RU |
| 8. CO94165-3P/P | 26. VC1009-1W/Y | 44. A9304-3 |
| 9. CO94183-1R/R | 27. VC1015-1R/Y | 45. A9305-10 |
| 10. CO94222-6RU/Y | 28. VC1015-7R/Y | 46. Stampede Russet |
| 11. NDC6084C-2W | 29. VC1075-1R | 47. NDTX4930-5W |
| 12. NDC6184-3R | 30. Russet Burbank | 48. A92584-3BB |
| 13. VC0967-2R/Y | 31. Sangre | 49. BTX1544-2W/W |
| 14. VC0967-5R/Y | 32. Centennial Russet | 50. NDO4323-2R |
| 15. VC1002-3W/Y | 33. WNC230-14RU | 51. NDTX4271-5R |
| 16. AC94296-5W | 34. Ute Russet | 52. NDTX4304-1R |
| 17. AC95405-2RU | 35. Russet Norkotah | 53. TX1523-1RU |
| 18. CO95007-1RU | 36. Alturas | 54. TX1674-1W/Y |
- Irrigation:** Solid set sprinkler: rate based on ET and ppt. Total water for season was 24".
- Fertilizer:** Planting fertilizer ground applied 66:58:33:15(S):1(Zn), 60 gal/acre; Chemigated 32N fertilizer (10 lbs/acre) on 7/5, 7/8, 7/10, and 7/17/02, for a season total of 106N, with 12N from irrigation water. Total for season = 118:58:33:15(S):1(Zn).
- Herbicide:** Ground rig application: 6/5/02 - Eptam (6.0 pt/acre) & Matrix 1.5 oz/acre, in 10 gal/acre.
- Fungicide:** Aerial applications: 7/9/02 - Quadris (4.6 gal/acre); 7/23/02 - Bravo Weatherstick (1.0 pt/acre); 8/8/02 - Dithane (2.0 lbs/acre).
- Insecticide:** Aerial applications: 7/23/02 - Asana Excel (0.375 oz/acre)
- Harvest:** 9/17/02

Table 3. 2002 Clonal Evaluation for Bacterial Ring Rot Foliar Symptom Expression.

^	Clone	Date of First Symptoms	# of Reps Positive	# of Plants Positive	% Plants Positive	Date 50% or More +	% Plants + 100 DAP	Summary of Symptoms	Stem Squeeze
3	CO93037-6R	8/26	1	3	14.3	-----	14.3	IVC,MN	+
2	CO94019-1R	8/9	1	2	9.5	-----	19.0	ALL	N/A
2	CO94024-16RU	7/12	2	2	9.5	-----	33.3	ALL but MN	+
2	CO94035-15RU	7/5	1	1	4.8	-----	47.6	ALL	+
2	CO94055-8RU	8/16	2	4	19.0	8/26	52.4	ALL but ED,R	-
2	CO94065-2R	7/19	1	2	9.5	-----	14.3	ALL but ED,R	-
2	CO94084-12RU	7/5	1	1	4.8	-----	42.9	ALL	+
2	CO94165-3P/P	7/12	1	1	4.8	-----	9.5	ED,R,IVC,W	-
2	CO94183-1R/R	7/26	1	2	9.5	8/26	71.4	ALL	-
2	CO94222-6RU/Y	7/5	2	2	9.5	8/16	71.4	ALL	-
2	NDC6084C-2W	7/12	1	1	4.8	-----	19.0	ALL but IVN	-
2	NDC6184-3R	8/26	2	3	14.3	-----	14.3	IVC,W	-
2	VC0967-2R/Y	7/12	1	1	4.8	-----	9.5	ED,R,IVC	-
2	VC0967-5R/Y	-----	-----	-----	-----	-----	-----	-----	-----
2	VC1002-3W/Y	-----	-----	-----	-----	-----	-----	-----	-----
1	AC94296-5W	7/5	1	2	9.5	-----	14.3	ALL	-
1	AC95405-2RU	7/12	1	1	4.8	-----	38.1	ALL	-
1	CO95007-1RU	7/12	1	2	9.5	-----	38.1	ALL	-
1	CO95007-8RU	7/26	3	7	33.3	8/9	90.5	ALL	-
1	CO95051-7W	7/19	1	1	4.8	-----	4.8	ED,R,IVC,W	+

