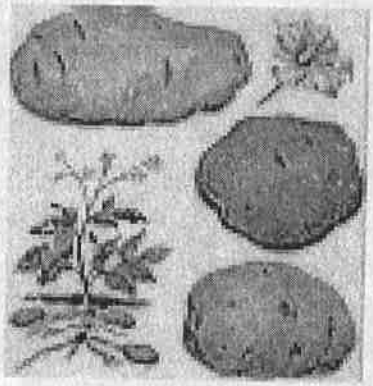
2006
RESEARCH REPORT

Extension Potato Disease Control Project



Robert Davidson
&
Andrew Houser

Colorado State University
SLV Research Center

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Southern Rocky Mountain Agricultural Conference (January 2007 version)

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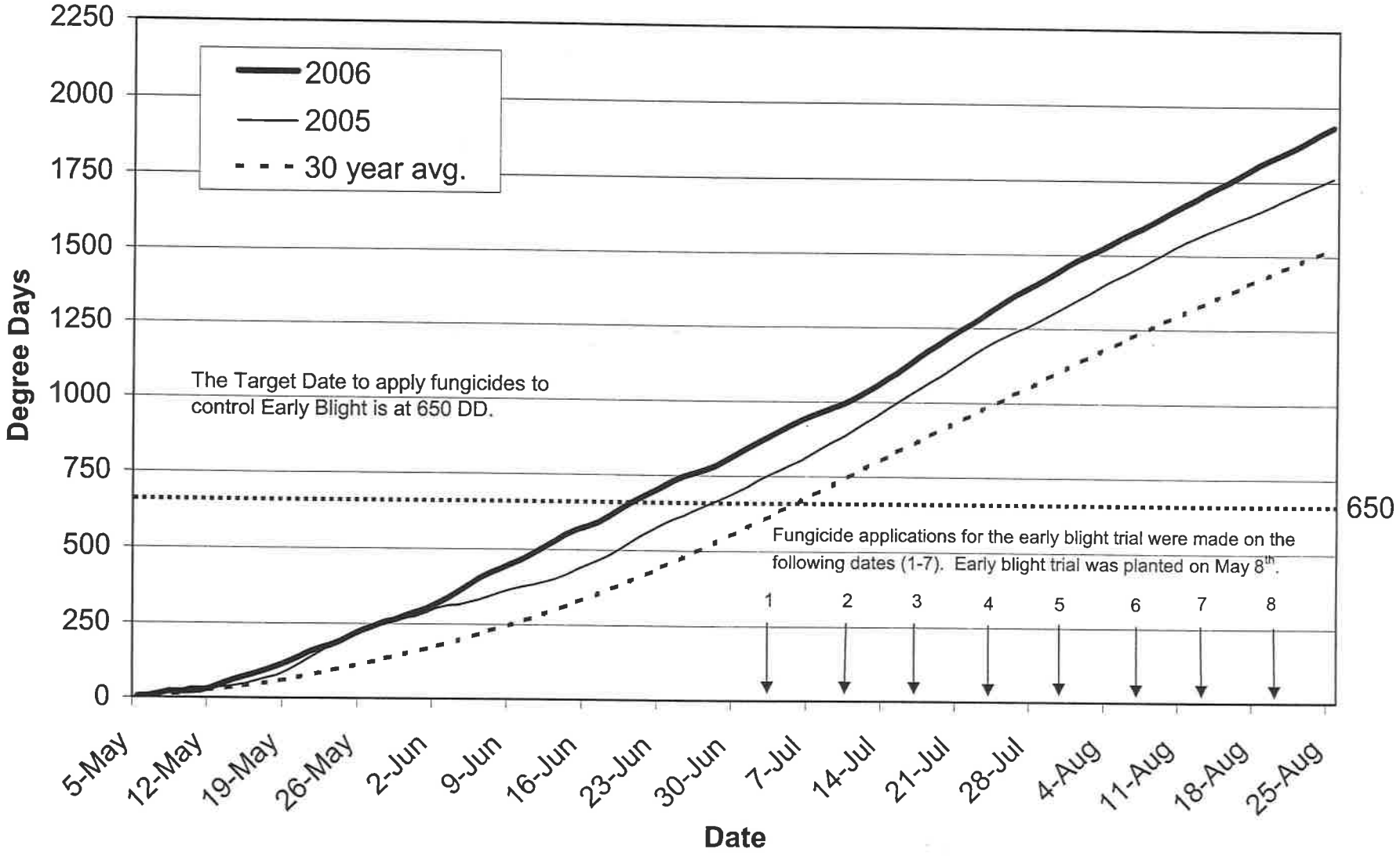


2006 POTATO - EARLY BLIGHT FUNGICIDE TRIAL #1

Researchers: Rob Davidson and Andrew Houser, Colorado State University, SLVRC

Location: San Luis Valley Research Center, Center, CO

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

Application: All treatments applied using an R & D CO_2 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 3; July 10; July 17; July 24; July 31; August 7; August 15; August 21

Planted: May 8, 2006

Plot Design: Randomized complete block

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

Plant Spacing: 12 inches

Row Spacing: 34 inches

Replications: Four

Irrigation: Solid set sprinkler, rate based on ET

Fertilizer: 80N-60P-40K-25S-2.5Z, preplant, 60N through sprinkler after tuber set

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

Insecticide: None

Vine Killer: Rotobeat vines on September 8, 2006

Harvested: September 25 & 26, 2006

DATA:

Disease: Early blight disease incidence based on percent leaves infected, readings taken weekly starting August 2, 2006. Due to high Early Blight incidence at the date of the last disease reading (August 24), a vigor reading was also taken (1-5, 1 = low vigor & 5 = high vigor).

AUDPC: **Area Under the Disease Progress Curve (AUDPC) is a measure of the progression of Early Blight, starting on August 2nd and ending with the last reading on August 24th. AUDPC gives a better idea of the total amount of Early Blight in a plot during this time period, rather than just looking at the weekly percent incidence. The total AUDPC for the control plot (1) indicates the total amount of Early Blight that was present if no fungicides were used to suppress disease. The other treatments should be compared with the control to determine the effectiveness at reducing the disease. AUDPC is based on total percent leaflets infected with Early Blight, with readings taken on a weekly basis.**

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

Grade: By hand, percent tubers by weight in kilograms < 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 2006.

Program	Products	Rate	Application Schedule[a]
1	Untreated Control		
2	Quadris	6.1 fl.oz./A	1,5
	Dithane Rainshield	2.0 lb./A	3
3	Quadris	6.1 fl.oz./A	2
	Bravo WS	1.5 pt./A	4
	Endura	2.5 oz./A	6
4	Proprietary	-	-
5	Reason	4.0 oz./A	5
	Bond	0.1% v/v	5
	Echo 720	1.0 pt./A	3,5,7
	Scala	7.0 oz./A	3,7
	Echo 720	1.5 pt./A	1
6	Scala	4.0 fl.oz./A	1,5
	Echo 720	1.0 lb./A	1,5
	Echo 720	1.5 pt./A	3,7
7	Echo 720	1.5 pt./A	1,3,5,7
8	Endura	2.5 oz./A	1
	Headline	6.1 fl.oz./A	4
9	Headline	6.1 fl.oz./A	1,5
	Endura	2.5 oz./A	3
	Dithane Rainshield	2.0 lb./A	7
10	Bravo WS	1.5 pt./A	1
	Quadris	6.1 fl.oz./A	3
	Dithane Rainshield	2.0 lb./A	5
11	Quadris	6.1 fl.oz./A	1
	Bravo WS	1.5 pt./A	3
	Endura	2.5 oz./A	5
	Dithane Rainshield	2.0 lb./A	7
12	Bravo WS	1.5 pt./A	4
	Quadris	6.1 fl.oz./A	5
	Dithane Rainshield	2.0 lb./A	6
13	Dithane Rainshield	2.0 lb./A	4,6
	Bravo WS	1.5 pt./A	5
14	Headline	6.1 fl.oz./A	4,7
	Endura	2.5 oz./A	5,8
	Dithane Rainshield	2.0 lb./A	6
15	Quadris	6.1 fl.oz./A	4,7
	Bravo WS	1.5 pt./A	5,8
	Dithane Rainshield	2.0 lb./A	6

[a] Schedule for applying treatments on a weekly basis, schedule started on July 5 (i.e. 1 = week 1, 2 = week 2).

Table 2. Effect of fungicide programs on the incidence of early blight in the cultivar Russet Norkotah Selection 8, San Luis Valley, Colorado, 2006; No Late Blight occurred within the trial.

	Percent Leaves Infected (with one or more lesion)					
Treatment	August 2	August 10	August 19	August 24	AUDPC[a]	Vigor[b]
1	5.2 a	95.1 a	100.0 a	100.0 a	1041.8 a	1.0 g
2	1.8 bc	70.8 bc	99.9 a	100.0 a	950.8 bc	1.5 fg
3	1.3 c	61.3 c	96.6 a	99.1 a	901.5 cde	2.8 abc
4	2.7 b	81.7 ab	100.0 a	100.0 a	990.5 ab	1.0 g
5	1.7 bc	58.8 cd	98.9 a	99.9 a	904.5 cde	2.0 def
6	1.2 c	55.8 cde	98.7 a	99.8 a	892.2 cde	2.0 def
7	1.5 c	62.5 c	99.3 a	99.9 a	918.5 bcd	1.8 ef
8	1.2 c	70.4 bc	99.9 a	100.0 a	948.2 bc	1.5 fg
9	1.2 c	38.4 efg	98.6 a	99.8 a	830.7 ef	2.0 def
10	1.7 bc	42.5 d-g	98.0 a	99.8 a	844.1 de	2.3 cde
11	1.2 c	35.2 fg	84.5 b	98.1 a	764.2 f	3.0 ab
12	1.7 bc	59.2 cd	94.9 a	99.4 a	890.2 cde	2.5 bcd
13	1.7 bc	54.6 cde	95.6 a	99.6 a	877.0 cde	2.3 cde
14	1.3 c	26.5 g	64.6 c	76.7 b	589.5 g	3.3 a
15	1.5 c	52.9 c-f	86.9 b	97.9 a	834.8 ef	2.8 abc
LSD(P=0.05)	1.01	18.54	5.42	6.29	76.69	0.63

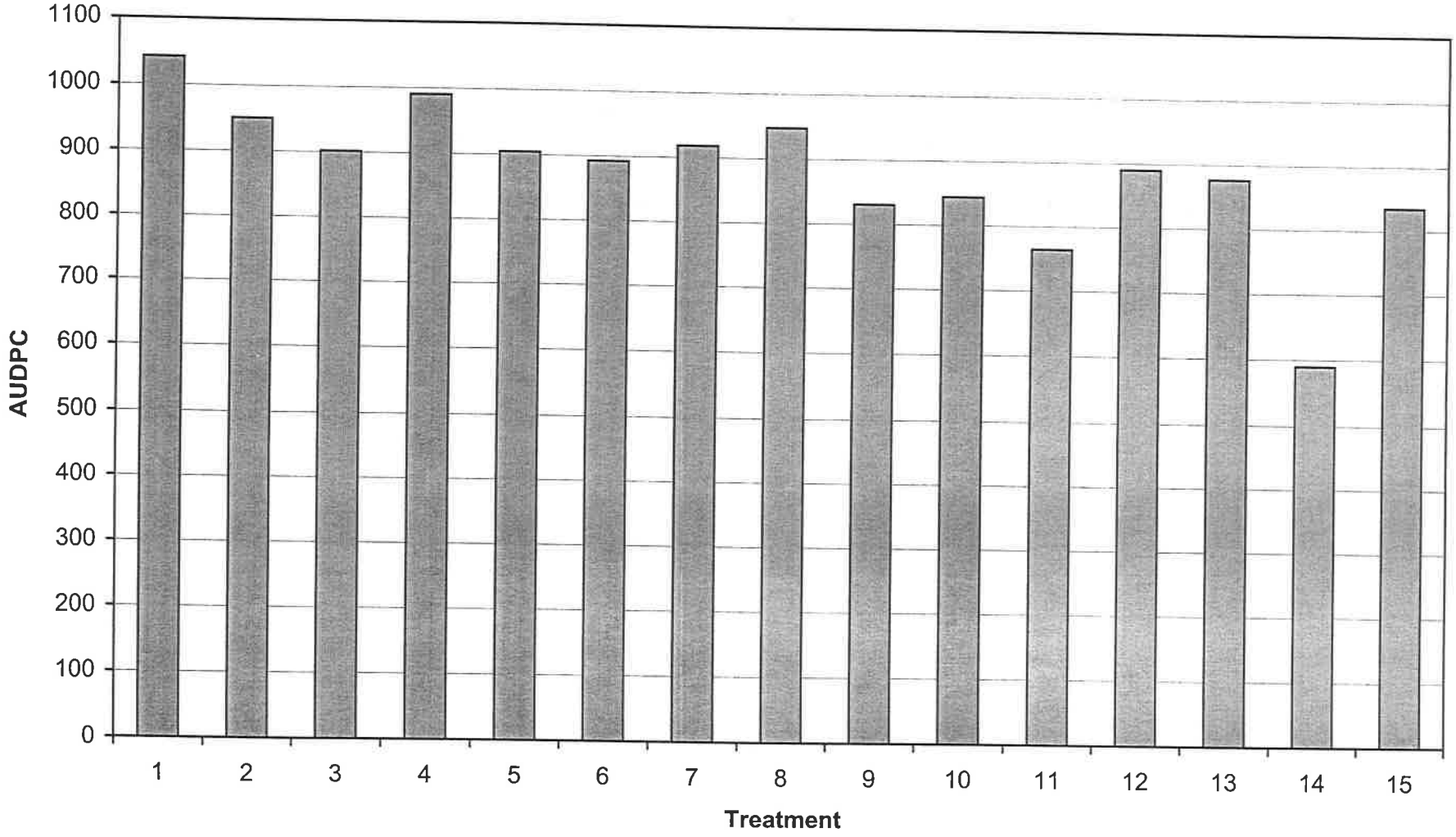
[a]AUDPC is the Area Under the Disease Progress Curve, accumulated from August 2 until August 24.
[b] Vigor readings were taken on August 24th with a rating of 1 to 5 (1 = poor and 5 = healthy).
Means followed by the same letters are not significantly different at P=0.05 for AUDPC.

Table 3. Effect of fungicide programs on tuber yield and quality in the cultivar Russet Norkotah Selection 8, San Luis Valley, Colorado, 2006.