^	Clone	Date of First Symptoms	# of Reps Positive	# of Plants Positive	% Plants Positive	Date 50% or More +	% Plants + 100 DAP	Summary of Symptoms	Stem Squeeze
1	CO95070-7W	7/12	1	1	4.8	-----	33.3	ALL	-
1	CO95077-3R	7/19	1	1	4.8	8/26	57.1	ALL	+
1	CO95086-8RU	7/5	1	1	4.8	8/16	66.6	ALL	-
1	CO95117-8W	7/26	1	2	9.5	-----	23.8	ALL	N/A
1	CO95172-3RU	7/5	1	3	14.3	8/1	57.1	ALL	-
1	VC1009-1W/Y	7/12	1	1	4.8	-----	4.8	ED,R	-
1	VC1015-1R/Y	-----	-----	-----	-----	-----	-----	-----	-
1	VC1015-7R	7/19	1	2	9.5	8/26	61.9	ALL	-
1	VC1075-1R	8/26	1	1	4.8	-----	4.8	IVC,IVN,MN,W	-
3+	Russet Burbank	7/5	2	5	23.8	8/1	52.4	ED,R,IVC	+
3+	Sangre	7/26	1	1	4.8	-----	4.8	ED,R	-
3+	Centennial Russet	7/5	1	1	4.8	-----	9.5	ALL	-
3+	WNC230-14RU	7/12	1	1	4.8	-----	9.5	ED,R,IVC	-
3+	Ute Russet	7/19	1	2	9.5	-----	33.3	ED,R,IVC	-
3+	Russet Norkotah	7/5	2	5	23.8	8/26	71.4	ALL	+
1	Alturas	7/5	1	1	4.8	-----	9.5	ED,R,IVC	-
1	A84118-3	7/26	1	1	4.8	-----	23.8	ED,R,IVC,IVN	+
1	A91790-13	7/5	2	2	9.5	-----	19.0	ED,R,IVC	-
1	A9014-2	7/26	2	3	14.3	8/16	76.2	ALL	N/A
1	A9045-7	7/5	1	3	14.3	-----	38.1	ALL	-
1	A90586-11	7/5	1	1	4.8	-----	14.3	ED,R,IVC	-

^	Clone	Date of First Symptoms	# of Reps Positive	# of Plants Positive	% Plants Positive	Date 50% or More +	% Plants + 100 DAP	Summary of Symptoms	Stem Squeeze
1	A8893-1	7/5	1	1	4.8	-----	42.9	ALL	-
1	ATX9202-1RU	7/5	1	1	4.8	-----	28.6	ED,R,IVC	-
1	A9304-3	7/26	2	3	14.3	8/26	81.0	ALL	-
1	A9305-10	7/12	1	1	4.8	-----	9.5	ED,R,IVC	-
1	Stampede Russet	7/5	1	1	4.8	-----	28.6	ALL	-
1	NDTX4930-5W	8/26	1	2	9.5	-----	9.5	ALL but ED,R	-
1	A92584-3BB	7/26	2	2	9.5	-----	33.3	ALL	+
1	BTX1544-2W/W	7/12	1	1	4.8	-----	9.5	ALL	-
1	NDO4323-2R	7/26	1	1	4.8	-----	23.8	ALL	-
1	NDTX4271-5R	7/5	1	1	4.8	-----	19.0	ALL	-
1	NDTX4304-IR	8/16	1	5	23.8	-----	28.6	ALL but ED,R	-
1	TX1523-1RU	7/12	1	1	4.8	8/26	71.4	ALL	-
1	TX1674-1W/Y	7/26	1	1	4.8	-----	19.0	ALL	-

^ Number of years tested, Planting date - 5/9/02. Key to symptoms; ED - Early dwarf, R - Rosette, IVC - Interveneal chlorosis, IVN - Interveneal necrosis, MN - Marginal necrosis and W - Wilt. N/A - Not available. Stem squeeze performed 8/26/02.

Date vs. Days after planting (DAP); 7/5 = 58DAP, 7/12 = 65DAP, 7/19 = 72DAP, 7/26 = 79DAP, 8/1 = 85DAP, 8/9 = 93DAP, 8/16 = 100DAP, 8/26 = 110DAP.

**Table 4. 2002 Clonal Evaluation for Bacterial Ring Rot
Tuber Symptom Expression**

Clone	# Reps +	# Tubers +	% Tubers +
CO93037-6R			
CO94019-1RU			
CO94024-16-RU			
CO94035-15RU			
CO94055-8RU			
CO94065-2R			
CO94084-12RU	1	1	1
CO94165-3P/P			
CO94183-1R/R	2	2	10
CO94222-6RU/Y	2	4	20
NDC6084C-2W			
NDC6184-3R			
VC0967-2R/Y	1	1	5
VC0967-5R/Y			
VC1002-3W/Y			
AC94296-5W			
AC95405-2RU			
CO95007-1RU			
CO95007-8RU	1	2	10
CO95051-7W	1	1	5
CO95070-7W			
CO95077-3R			
CO95086-8RU			
CO95117-8W			
CO95172-3RU			
VC1009-1W/Y			
VC1015-1R/Y			
VC1015-7R/Y			
VC1075-1R	1	1	5

Russet Burbank			
Sangre			
Centennial Russet			
WNC230-14RU			
Ute Russet	1	1	5
Russet Norkotah	1	1	5
Alturas	1	1	5
A84118-3			
A91790-13			
A9014-2			
A9045-7	1	1	5
A90586-11			
A8893-1	1	1	5
ATX9202-1RU			
A9304-3			
A9305-10	1	2	10
Stampede Russet			
NDTX4930-5W	1	2	10
A92584-3BB	1	1	5
BTX1544-2W/WY			
NDO4323-2R			
NDTX4271-5R			
NDTX4304-1R			
TX1523-1RU			
TX1674-1W/Y			

2 reps screened; 10 tubers/rep were cut. % based upon # pos/#cut (20). Harvest 9/19/02

Clonal Evaluation for Storage Rots

Treatments: *Erwinia* - 50ul of 1×10^4 cfu/ml into 3 inoculation sites, stem end.
Fusarium - 50ul of 250-500 spores/tuber into 3 inoculation sites, stem end.
Alternaria - 40 spores/tuber in a 50-50 oil-water spray, after bruising.

Inoculation/Reading: *Erwinia* (11/25/02; 12/24/02); *Fusarium* (11/26/02; 12/24/02)
Alternaria (12/4/02; 1/23/03)

Cultivars:

1. AC92009-4RU	16. CO96197-3RU	31. CO94035-15RU
2. AC93026-9RU	17. CO96211-2W	32. CO94065-2R
3. AC93047-1RU	18. CO96284-1W/Y	33. CO94084-12RU
4. CO92077-2RU	19. CO96284-3W/Y	34. CO94165-3P/P
5. CO93001-11RU	20. CO96320-1RU	35. CO94183-1R/R
6. CO93016-3RU	21. CO96320-2RU	36. CO94222-6RU/Y
7. CO93037-6RU	22. CO96324-3RU	37. NDC6084C-2W
8. CO96008-2RU	23. CO96326-1RU	38. VC0967-2R/Y
9. CO96021-1RU/Y	24. CO96332-3W	39. VC0967-5R/Y
10. CO96048-1RU/Y	25. CO96339-4W/Y	40. VC1002-3W/Y
11. CO96048-4RU	26. CO96339-7W	41. Sangre 10
12. CO96049-4RU	27. NDC5281-2R	42. Russet Norkotah 3
13. CO96049-6RU	28. NDC5372-1RU	43. Russet Nugget
14. CO96050-2RU/Y	29. NDC5372-1RU	
15. CO96050-3RU/Y	30. CO94019-1R	

Evaluation: Ranked by Score. Scores based upon 3 reps x 10 tubers/rep.
 Tuber evaluations follow: Control will always equal 1 or 0.