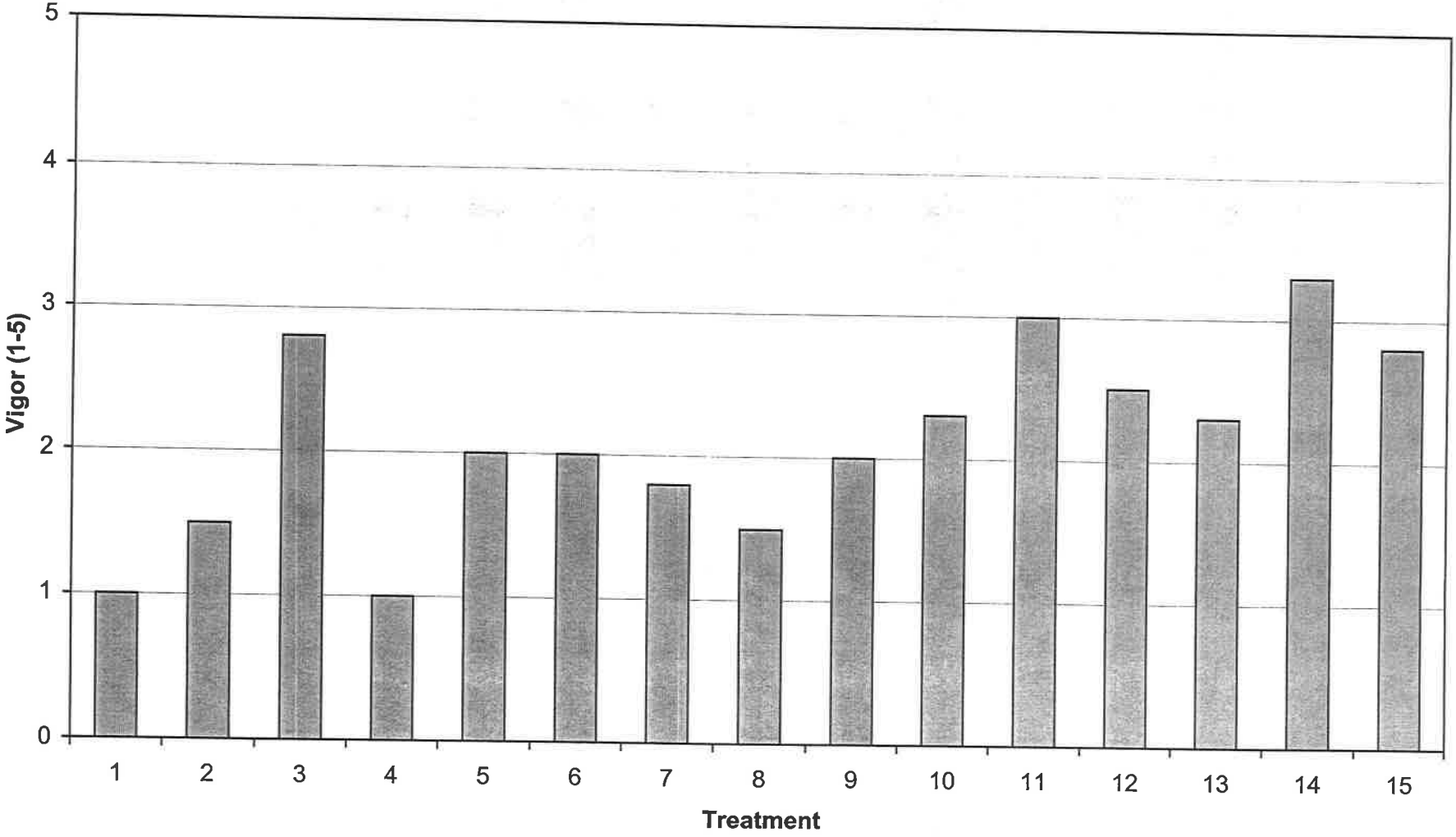
	Percent[a]					
Treatment	< 4 oz.	4-10 oz.	> 10 oz.	US No 2's	Culls	Cwt/A[b]
1	23.4	67.4 ab	5.6 d	0.0 b	3.5	319.3
2	23.0	69.0 ab	5.0 d	0.1 b	2.9	339.9
3	19.6	62.0 abc	16.1 b	0.0 b	2.3	375.6
4	22.3	70.1 a	4.2 d	0.4 b	3.1	364.2
5	18.4	70.0 a	8.6 cd	0.0 b	3.1	359.3
6	21.3	69.1 ab	5.0 d	0.1 b	4.4	331.8
7	22.2	69.2 ab	6.1 d	0.0 b	2.5	335.2
8	19.0	69.1 ab	8.4 cd	0.2 b	3.4	329.3
9	23.3	61.5 ab	10.3 bcd	0.0 b	4.9	338.0
10	21.0	63.5 abc	9.4 cd	0.6 b	5.6	338.0
11	20.0	69.3 ab	8.8 cd	0.0 b	1.9	345.8
12	19.8	64.2 ab	12.8 bc	0.3 b	3.0	380.5
13	23.8	65.0 ab	8.4 cd	0.4 b	2.3	334.1
14	17.4	55.2 c	22.6 a	1.3 a	3.7	362.5
15	21.3	68.9 ab	6.7 cd	0.3 b	2.9	345.4
LSD(P=0.05)	NS	8.44	6.40	0.63	NS	NS

[a] Based on tuber weight in kilograms, 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.

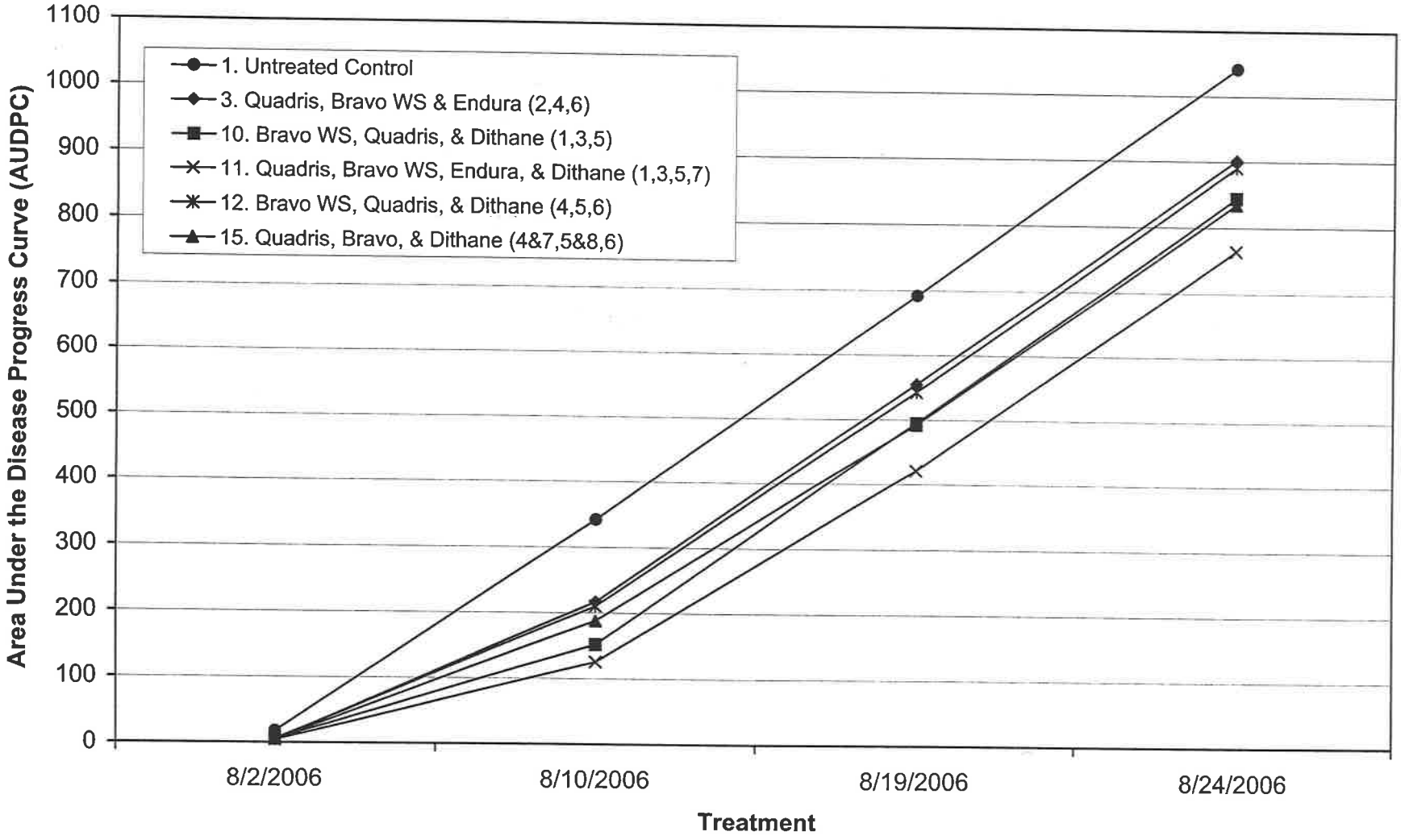
Area Under the Disease Progress Curve for Early Blight
2006 Foliar Fungicide Trial, Colorado State University
San Luis Valley Research Center, Center, CO
Total Amount of Accumulated Early Blight - Final Readings Taken on August 24, 2006



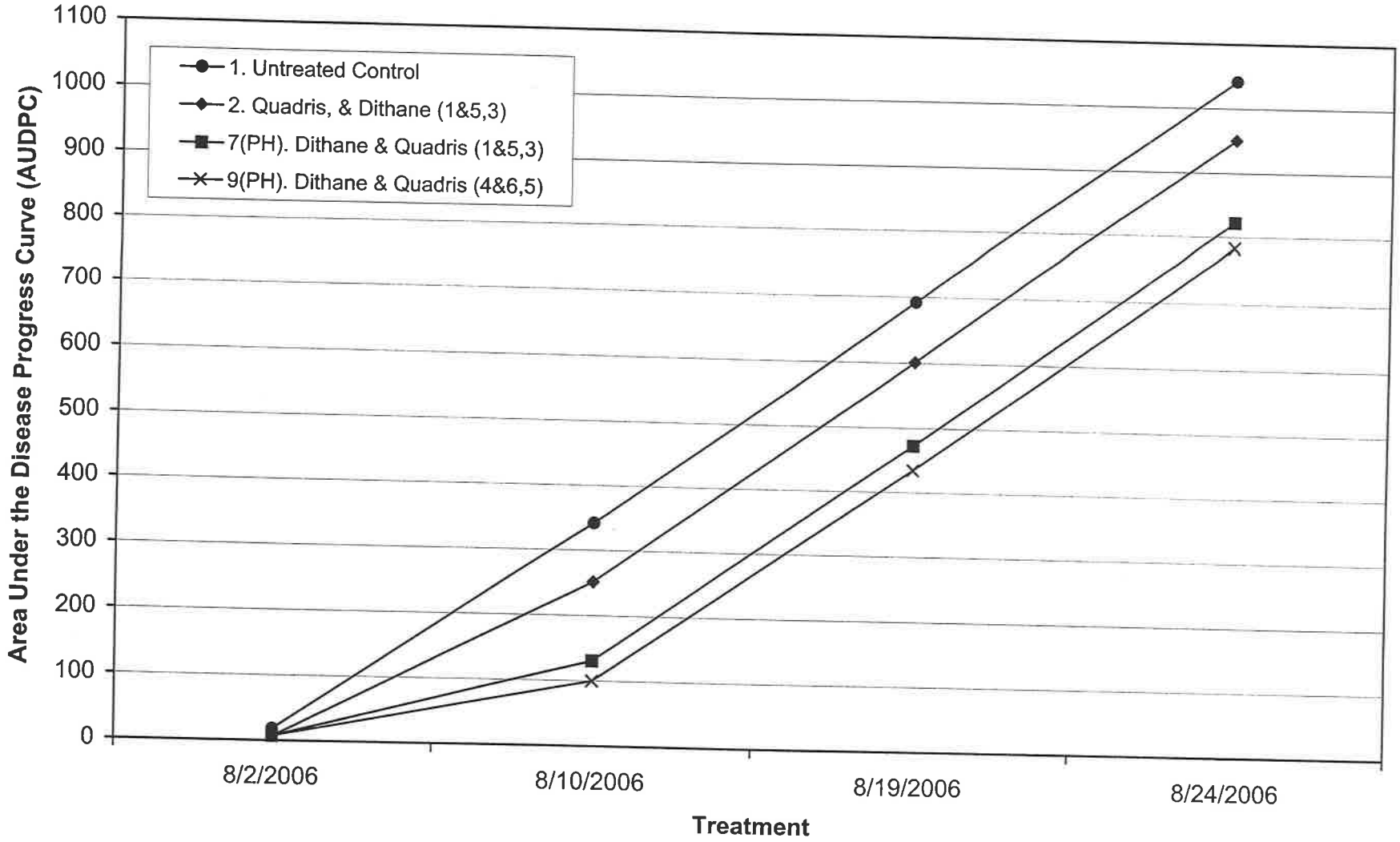
Plant Vigor Reading
2006 Early Blight Foliar Fungicide Trial
Colorado State University, San Luis Valley Research Center, Center, CO
Vigor Readings Taken on August 24, 2006



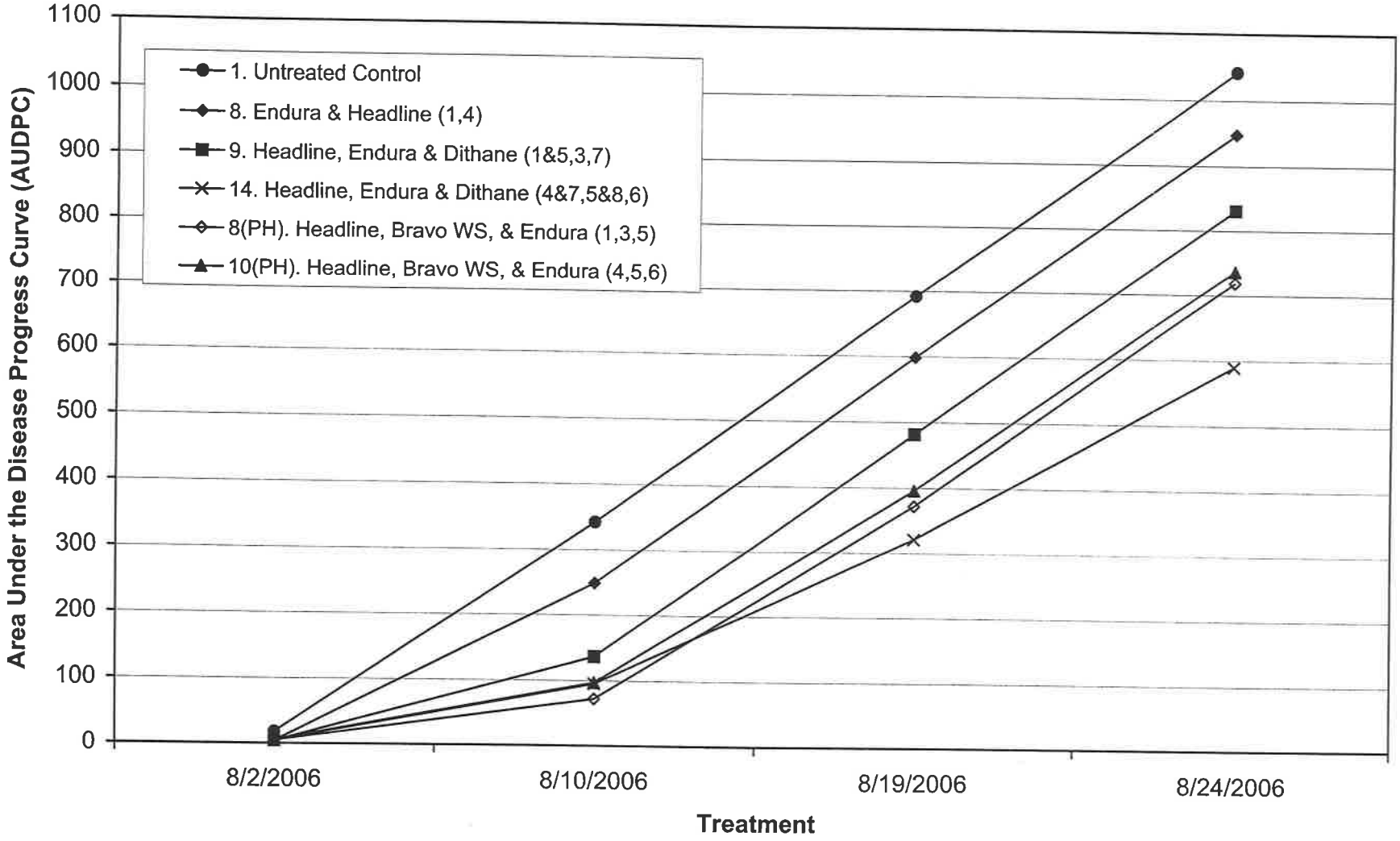
2006 Early Blight Post Harvest Fungicide Trial, Quadris/Bravo WS Treatments
Colorado State University
San Luis Valley Research Center, Center, CO



2006 Early Blight Post Harvest Fungicide Trial, Quadris/Dithane Treatments
Colorado State University
San Luis Valley Research Center, Center, CO



2006 Early Blight Post Harvest Fungicide Trial, Headline/Endura Treatments
Colorado State University
San Luis Valley Research Center, Center, CO



2006 POTATO - EARLY BLIGHT FUNGICIDE TRIAL #2

Researchers:	Rob Davidson and Andrew Houser, Colorado State University, SLVRC
Location:	San Luis Valley Research Center, Center, CO
Cultivar:	Russet Norkotah Selection 8 and Keystone Russet, cut seed, 2-4 oz.
Application:	All treatments applied using an R & D CO_2 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 3; July 10; July 17; July 24; July 31; August 7; August 15; August 21
Planted:	May 8, 2006
Plot Design:	Randomized complete block
Plot Size:	4 - 20 foot rows per treatment per replication, treatments applied to center two rows and data was taken on center two rows.
Plant Spacing:	12 inches
Row Spacing:	34 inches
Replications:	Four
Irrigation:	Solid set sprinkler, rate based on ET
Fertilizer:	80N-60P-40K-25S-2.5Z, preplant, 60N through sprinkler after tuber set
Herbicide:	Matrix, 1.5 oz./A + Eptam, 4.5 pt./A
Insecticide:	None
Vine Killer:	Rotobeat vines on September 8, 2006
Harvested:	September 25 & 26, 2006

DATA:

Disease: Early blight disease incidence based on percent leaves infected, readings taken weekly starting August 2, 2006. Due to high Early Blight incidence at the date of the last disease reading (August 24), a vigor reading was also taken (1-5, 1 = low vigor & 5 = high vigor).