Fusarium

1 = No symptoms
 2 = Localized damage
 3 = < 50% tuber damage
 4 = > 50% tuber damage
 5 = 100% tuber damage

Erwinia

1 = No symptoms
 2 = Localized damage
 3 = < 50% tuber damage
 4 = > 50% tuber damage
 5 = 100% tuber damage

Alternaria

0 = No symptoms
 1 = 1/8" dia./1peel
 2 = 1/4" dia./2 peels
 3 = 1/2" dia./3 peels
 4 = > 10% tuber damage
 5 = 100% tuber damage

Grade loss occurs at 3 for *Fusarium* and *Erwinia* and at 4 for *Alternaria*

Table 5. Clonal Evaluation for Storage Rot

<i>Fusarium</i>			
Inoculation	11/19/2001	11/26/2002	
Reading	2/4/2002	12/24/2002	
Clone	Avg Score	Avg Score	2 Yr. Avg
AC92009-4RU		3.00	
AC93026-9RU	3.00	3.00	3.00
AC93047-1RU	2.93	2.10	2.50
CO92077-2RU		2.00	
CO93001-11RU	1.87	2.50	2.18
CO93016-3RU	2.86	1.90	2.38
CO93037-6RU		2.80	
CO96008-2RU	2.86	2.00	2.43
CO96021-1RU/Y	2.92	3.00	2.96
CO96048-1RU/Y	3.93	3.00	3.47
CO96048-4RU		2.10	
CO96049-4RU	3.53	1.90	2.72
CO96049-6RU		2.50	
CO96050-2RU/Y		2.10	
CO96050-3RU/Y	2.87	3.10	2.99
CO96197-3RU	2.80	2.00	2.40
CO96211-2W		2.90	
CO96284-1W/Y	3.47	3.10	3.29
CO96284-3W/Y	2.80	2.80	2.80
CO96320-1RU	3.00	3.00	3.00
CO96320-2RU	2.93	2.60	2.77
CO96324-3RU	3.07	2.60	2.84
CO96326-1RU	2.87	2.00	2.44
CO96332-3W	3.40	2.50	2.95
CO96339-4W/Y		3.10	
CO96339-7W	2.86	3.30	3.08
NDC5281-2R	3.00	2.00	2.50
NDC5372-1RU	3.06	2.20	2.63
TC1675-1RU		3.00	
CO94019-1R		3.00	
CO94035-15RU		2.00	
CO94065-2R		3.00	
CO94084-12RU		2.90	
CO94165-3P/P		2.80	
CO94183-1R/R		2.70	
CO94222-6RU/Y		2.40	
NDC6084C-2W		1.90	
VCO967-2R/Y		2.00	
VC0967-5R/Y		2.90	
VC1002-3W/Y		3.00	
Sangre 10	2.47	2.00	2.24
Rus. Norkotah	2.80	2.00	2.40
Rus. Nugget	4.26	3.50	3.88