AUDPC: **Area Under the Disease Progress Curve (AUDPC) is a measure of the progression of Early Blight, starting on August 2nd and ending with the last reading on August 24th. AUDPC gives a better idea of the total amount of Early Blight in a plot during this time period, rather than just looking at the weekly percent incidence. The total AUDPC for the control plot (#1 for Keystone treatments and # 6 for Norkotah treatments) indicates the total amount of Early Blight that was present if no fungicides were used to suppress disease. The other treatments should be compared with the control to determine the effectiveness at reducing the disease. AUDPC is based on total percent leaflets infected with Early Blight, with readings taken on a weekly basis.**

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

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

Table 1. Fungicide programs evaluated for foliar and post harvest early blight control, San Luis Valley, Colorado 2006.

Program [a]	Products	Rate	Application Schedule [b]
1 (K)	Untreated Control		
2 (K)	Dithane Rainshield Quadris	2.0 lb./A 6.1 fl.oz./A	1,5 3
3 (K)	Headline Bravo WS Endura	6.1 fl.oz./A 1.5 pt./A 2.5 oz./A	1 3 5
4 (K)	Dithane Rainshield Quadris	2.0 lb./A 6.1 fl.oz./A	4,6 5
5 (K)	Headline Bravo WS Endura	6.1 fl.oz./A 1.5 pt./A 2.5 oz./A	4 5 6
6 (N)	Untreated Control		
7 (N)	Dithane Rainshield Quadris	2.0 lb./A 6.1 fl.oz./A	1,5 3
8 (N)	Headline Bravo WS Endura	6.1 fl.oz./A 1.5 pt./A 2.5 oz./A	1 3 5
9 (N)	Dithane Rainshield Quadris	2.0 lb./A 6.1 fl.oz./A	4,6 5
10 (N)	Headline Bravo WS Endura	6.1 fl.oz./A 1.5 pt./A 2.5 oz./A	4 5 6

[a] Treatments 1 through 5 were planted with the cultivar Keystone Russet. Treatments 6 through 10 were planted with the cultivar Russet Norkotah selection 8.

[b] Schedule for applying treatments on a weekly basis, schedule started on July 5 (i.e. 1 = week 1, 2 = week 2).

Table 2. Effect of fungicide programs on the incidence of early blight in the cultivars Keystone Russet (treatments 1-5) and Russet Norkotah Selection 8 (treatments 6-10), San Luis Valley, Colorado, 2006; No Late Blight occurred within the trial.

	Percent Leaves Infected (with one or more lesion)					
Treatment	August 2	August 10	August 19	August 24	AUDPC[a]	Vigor[b]
1	3.2	55.4 b	99.9 a	100.0 a	899.2 b	3.3 bc
2	1.3	13.5 ef	92.3 ab	98.0 a	715.5 e	3.5 abc
3	1.0	9.5 f	55.8 d	92.2 c	553.0 g	4.0 a
4	2.0	15.0 ef	85.4 bc	98.3 a	698.8 ef	3.8 ab
5	1.7	15.4 ef	75.8 c	94.8 bc	653.9 f	4.0 a
6	2.8	83.8 a	100.0 a	100.0 a	998.1 a	1.3 f
7	2.0	36.2 c	97.7 a	99.8 a	821.6 c	2.3 e
8	1.3	19.9 de	85.7 bc	99.1 a	718.7 e	3.0 cd
9	2.0	27.5 cd	95.5 ab	99.8 a	783.1 cd	2.5 de
10	1.7	26.8 cd	85.4 bc	97.3 ab	736.5 de	3.0 cd
LSD(P=0.05)	NS	9.89	10.36	2.79	58.46	0.55

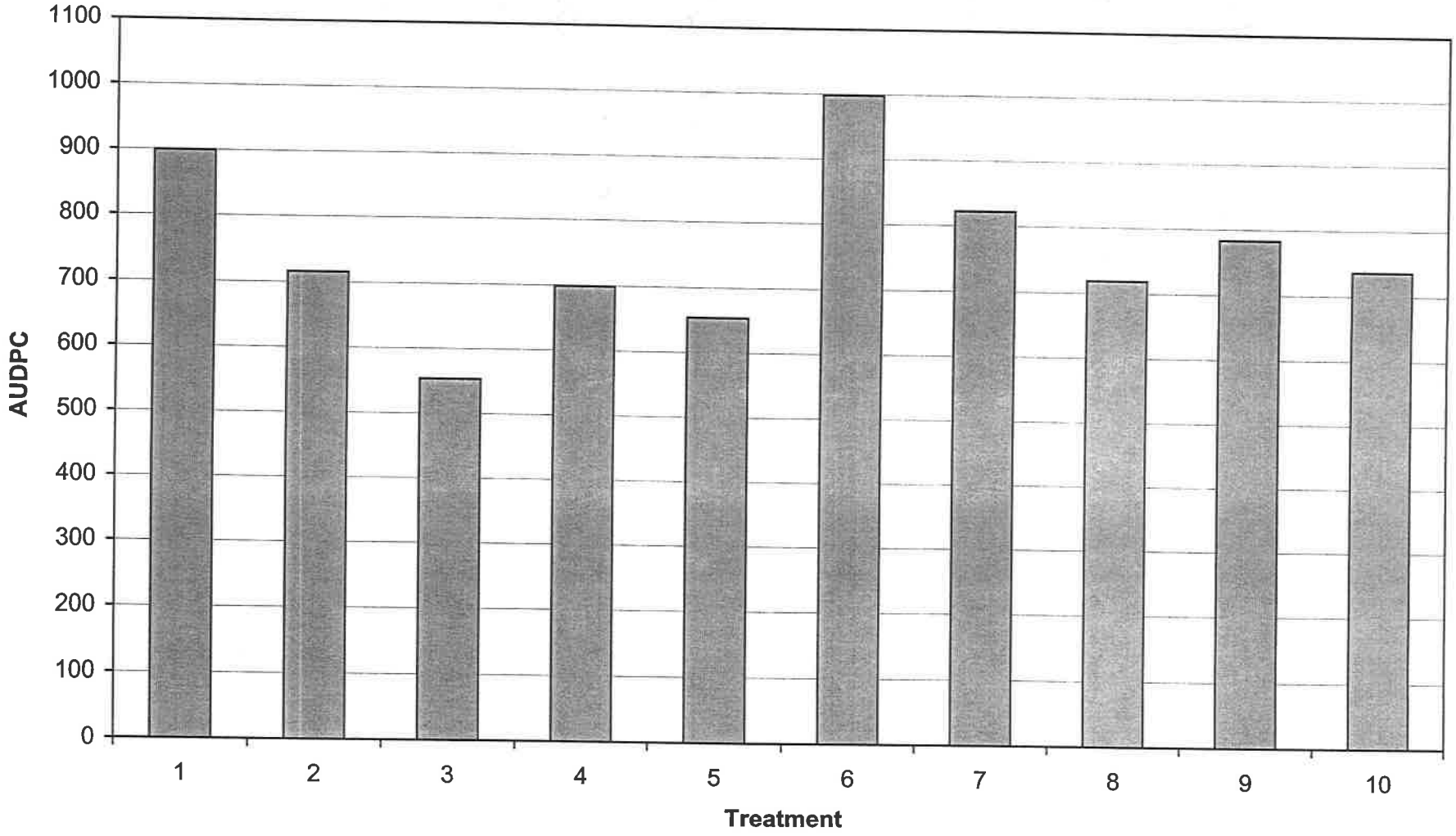
[a]AUDPC is the Area Under the Disease Progress Curve, accumulated from August 2 until August 24.
[b] Vigor readings were taken on August 24th with a rating of 1 to 5 (1 = poor and 5 = healthy).
Means followed by the same letters are not significantly different at P=0.05 for AUDPC.

Table 3. Effect of fungicide programs on tuber yield and quality in the cultivars Keystone Russet (treatments 1-5) and Russet Norkotah Selection 8 (treatments 6-10), San Luis Valley, Colorado, 2006.

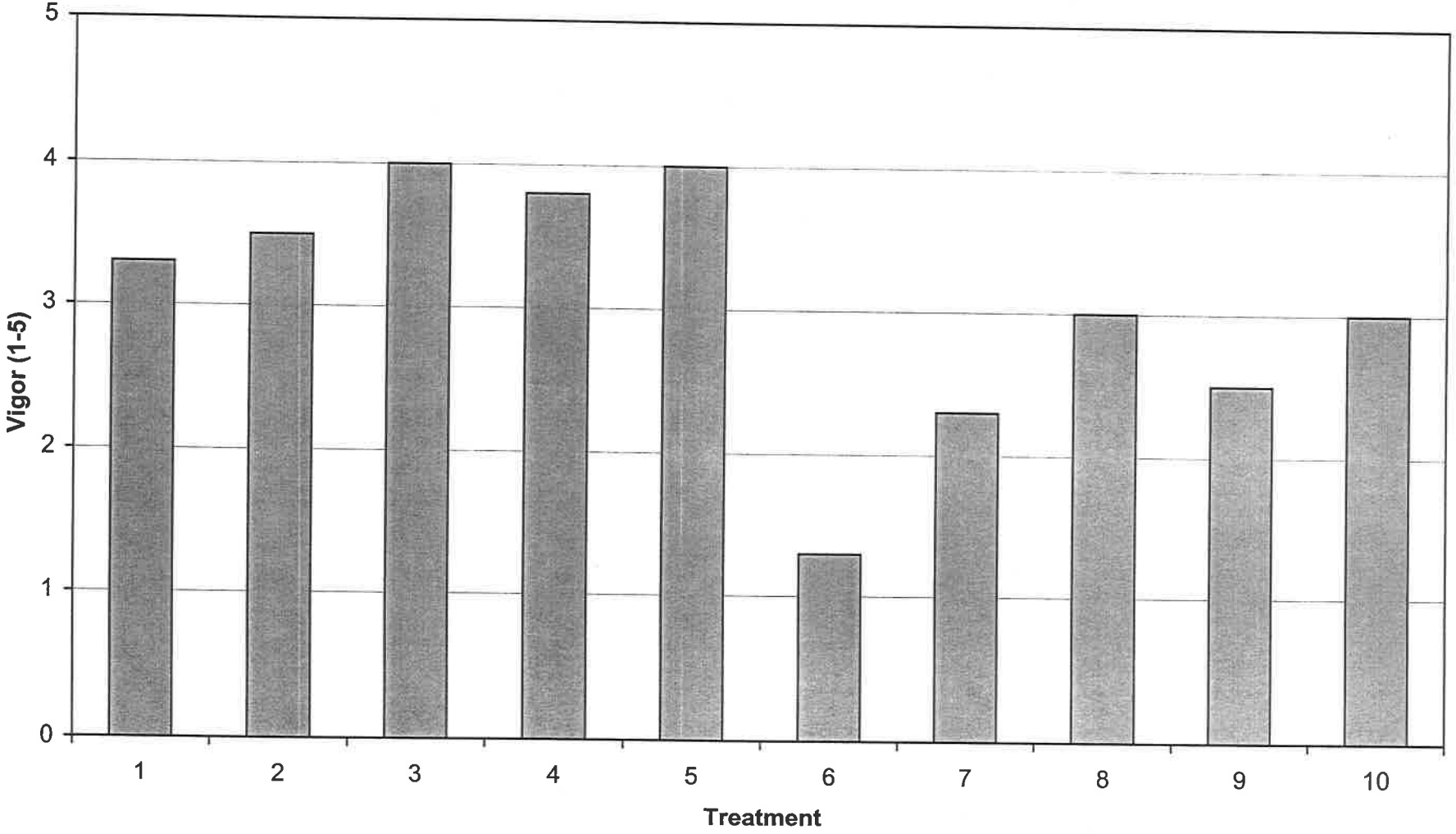
	Percent[a]					
Treatment	< 4 oz.	4-10 oz.	> 10 oz.	US No 2's	Culls	Cwt/A[b]
1	13.9	74.3	10.7	0.1	0.9	401.1 ab
2	17.1	74.3	7.5	0.0	1.1	384.3 bc
3	14.5	74.9	8.8	0.1	1.8	398.5 ab
4	17.1	71.3	10.2	0.0	1.4	430.3 a
5	14.3	71.1	13.3	0.2	1.2	429.6 a
6	17.7	68.6	11.0	0.0	2.7	353.4 c
7	14.1	74.5	9.9	0.0	1.5	361.5 bc
8	13.8	67.9	16.0	0.0	2.3	367.6 bc
9	14.3	72.7	10.2	0.0	2.8	376.3 bc
10	13.4	70.3	13.6	0.2	2.5	367.0 bc
LSD(P=0.05)	NS	NS	NS	NS	NS	44.36

[a] Based on tuber weight in kilograms, 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.

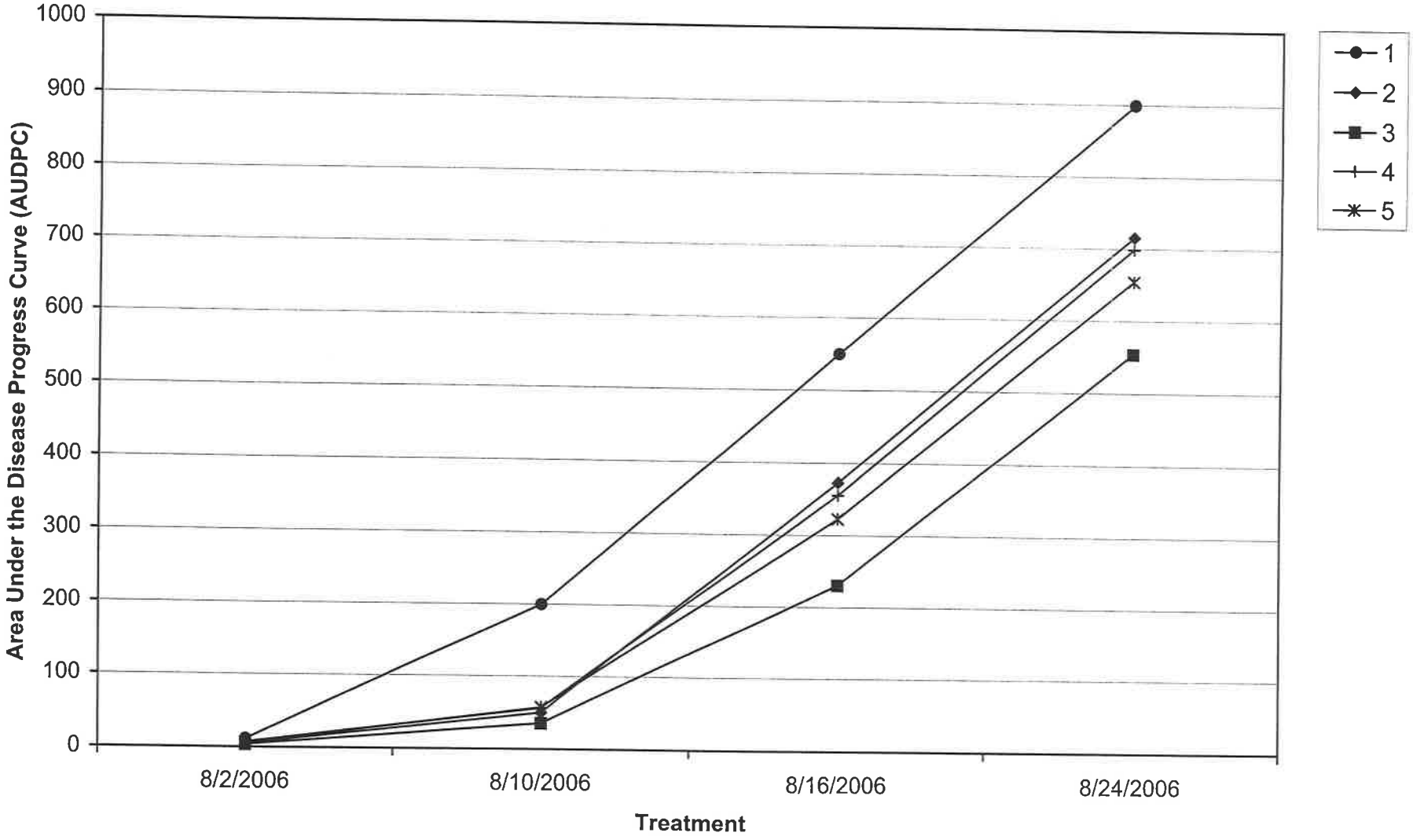
Area Under the Disease Progress Curve for Early Blight
2006 Post Harvest Early Blight Fungicide Trial, Colorado State University
San Luis Valley Research Center, Center, CO
Total Amount of Accumulated Early Blight - Final Readings Taken August 24, 2006



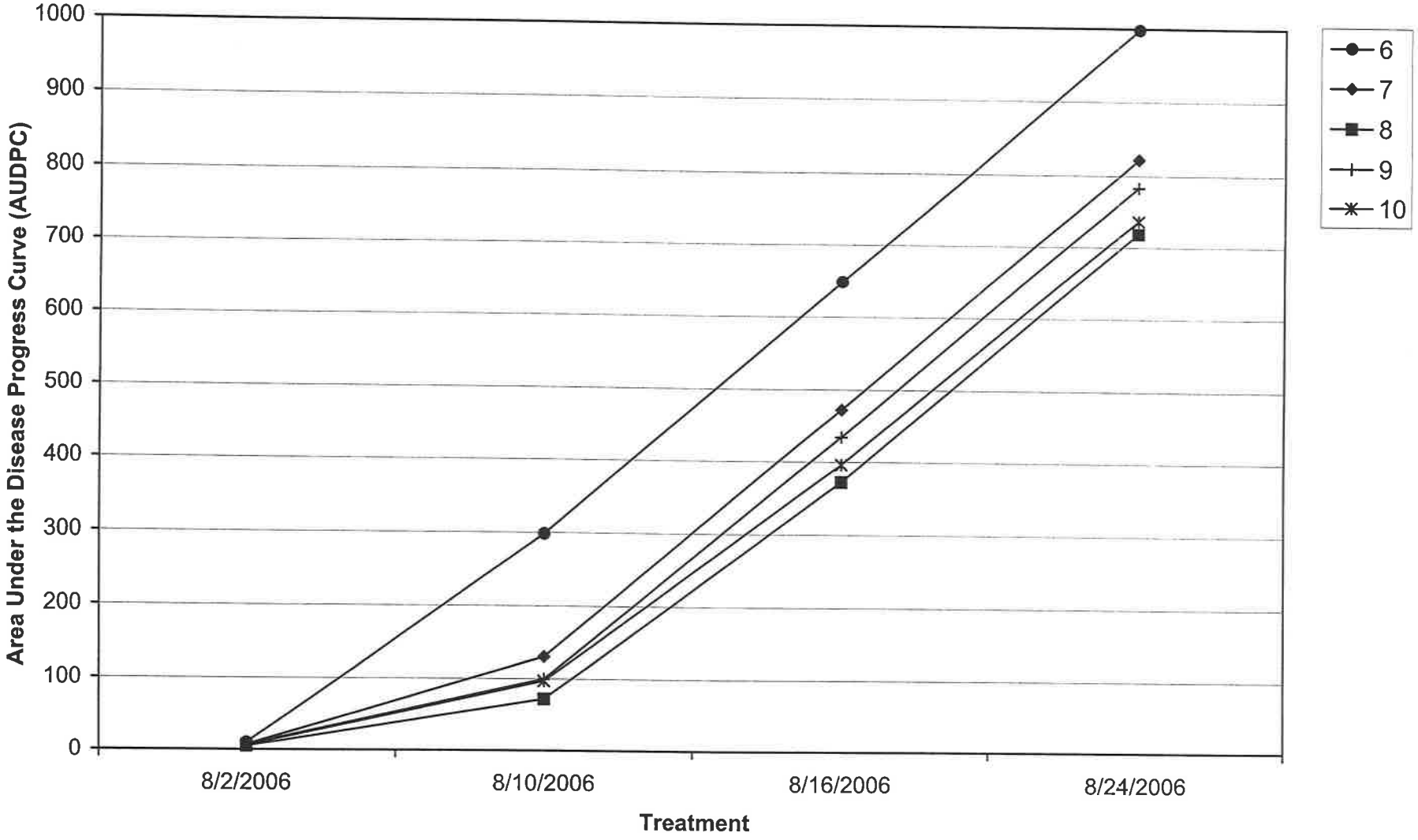
Plant Vigor Reading
2006 Post Harvest Early Blight Fungicide Trial
Colorado State University, San Luis Valley Research Center, Center, CO
Vigor Readings Taken on August 24, 2006



2006 Early Blight Post Harvest Fungicide Trial, Keystone Treatments
Colorado State University
San Luis Valley Research Center, Center, CO

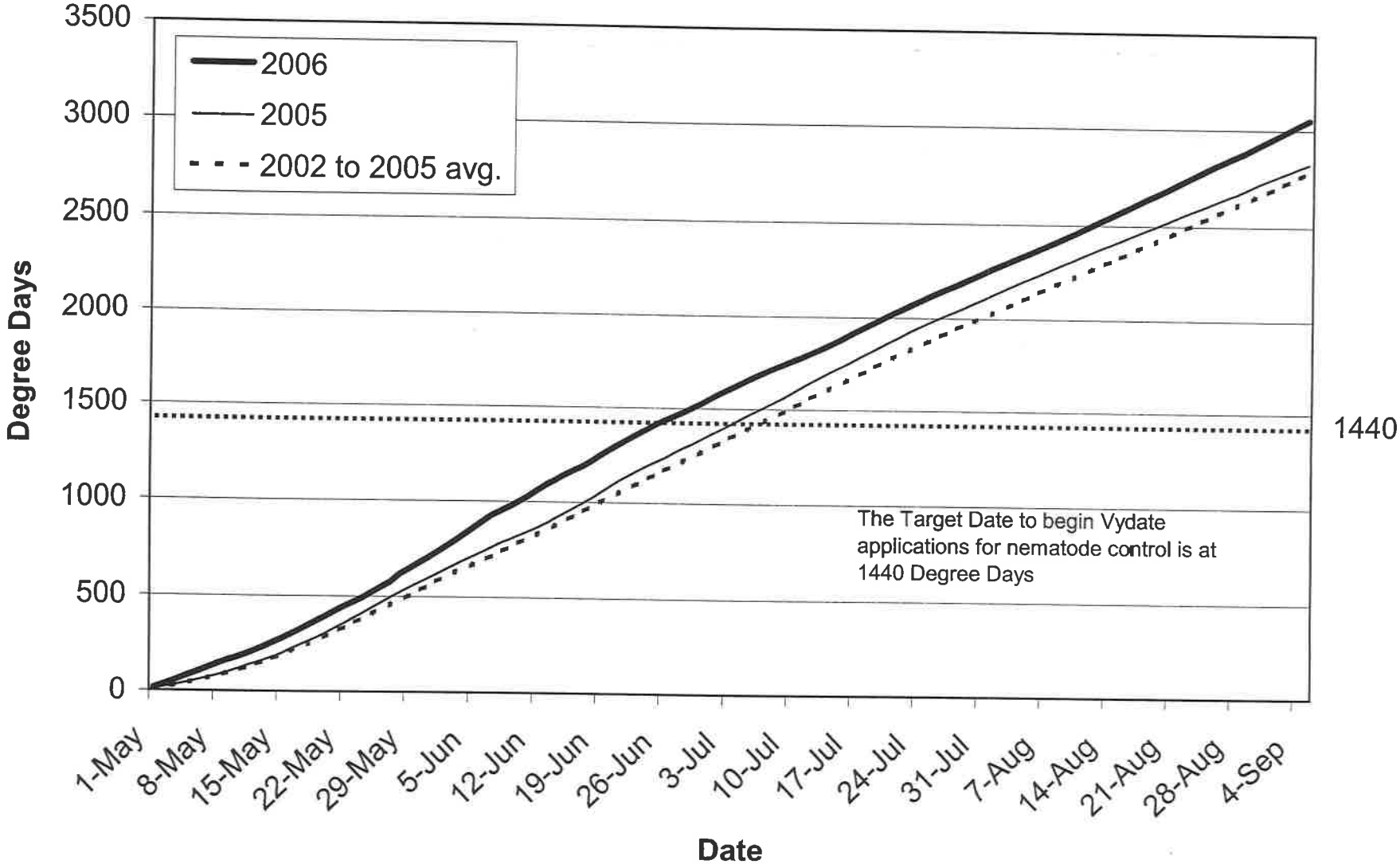


2006 Early Blight Post Harvest Fungicide Trial, Russet Norkotah Sel. 8 Treatments
Colorado State University
San Luis Valley Research Center, Center, CO



Root Knot Nematode Degree Days

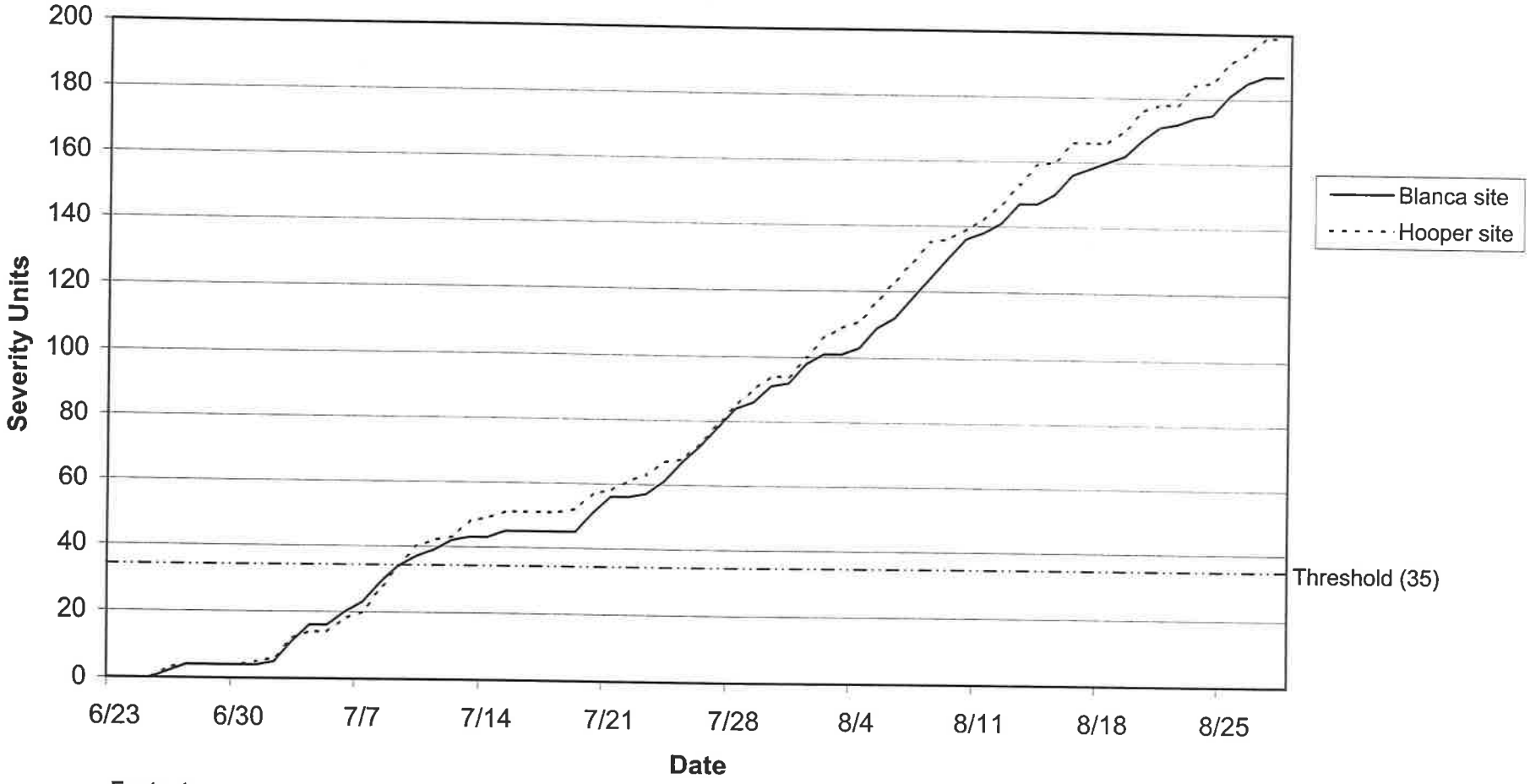
Root Knot Nematode Degree Days for the San Luis Valley



SLV Late Blight Forecasting Data

Potato Late Blight Fry Units, San Luis Valley, Colorado, 2006

Moderate Susceptible Varieties

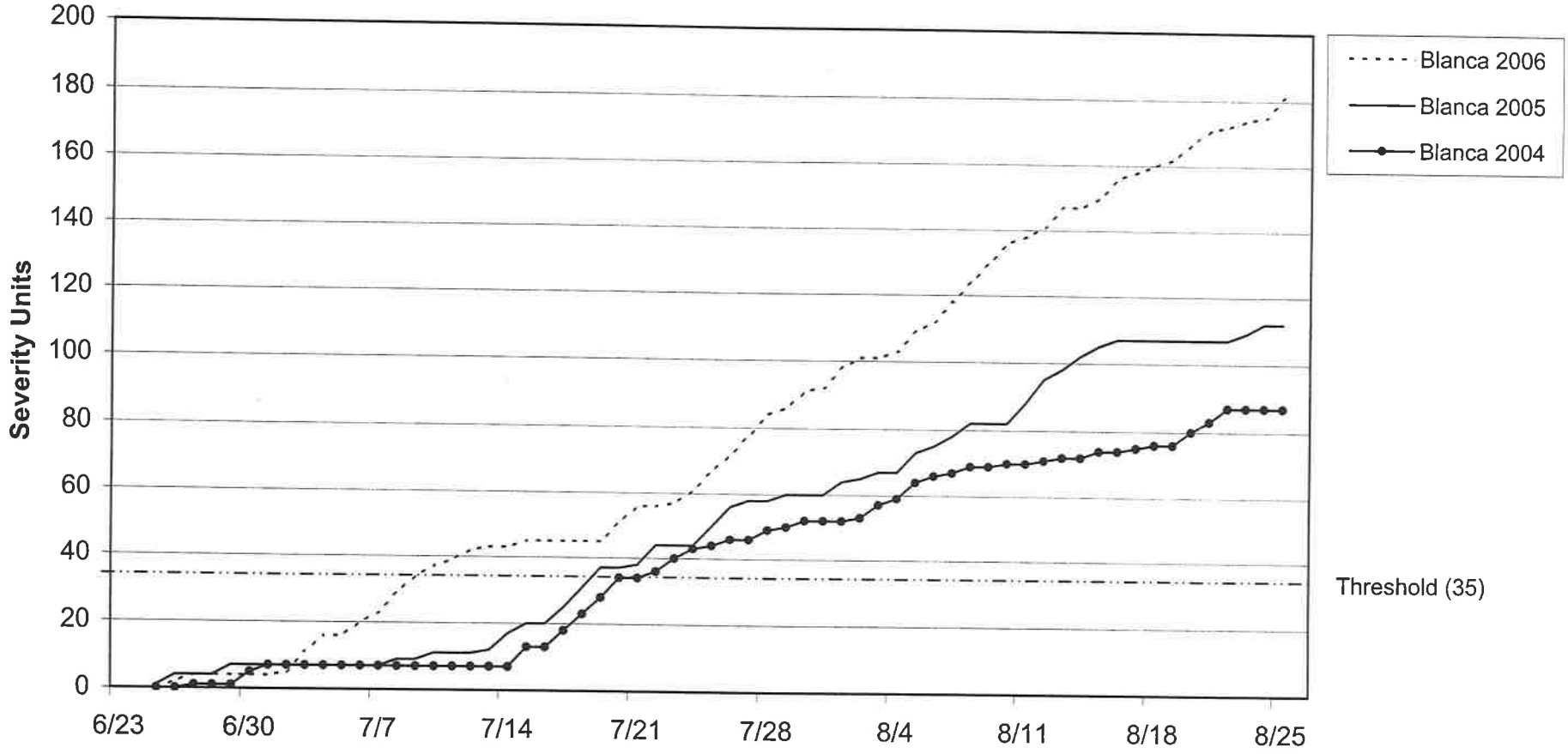


Footnote:

- The Fry Late Blight model was used to calculate the severity units.
- The Hooper weather station was set up on June 14, 2006.
- The Blanca weather station was set up on June 23, 2006.