Table 6. Clonal Evaluation for Storage Rot			
<i>Erwinia</i>			
Inoculation	10/12/2001	11/25/2002	
Reading	11/27/2001	12/24/2002	
Clone	Avg Score	Avg Score	2 Yr. Avg
AC92009-4RU	1.80	1.70	1.75
AC93026-9RU	2.13	1.40	1.77
AC93047-1RU	2.00	1.40	1.70
CO92077-2RU		2.40	
CO93001-11RU		1.10	
CO93016-3RU	2.20	2.30	2.25
CO93037-6RU		2.00	
CO96008-2RU	2.60	2.50	2.55
CO96021-1RU/Y	2.40	1.90	2.15
CO96048-1RU/Y	1.80	1.70	1.75
CO96048-4RU	2.33	1.90	2.12
CO96049-4RU	2.20	1.40	1.80
CO96049-6RU	2.67	2.40	2.54
CO96050-2RU/Y	2.27	2.60	2.44
CO96050-3RU/Y	2.07	2.00	2.04
CO96197-3RU	4.33	1.30	2.82
CO96211-2W	2.20	2.00	2.10
CO96284-1W/Y	1.93	2.10	2.02
CO96284-3W/Y	2.40	2.00	2.20
CO96320-1RU	2.71	1.30	2.01
CO96320-2RU	2.80	1.60	2.20
CO96324-3RU	3.27	2.10	2.69
CO96326-1RU	3.80	2.50	3.15
CO96332-3W	2.07	2.00	2.04
CO96339-4W/Y	2.00	2.60	2.30
CO96339-7W	3.93	2.60	3.27
NDC5281-2R	1.77	2.10	1.94
NDC5372-1RU	2.21	1.10	1.66
TC1675-1RU	2.60	2.80	2.70
CO94019-1R		1.00	
CO94035-15RU		1.10	
CO94065-2R		1.10	
CO94084-12RU		1.40	
CO94165-3P/P		1.10	
CO94183-1R/R		2.90	
CO94222-6RU/Y		2.10	
NDC6084C-2W		1.20	
VCO967-2R/Y		1.40	
VC0967-5R/Y		2.70	
VC1002-3W/Y		1.00	
Sangre 10	2.60	2.80	2.70
Rus. Norkotah	2.27	1.60	1.94
Rus. Nugget	2.47	1.70	2.09

Table 7. Clonal Evaluation for Storage Rot

<i>Alternaria</i>			
Inoculation	10/12/2001	12/3/2002	
Reading	11/27/2001	1/23/2003	
Clone	Avg Score	Avg Score	2 yr avg
AC92009-4RU		0.20	0.08
AC93026-9RU	0.06	0.10	0.33
AC93047-1RU	0.06	0.60	0.54
CO92077-2RU	0.27	0.80	0.20
CO93001-11RU	0.00	0.40	0.08
CO93016-3RU	0.06	0.10	0.07
CO93037-6RU	0.13	0.00	0.00
CO96008-2RU	0.00	0.00	0.07
CO96021-1RU/Y	0.00	0.13	0.15
CO96048-1RU/Y	0.00	0.30	0.10
CO96048-4RU	0.00	0.20	0.00
CO96049-4RU	0.00	0.00	0.13
CO96049-6RU	0.06	0.20	0.08
CO96050-2RU/Y	0.06	0.10	0.20
CO96050-3RU/Y	0.00	0.40	1.08
CO96197-3RU	0.06	2.10*	0.18
CO96211-2W	0.06	0.30	0.05
CO96284-1W/Y	0.00	0.10	0.15
CO96284-3W/Y	0.00	0.30	0.20
CO96320-1RU	0.00	0.40	0.05
CO96320-2RU	0.00	0.10	0.58
CO96324-3RU	0.06	1.10	0.00
CO96326-1RU	0.00	0.00	0.10
CO96332-3W	0.00	0.20	0.00
CO96339-4W/Y	0.00	0.00	0.23
CO96339-7W	0.06	0.40	0.38
NDC5281-2R	0.46	0.30	0.03
NDC5372-1RU	0.06	0.00	0.17
TC1675-1RU	0.33	0.00	
CO94019-1R		0.00	
CO94035-15RU		1.00	
CO94065-2R		0.50	
CO94084-12RU		0.20	
CO94165-3P/P		0.00	
CO94183-1R/R		0.30	
CO94222-6RU/Y		0.20	
NDC6084C-2W		0.10	
VCO967-2R/Y		0.00	
VC0967-5R/Y		0.60*	
VC1002-3W/Y		N/A	0.08
Sangre 10	0.06	0.10	0.12
Rus. Norkotah	0.13	0.10	0.15
Rus. Nugget	0.20	0.10	
* CO96197-3RU - 20% out of grade			
* VC0967-5R/Y - 10% out of grade			

more
row
down
one space

etc

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