Potato Late Blight Fry Units, San Luis Valley (Blanca site), Colorado, 2004 - 2006

Moderate Susceptible Varieties

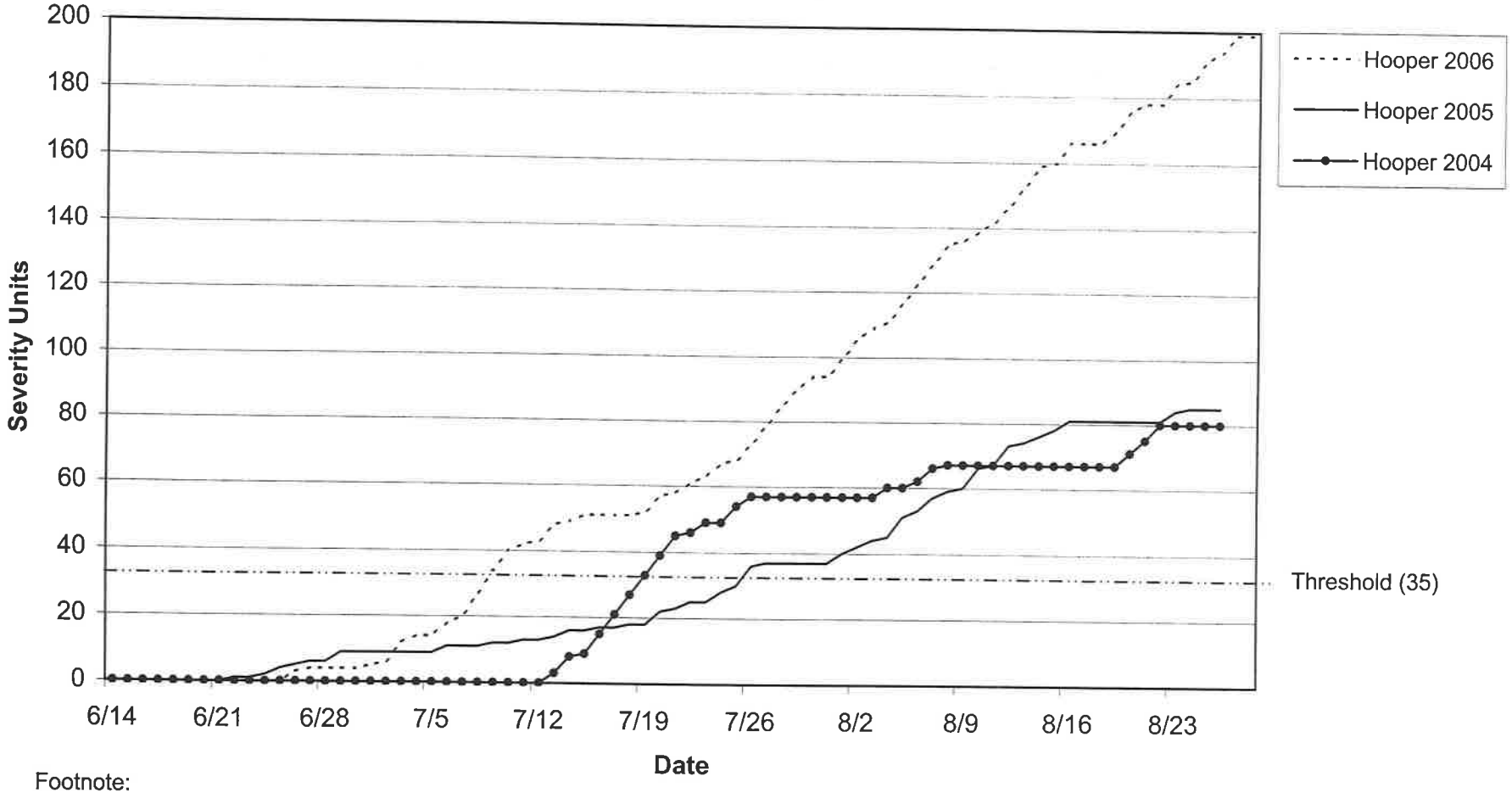


Footnote:

- The Fry Late Blight model was used to calculate the severity units.
- The 2006 Blanca weather station was set up on June 23, 2006.
- The 2005 Blanca weather station was set up on June 17, 2005.
- The 2004 Blanca weather station was set up on June 25, 2004.

Potato Late Blight Fry Units, San Luis Valley (Hooper site), Colorado, 2004 - 2006

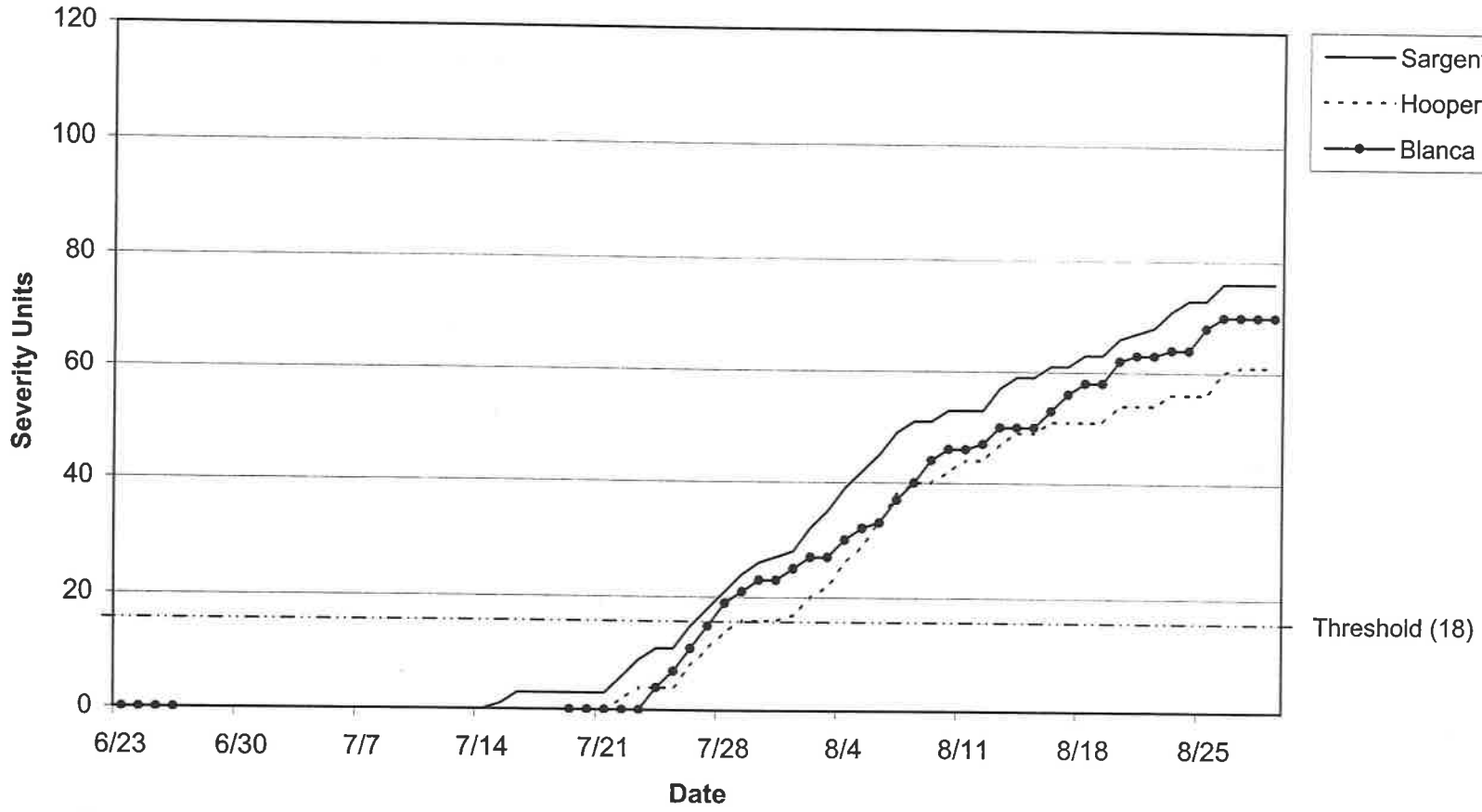
Moderate Susceptible Varieties



Footnote:

- The Fry Late Blight model was used to calculate the severity units.
- The 2006 Hooper weather station was set up on June 14, 2006.
- The 2005 Hooper weather station was set up on June 8, 2005.
- The 2004 Hooper weather station was set up on June 14, 2004.

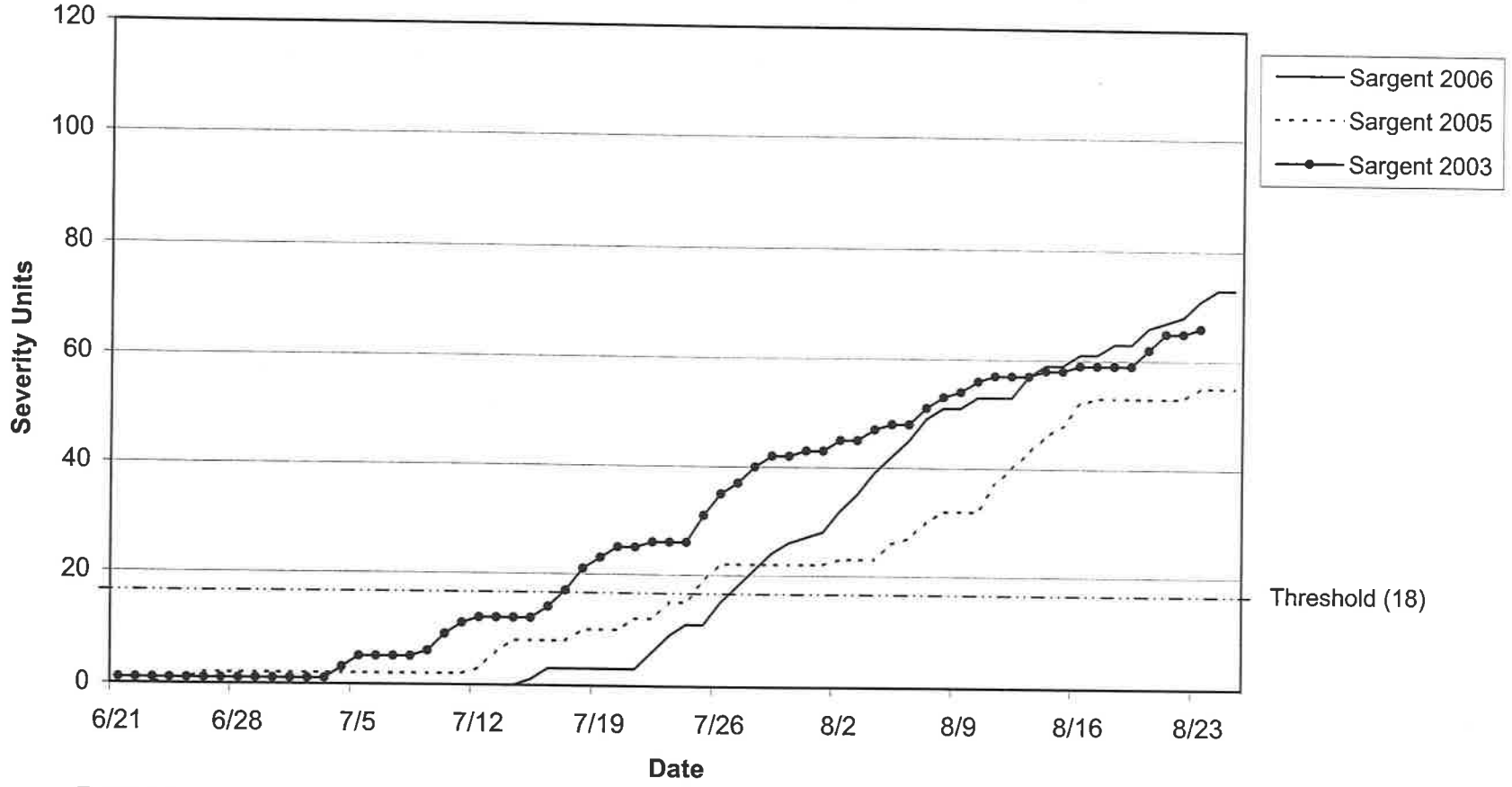
Potato Late Blight Severity Values - Wallin Model, San Luis Valley, Colorado, 2006



Footnote:

- The Sargent weather station was set up on June 21, 2006. There is missing data from June 24th through July 13th.
- The Hooper weather station was set up on June 14, 2006. There is missing data from June 16th through July 18th.
- The Blanca weather station was set up on June 23, 2006. There is missing data from June 27th through July 18th.

Potato Late Blight Severity Values - Wallin Model, San Luis Valley, Sargent site, Colorado (2003, 2005, 2006)



Footnote:

- The Sargent 2006 weather station was set up on June 21, 2006. There is missing data from June 24th through July 13th. Due to the missing data, the 2006 severity units may be higher than what was recorded.
- The Sargent 2005 weather station was set up on June 8, 2005.
- The Sargent 2003 weather station was set up on June 11, 2003.

Pink Rot Trials

EVALUATION OF FUNGICIDES FOR CONTROL OF PINK ROT ON POTATO, 2006

Researchers: Rob Davidson and Andrew Houser, Colorado State University, SLVRC

Location: Off-station trial, San Luis Valley, Center, CO

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

Objective: To evaluate the efficacy of various fungicides in controlling pink rot in potato.

Application: In-Furrow treatments were applied using an R & D CO_2 charged backpack sprayer at 35 PSI, with one XR 8002VS nozzle, at 10 gallons/acre as a directed in-furrow application. Foliar treatments were applied using an R & D CO_2 charged backpack sprayer at 35 PSI, with two XR 8002VS nozzles, at 20 gallons/acre (Treatments applied At Hilling were made with one nozzle at 10 gallons per acre).

Treatments:

1. Control, no treatment
2. Ranman @ 0.42 floz./1000 row ft., At Planting (AP)
3. Ranman @ 0.31 floz./1000 row ft. (AP)
4. Ranman @ 0.31 floz./1000 row ft. (AP) & Phostrol @ 8.0 pt./A (AP)
5. Ranman @ 0.42 floz./1000 row ft.(AP) & Ranman @ 2.75 floz./A + Silwet @ 2.0 floz./A, At Hilling (AH)
6. Ranman @ 0.31 floz./1000 row ft. (AP) & Ranman @ 2.75 floz./A + Silwet @ 2.0 floz./A (AH)
7. Ranman @ 0.31 floz./1000 row ft. + Phostrol @ 8.0 pt./A (AP) & Ranman @ 2.75 floz./A + Silwet @ 2.0 floz./A (AH)
8. Ridomil Gold @ 0.42 floz./1000 row ft. (AP)
9. Proprietary
10. Proprietary
11. Proprietary
12. Proprietary
13. Beyond @ 16 floz./A (AP) & Beyond @ 10 ml/gal water, Tuber Initiation (TI)
14. New Earth Biological @ 8 gal./A (AP)

Planted: May 19, 2006
Plot Design: Randomized complete block
Plot Size: 2 - 20 foot rows per treatment per replication
Plant Spacing: 12 inches
Row Spacing: 34 inches
Replications: four
Irrigation: Center pivot irrigation system, rate based on ET
Fertilizer: Unavailable
Herbicide: Unavailable
Insecticide: Unavailable
Vine Killer: Applied Reglone on August 19, 2006
Harvested: September 12, 2006

DATA

Disease: Mean percent of tubers with pink rot at harvest multiplied by disease severity rating of 1-5 (1 = less than 5% rotten, 5 = 100 % rotten) per treatment per replication.
Yield: 2-20 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. Effect of applied products, for control of pink rot, on tuber yield and quality in the cultivar Russet Norkotah Selection 8, San Luis Valley, Colorado, 2006.

Program	Treatment		Percent[b]							
	Product/Rate	Application Schedule[a]	< 4 oz.	4-10 oz.	> 10 oz.	US #2's	Culls	cwt/A[c]	% rot[d]	% rot x severity[e]
1	Untreated Control	-	29.4	48.5	21.5	0.0 d	0.6	301.3	0.86	3.93
*2	Ranman @ 0.42 floz./1000 row ft.	AP	28.3	54.2	14.6	2.1 a	0.8	320.2	0.18	0.88
3	Ranman @ 0.31 floz./1000 row ft.	AP	25.4	58.3	14.8	0.4 cd	1.1	300.5	0.15	0.75
4	Ranman @ 0.31 floz./1000 row ft. Phostrol @ 8.0 pt./A	AP AP	28.2	48.6	20.5	2.0 ab	0.7	329.5	0.34	1.67
*5	Ranman @ 0.42 floz./1000 row ft. Ranman @ 2.75 floz./A Silwet @ 2.0 floz./A	AP AH AH	28.9	53.5	15.3	0.6 a-d	1.6	300.1	0.00	0.00
6	Ranman @ 0.31 floz./1000 row ft. Ranman @ 2.75 floz./A Silwet @ 2.0 floz./A	AP AH AH	31.0	49.1	17.1	0.5 a-d	2.3	314.2	0.41	2.05
7	Ranman @ 0.31 floz./1000 row ft. Phostrol @ 8.0 pt./A Ranman @ 2.75 floz./A Silwet @ 2.0 floz./A	AP AP AH AH	25.8	52.0	19.8	0.0 d	2.4	312.8	0.14	0.69
8	Ridomil Gold @ 0.42 floz./1000 row ft.	AP	25.8	52.6	18.6	1.0 a-d	2.1	332.5	0.95	4.00
*9	Proprietary	-	23.1	53.9	21.1	0.3 cd	1.7	304.1	0.29	1.43
10	Proprietary	-	26.5	52.5	19.1	0.0 d	1.8	308.3	0.20	0.93
11	Proprietary	-	27.8	55.0	14.4	0.0 d	2.8	312.1	0.82	3.84
12	Proprietary	-	24.4	52.0	20.1	2.1 a	1.4	333.5	0.53	2.56
13	Beyond @ 16 floz./A, 10 ml./gal. water	AP, TI (July 21, 2006)	28.4	47.6	22.1	0.4 bcd	1.5	297.5	0.77	3.87
14	New Earth Biological @ 8 gal./A	AP	23.5	51.5	22.3	1.7 abc	1.2	327.0	0.74	2.95
LSD(P=0.05)			NS	NS	NS	1.59	NS	NS	NS	NS

* Treatments in replicated block #3 were not included in analysis due to inconsistencies in plot size.

[a] Application Schedule Abbreviations (AP = At Planting on May 19, 2006; AH = At Hilling on June 21, 2006; TI = Tuber Initiation on July 12 & 21, 2006).

[b] Based on tuber weight in pounds, mean of four replications.

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

[d] Mean percent of tubers with pink rot at harvest per treatment per replication.

[e] Mean percent of tubers with pink rot at harvest multiplied by disease severity from 1 to 5(1 = less than 5% rotten, 5 = 100 % rotten).

Several infected tubers were lost in the field (especially in the untreated control) due to pink rot severity and were not detected at harvest. This does have an affect on "% rot" and "% rot x severity" which may explain the non-significant results in these categories.

Powdery Scab Trials

2006 EVALUATION OF FUNGICIDES APPLIED AT PLANTING FOR CONTROL OF POWDERY SCAB ON POTATO

Researchers: Robert Davidson and Andrew Houser, Colorado State University

Location: Off-station trial, San Luis Valley, CO

Cultivar: Cherry Red, cut seed, 2-4 oz.

Objective: To evaluate the efficacy of various fungicide treatments in controlling powdery scab on potato.

Application: In-furrow treatments were applied using an R & D CO_2 charged backpack sprayer mounted to a potato planter at 35 PSI, with one XR 8002VS nozzle directed to spray the soil as it covered the seed piece (55% mix) and one 8015VS nozzle directed over seed piece (45% mix), at 10 gal./A. On-seed treatments were applied directly to whole seed and planted within 24 hours.

Treatments:

1. Control, no treatment
2. Maxim @ 0.08 floz./cwt, On Seed
3. Omega @ 1.5 pt./A (one nozzle directed over seed), At Planting
4. Omega @ 3.0 pt./A (one nozzle directed over seed), At Planting
5. Omega @ 1.5 pt./A (two nozzles), At Planting
6. Omega @ 3.0 pt./A (two nozzles), At Planting
7. Maxim @ 0.08 floz./cwt (On Seed) & Omega @ 1.5 pt./A (two nozzles), At Planting
8. Maxim @ 0.08 floz./cwt (On Seed) & Omega @ 3.0 pt./A (two nozzles), At Planting
9. Proprietary
10. New Earth Biological @ 8 gal./A, At Planting
11. Omega @ 0.85 pt./A (one nozzle dir. at soil), At Planting
12. Maxim @ 0.08 floz./cwt (On Seed) & Omega @ 0.85 pt./A (one nozzle dir. at soil), At Planting

Planted: May 19, 2006
Plot Design: Randomized
Plot Size: 2 - 10 foot rows per treatment per replication
Plant Spacing: 12 inches
Row Spacing: 34 inches
Replications: Four
Irrigation: Center pivot sprinkler, rate based on ET
Fertilizer: 163N-110P-265K-1Cu-0.5Zn (full season)
Herbicide: Dual Magnum @ 1.65 pt./A + Sencor @ 5.33 oz./A, applied on May 24 & 25, 2006
Insecticide: Leverage 2.7 @ 3.75 floz./A + Vydate @ 8.33 pt./A (full season)
Fungicide: Penncozeb @ 2.18 lb./A + Amistar @ 3.93 oz./A + Endura @ 2.5 oz./A + Bravo WS @ 2.96 pt./A
Vine Killer: Chopped vines on September 5 & 6, 2006
Harvested: September 15, 2006

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. Mean percent of the number of unmarketable tubers due to powdery scab lesion severity, multiplied by the severity rating, where 1 = not severe and 5 = very severe.

Yield: Total yield expressed as hundred weight per acre. A second cwt/A has also been calculated in which all unmarketable tubers (due to high powdery scab severity), have been removed from the total yield, 2-10 foot rows per treatment per replication, mean of four replications.

Grade: By hand, percent tubers by weight in kilograms < 4 oz., 4-10 oz., > 10 oz., and culls.

Table 1. Evaluation of fungicides on the incidence of powdery scab on tubers in the cultivar Cherry Red, San Luis Valley, Colorado, 2006

Treatment	Tuber symptoms				
	Percent Incidence[a]	Percent Healthy[b]	Severity Index (Marketable)[c]	Percent Unmarketable[d]	Severity Index (Unmarketable)[e]
1. Untreated Control	78.7 a	21.4 g	157.3 a	46.2 a	197.7 a
2. Maxim @ 0.08 floz./cwt, On Seed	73.8 ab	26.1 fg	138.2 ab	26.6 bcd	90.0 bcd
3. Omega @ 1.5 pt./A (one nozzle dir. over seed), At Planting	67.6 bc	32.4 ef	96.1 cd	27.5 bcd	94.9 bc
4. Omega @ 3.0 pt./A (one nozzle dir. over seed), At Planting	49.4 f	50.6 b	72.8 de	14.5 e	43.5 e
[f]5. Omega @ 1.5 pt./A (two nozzles), At Planting	52.3 ef	47.7 bc	52.3 e	17.9 de	53.8 cde
[f]6. Omega @ 3.0 pt./A (two nozzles), At Planting	56.2 def	43.8 bcd	70.2 de	23.0 cde	68.9 cde
[f]7. Maxim @ 0.08 floz./cwt, On Seed Omega @ 1.5 pt./A (two nozzles), At Planting	38.4 g	61.6 a	47.8 e	15.1 e	45.2 de
[f]8. Maxim @ 0.08 floz./cwt, On Seed Omega @ 3.0 pt./A (two nozzles), At Planting	56.2 def	43.9 bcd	56.2 e	22.2 cde	88.8 b-e
9. Proprietary	72.0 abc	28.0 efg	144.0 ab	34.2 b	119.0 b
10. New Earth Biological @ 8 gal./A, At Planting	75.3 ab	24.7 fg	150.6 a	30.4 bc	121.5 b
11. Omega @ 0.85 pt./A (one nozzle dir. at soil), At Planting	62.5 cde	37.5 cde	109.7 bc	21.5 cde	64.6 cde
12. Maxim @ 0.08 floz./cwt, On Seed Omega @ 0.85 pt./A (one nozzle dir. at soil), At Planting	64.8 bcd	35.3 def	82.5 cde	20.8 cde	64.9 cde
LSD(P=0.05)	10.85	10.85	36.81	10.47	46.46

[a] Percent incidence = mean percent of the total number of tubers with one or more powdery scab lesion at harvest. Mean of four replications.
[b] Percent healthy = mean percent of the total number of tubers with zero powdery scab lesions at harvest. Mean of four replications.
[c] Severity Index (Marketable) = mean percent of the number of infected marketable tubers/treatment/replication multiplied by the avg. severity of the lesions, where 1 = very little or no disease and 5 = heavily infested.
[d] Percent Unmarketable = mean percent of the total number of tubers with a lesion severity rating of three or higher at harvest. Mean of four replications.
[e] Severity Index (Unmarketable) = mean percent of the number of unmarketable tubers due to powdery scab lesion severity/treatment/replication multiplied by the average severity of the lesions, where 1 = very little or no disease and 5 = heavily infested.
[f] Where two nozzles are used, one nozzle is directed over the seed piece (45% of mix)and one nozzle is directed at the soil as it covers the seed piece (55% of mix).
Means followed by the same letter are not significantly different at P=0.05.

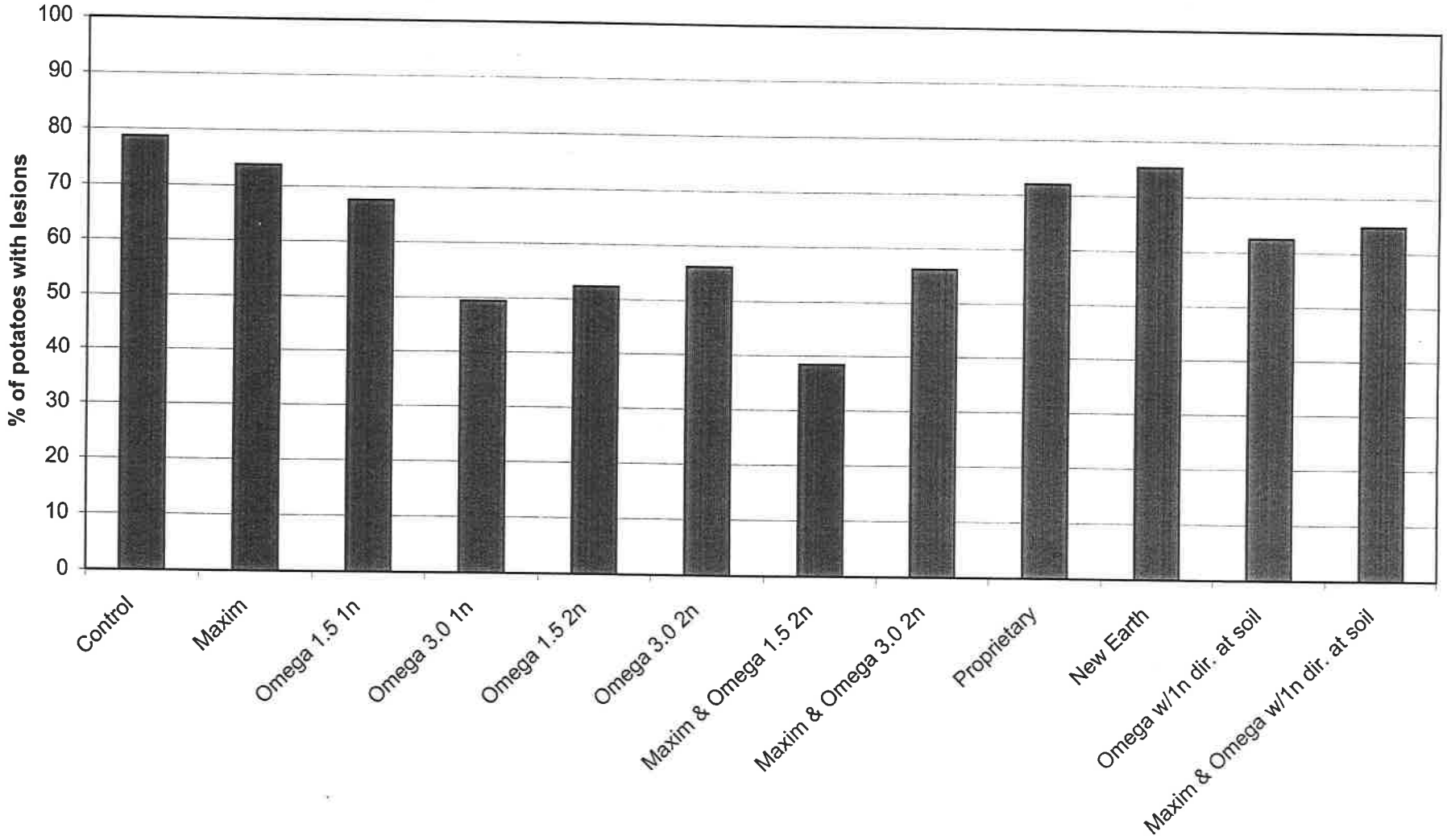
Robert D. Davidson, Associate Professor, Colorado State University

Table 2. Evaluation of fungicide programs on tuber yield and quality in the cultivar Cherry Red, San Luis Valley, Colorado, 2006

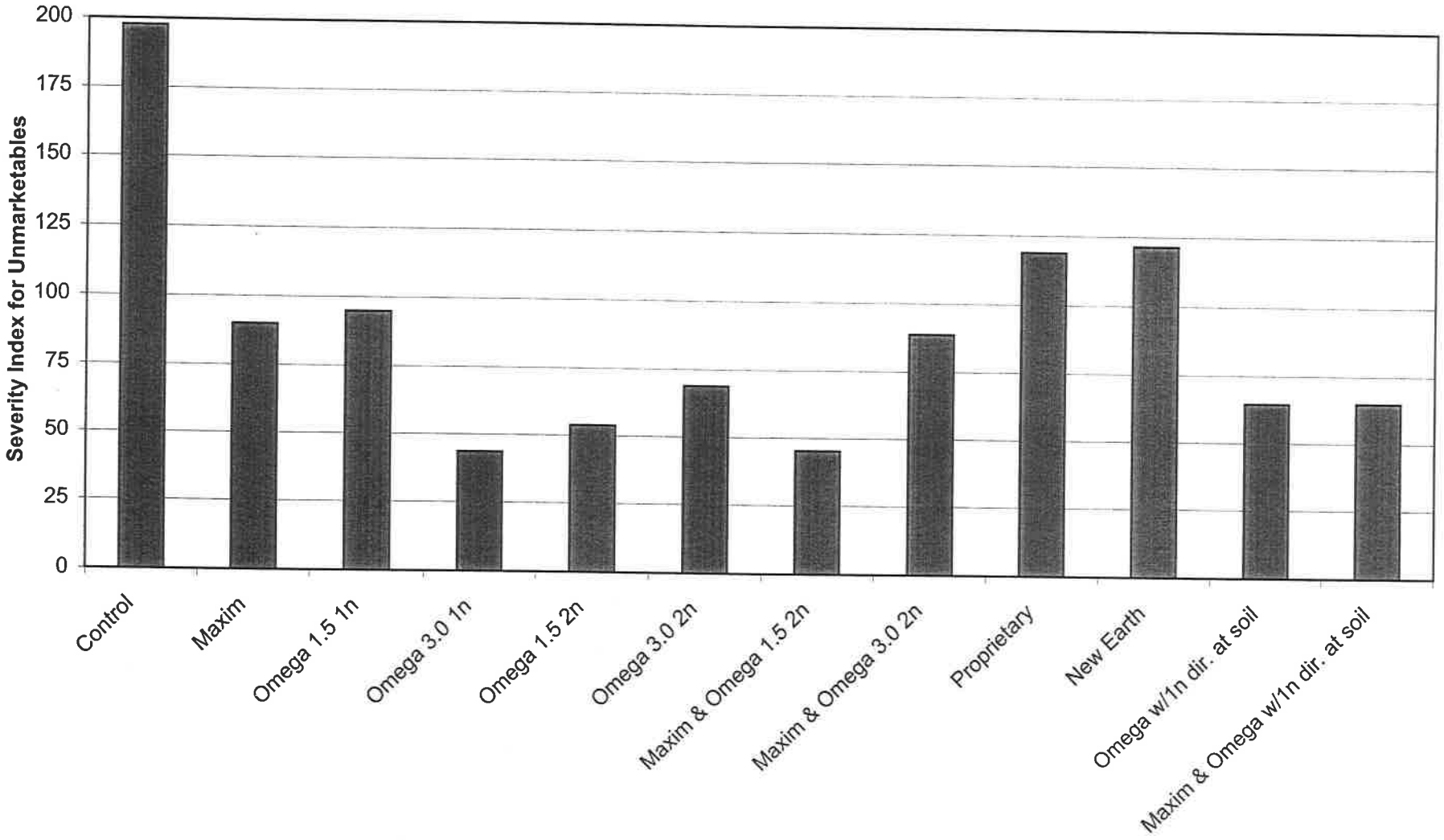
Treatment	Percent[a]					
	< 4 oz.	4-10 oz.	> 10 oz.	culls	Cwt/A[b]	Marketable Cwt/A[c]
1. Untreated Control	28.1 bc	62.9 bcd	9.0	0.0	509.4 a	274.3
2. Maxim @ 0.08 floz./cwt, On Seed	26.1 c	69.7 b	4.2	0.0	414.7 b-e	302.2
3. Omega @ 1.5 pt./A (one nozzle dir. over seed), At Planting	30.4 abc	64.4 bcd	5.3	0.0	378.0 de	275.9
4. Omega @ 3.0 pt./A (one nozzle dir. over seed), At Planting	28.1 bc	69.5 b	2.4	0.5	362.7 e	310.4
[d] 5. Omega @ 1.5 pt./A (two nozzles), At Planting	29.8 abc	63.3 bcd	6.9	0.0	407.6 b-e	334.8
[d] 6. Omega @ 3.0 pt./A (two nozzles), At Planting	16.8 d	80.7 a	2.5	0.0	431.8 b-e	333.8
[d] 7. Maxim @ 0.08 floz./cwt, On Seed Omega @ 1.5 pt./A (two nozzles), At Planting	37.1 a	57.2 d	5.8	0.0	434.8 bcd	369.8
[d] 8. Maxim @ 0.08 floz./cwt, On Seed Omega @ 3.0 pt./A (two nozzles), At Planting	17.6 d	81.9 a	0.5	0.0	420.4 b-e	328.2
9. Proprietary	26.8 bc	65.8 bc	7.4	0.4	454.7 abc	299.5
10. New Earth Biological @ 8 gal./A, At Planting	30.5 abc	60.8 cd	8.8	1.2	459.3 ab	318.7
11. Omega @ 0.85 pt./A (one nozzle dir. at soil), At Planting	34.2 ab	60.5 cd	5.4	0.0	470.3 ab	369.2
12. Maxim @ 0.08 floz./cwt, On Seed Omega @ 0.85 pt./A (one nozzle dir. at soil), At Planting	30.8 abc	66.1 bc	3.1	0.0	386.5 cde	309.0
LSD(P=0.05)	7.33	8.49	NS	NS	72.03	NS

[a] Based on tuber weight in pounds, mean of three replications.
[b] Total yield expressed as hundred weight per acre, 2-10 foot rows per treatment per replication, mean of four replications.
[c] Total yield expressed as hundred weight per acre (All unmarketable tubers due to high powdery scab severity have been removed from the total yield), 2-10 foot rows per treatment per replication, mean of four replications.
[d] Where two nozzles are used, one nozzle is directed over the seed piece (45% of mix) and one nozzle is directed at the soil as it covers the seed piece (55% of mix).
Means followed by the same letter are not significantly different at P=0.05.

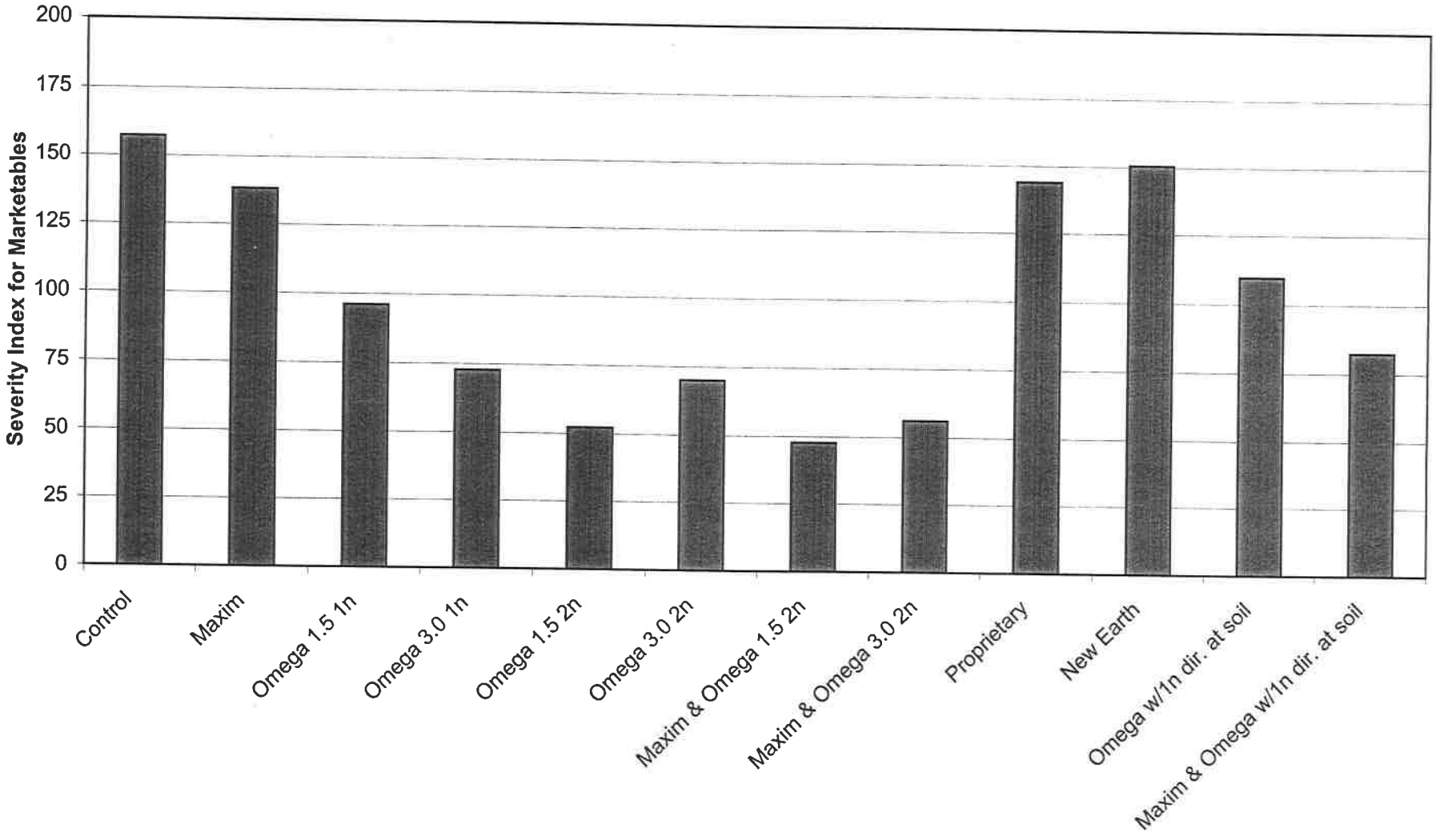
Percent of Potatoes at Harvest with Powdery Scab Lesions
Evaluation of Fungicides for Control of Powdery Scab
San Luis Valley, Colorado, 2006



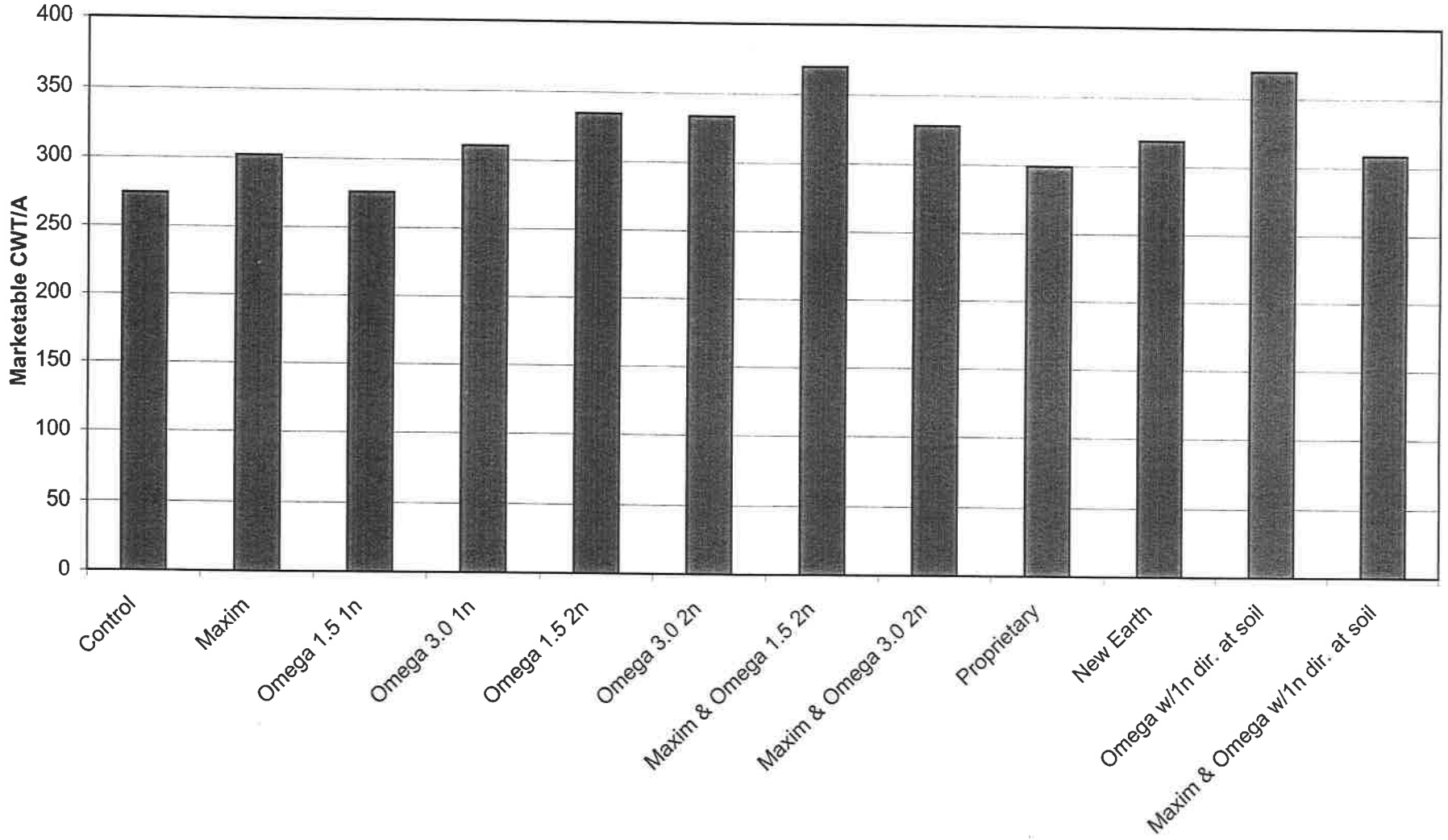
Severity Index for Unmarketable Potatoes
Evaluation of Fungicides for Control of Powdery Scab
San Luis Valley, Colorado, 2006



Severity Index for Marketable Potatoes with Powdery Scab Lesions
Evaluation of Fungicides for Control of Powdery Scab
San Luis Valley, Colorado, 2006



Marketable Yield (Potatoes with a Severity Rating Greater than Three have been Removed)
Evaluation of Fungicides for Control of Powdery Scab
San Luis Valley, Colorado, 2006



EVALUATION OF ADVANCED CLONES FOR SUSCEPTIBILITY TO POWDERY SCAB, 2006

Researchers: Robert Davidson and Andrew Houser, Colorado State University, SLVRC

Location: Off-station trial, San Luis Valley, CO

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

Clones:

1. AC97097-14W
2. AC97521-1R/Y
3. CO97043-14W
4. CO97065-7W
5. CO97087-2RU
6. CO97090-4RU
7. CO97137-1W
8. CO97138-3RU
9. CO97138-7RU
10. CO97226-2R/R
11. CO97232-1R/Y
12. CO97232-2R/Y
13. CO97233-3R/Y
14. AC96052-1RU
15. CO96141-4W
16. VC1123-2W/Y
17. CO95086-8RU
18. AC92009-4RU (Canela Russet)
19. NDC5281-2R (Rio Colorado)
20. Ranger Russet
21. Russet Burbank
22. A95109-1
23. A9045-7
24. A93157-6LS
25. Blazer Russet
26. MSJ036-A
27. MSJ126-9Y
28. MSJ316-A
29. MSK061-4
30. Atlantic
31. Superior
32. AF2211-9
33. AF2215-1
34. AF1758-7
35. AF2291
36. DT6063-1R
37. CO95172-3RU
38. CO95051-7W
39. VC1002-3W/Y
40. VC1009-1W/Y
41. VC0967-2R/Y
42. Mountain Rose
43. Purple Majesty
44. Freedom Russet
45. DT6063-1R (Border)
46. Rio Grande Russet
47. CO94035-15RU

Planted: May 16, 2006
Plot Design: Randomized
Plot Size: 1 - 10 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: 163N-110P-265K-1Cu-0.5Zn (full season)
Herbicide: Dual Magnum @ 1.65 pt./A + Sencor @ 5.33 oz./A, applied on May 24 & 25, 2006
Insecticide: Leverage 2.7 @ 3.75 floz./A + Vydate @ 8.33 pt./A (full season)
Fungicide: Penncozeb @ 2.18 lb./A + Amistar @ 3.93 oz./A + Endura @ 2.5 oz./A + Bravo WS @ 2.96 pt./A
Vine Killer: Chopped vines on September 5 & 6, 2006
Harvested: September 13, 2006

DATA

Disease: Galls on roots rated 0 to 4, 0 = none, 4 = heavily infected, readings taken on August 4.
Mean percent of 40 tubers (4-10 oz.) per plot showing one or more powdery scab lesions at harvest multiplied by the severity of the lesions, where 1 = very little or no disease and 5 = heavily infested.
Percent of 40 tubers (4-10 oz.) per plot which are unmarketable due to powdery scab severity.

Table 1. Evaluation of advanced clones for tuber susceptibility to powdery scab, San Luis Valley, Colorado, 2006.

Cultivar	Tuber symptoms				Root Gall Rating[b]
	Percent Incidence	Percent Healthy	Severity Index[a]	% Unmarketable	
1. AC97097-14W	10.8 gh	89.2 ab	27.5 fgh	3.3 de	2.0 cde
2. AC97521-1R/Y	13.3 fgh	86.7 abc	25.8 fgh	3.3 de	3.5 ab
3. CO97043-14W	17.5 e-h	82.5 a-d	35.0 fgh	0.8 e	1.0 efg
4. CO97065-7W	27.5 c-h	72.5 a-f	67.5 d-h	11.7 b-e	2.5 bcd
5. CO97087-2RU	0.0 h	100.0 a	0.0 h	0.0 e	3.0 abc
6. CO97090-4RU	0.0 h	100.0 a	0.0 h	0.0 e	2.5 bcd
7. CO97137-1W	23.3 c-h	76.7 a-f	24.2 fgh	0.0 e	1.0 efg
8. CO97138-3RU	0.0 h	100.0 a	0.0 h	0.0 e	3.0 abc
9. CO97138-7RU	1.3 h	98.8 a	1.3 h	0.0 e	1.0 efg
10. CO97226-2R/R	10.2 gh	89.8 ab	26.9 fgh	4.2 de	3.0 abc
11. CO97232-1R/Y	66.0 a	34.1 h	228.5 a	24.2 a	4.0 a
12. CO97232-2R/Y	35.0 b-g	65.0 b-g	69.2 d-h	4.2 de	4.0 a
13. CO97233-3R/Y	23.3 c-h	76.7 a-f	55.8 d-h	9.2 b-e	2.0 cde
14. AC96052-1RU	0.0 h	100.0 a	0.0 h	0.0 e	3.0 abc
15. CO96141-4W	42.5 a-f	57.5 c-h	81.7 d-h	2.5 de	1.5 def
16. VC1123-2W/Y	8.8 gh	91.3 ab	16.3 fgh	2.5 de	4.0 a
17. CO95086-8RU	1.3 h	98.8 a	1.3 h	0.0 e	3.5 ab
18. AC92009-4RU (Canela Russet)	0.0 h	100.0 a	0.0 h	0.0 e	2.5 bcd
19. NDC5281-2R (Rio Colorado)	59.8 ab	40.2 gh	140.6 bcd	8.3 cde	3.5 ab
20. Ranger Russet	1.7 h	98.3 A	1.7 gh	0.0 e	1.0 efg
21. Russet Burbank	0.0 h	100.0 a	0.0 h	0.0 e	2.5 bcd
22. A95109-1	10.8 gh	89.2 ab	21.7 fgh	1.7 de	0.5 fg
23. A9045-7	12.5 gh	87.5 ab	22.5 fgh	0.0 e	0.5 fg
24. A93157-6LS	0.0 h	100.0 a	0.0 h	0.0 e	2.0 cde
25. Blazer Russet	3.3 h	96.7 a	3.3 gh	0.0 e	2.5 bcd
26. MSJ036-A	10.8 gh	89.2 ab	13.3 fgh	0.8 e	1.5 def
27. MSJ126-9Y	22.5 d-h	77.5 a-e	35.0 fgh	1.7 de	1.5 def
28. MSJ316-A	14.2 fgh	85.8 abc	22.5 fgh	0.0 e	0.0 g
29. MSK061-4	12.5 gh	87.5 ab	28.3 fgh	3.3 de	3.0 abc
30. Atlantic	5.8 gh	94.3 ab	5.8 fgh	0.0 e	3.0 abc
31. Superior	33.8 b-g	66.3 b-g	88.8 c-g	13.8 a-d	1.5 def
32. AF2211-9	58.8 ab	41.2 gh	176.4 ab	21.3 ab	2.0 cde
33. AF2215-1	27.5 c-h	72.5 a-f	72.5 d-h	10.0 b-e	3.0 abc
34. AF1758-7	0.0 h	100.0 A	0.0 h	0.0 e	1.0 efg
35. AF2291	25.4 c-h	74.6 a-f	67.9 d-h	11.3 b-e	2.5 bcd
36. DT6063-1R[c]	45.8 a-e	54.2 d-h	90.8 b-f	13.3 a-d	2.5 bcd
37. CO95172-3RU	0.0 h	100.0 a	0.0 h	0.0 e	2.5 bcd
38. CO95051-7W	35.1 b-g	64.9 b-g	84.5 c-h	10.7 b-e	1.5 def
39. VC1002-3W/Y	12.5 gh	87.5 ab	20.8 fgh	1.7 de	4.0 a
40. VC1009-1W/Y	50.0 a-d	50.0 e-h	123.3 b-e	10.0 b-e	2.0 cde
41. VC0967-2R/Y	27.5 c-h	72.5 a-f	55.0 d-h	5.0 de	4.0 a
42. Mountain Rose	60.1 ab	39.9 gh	141.0 bcd	4.7 de	2.5 bcd
43. Purple Majesty	25.8 c-h	74.2 a-f	51.7 e-h	0.0 e	2.0 cde
44. Freedom Russet	3.8 h	96.3 a	7.5 fgh	0.0 e	2.5 bcd
45. DT6063-1R (Border)[c]	52.1 abc	47.9 fgh	169.0 abc	18.3 abc	2.5 bcd
46. Rio Grande Russet	0.0 h	100.0 a	0.0 h	0.0 e	1.5 def
47. CO94035-15RU	0.0 h	100.0 a	0.0 h	0.0 e	1.0 e
LSD(P=0.05)	29.47	29.47	87.12	12.41	1.14

[a] Severity Index = mean percent of the number of affected tubers, 40 tubers/treatment/replication multiplied by the severity of the lesions, where 1 = very little or no disease and 5 = heavily infested.

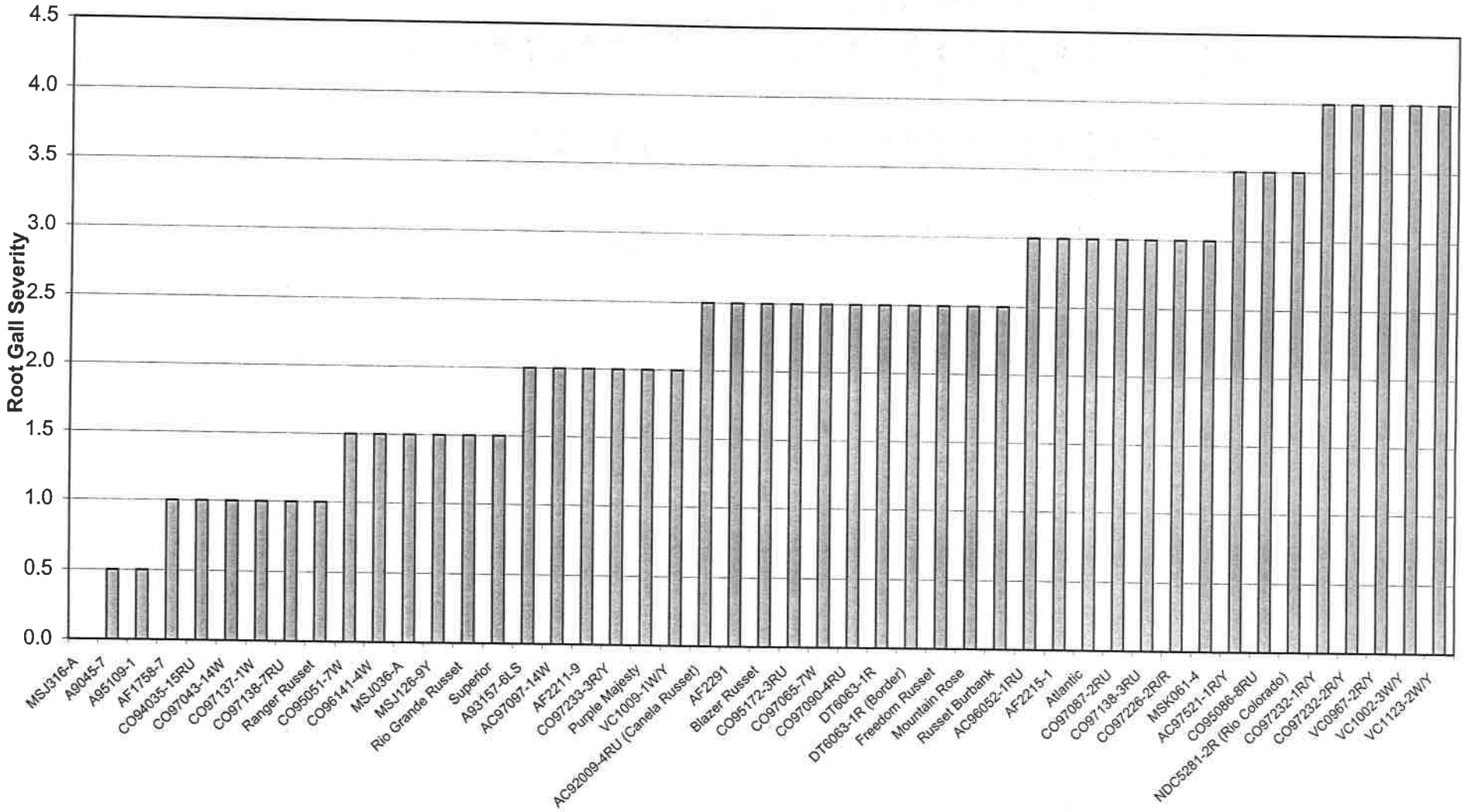
[b] Root Gall Rating = visual analysis of roots for the presence of powdery scab root galls, where 0 = no root galls and 4 = extensive root galls. Two plants per treatment were rated.

[c] Treatments 36 and 45 were planted to the same cultivar, DT6063-1R (Cherry Red), which is used as a susceptible control.

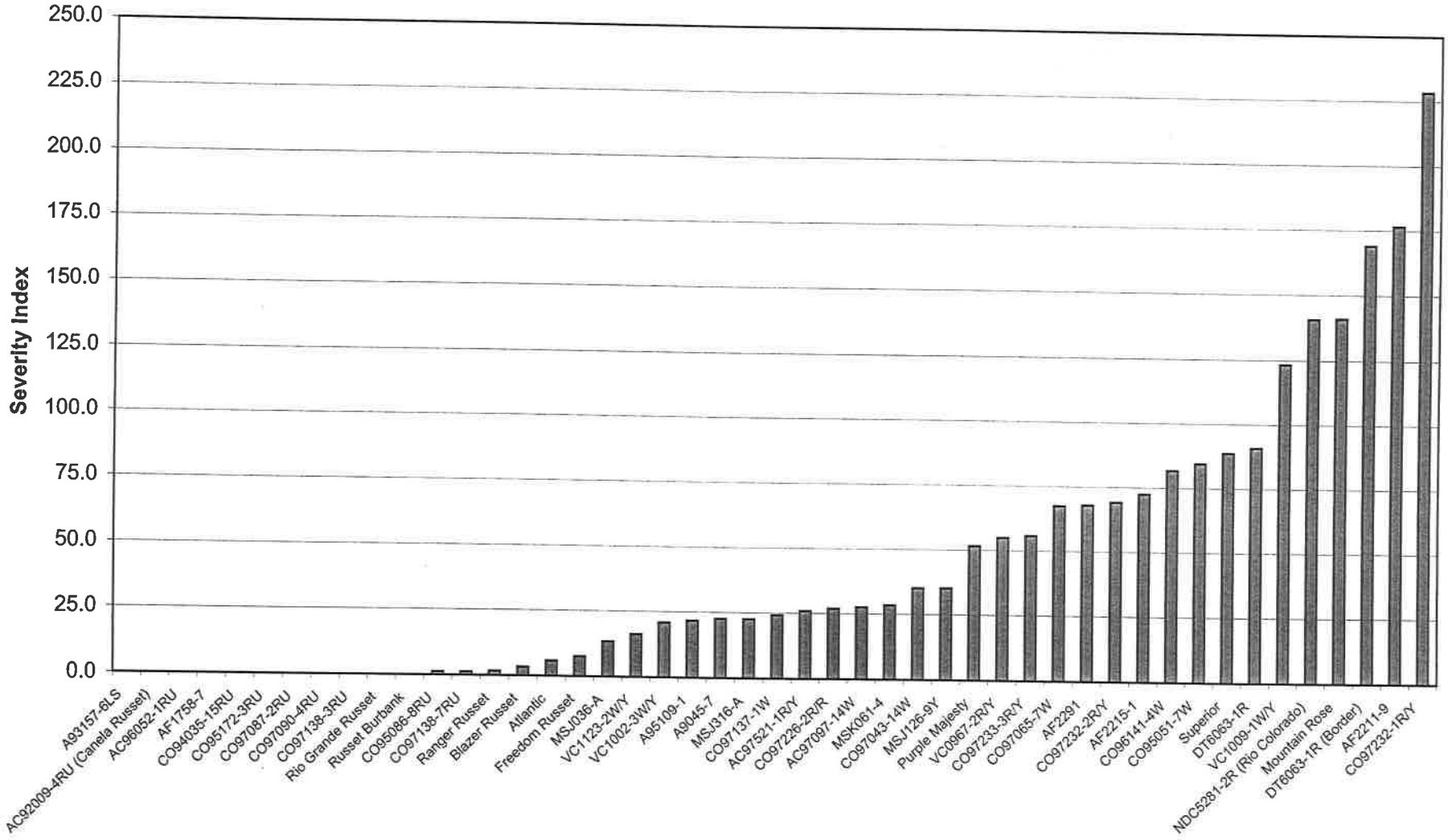
Means followed by the same letter are not significantly different at P=0.05.

Rob Davidson, Associate Professor, Colorado State University

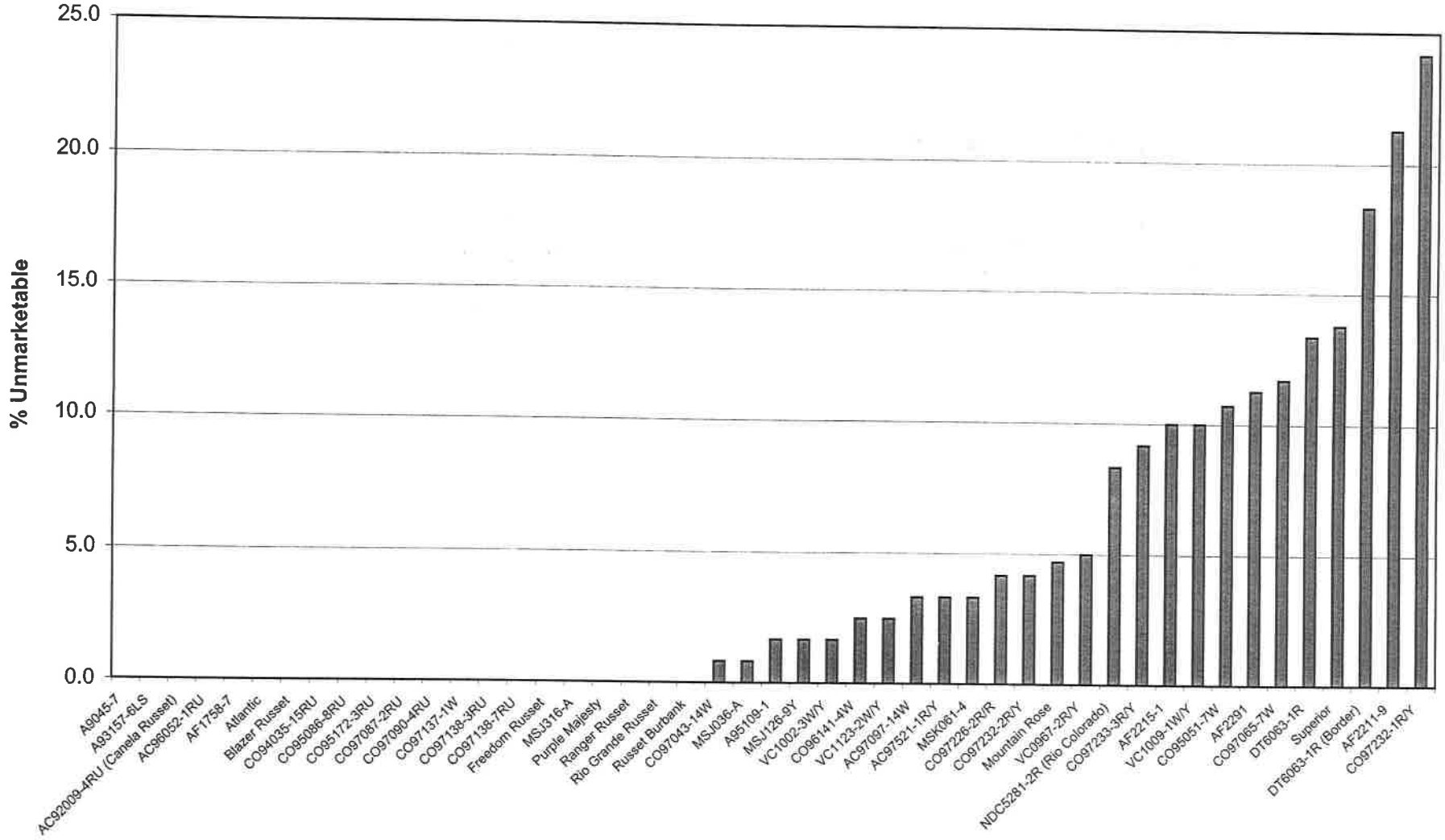
Root Gall Severity Readings (0-4, where 0=no galls & 4 = roots are heavily infested with root galls)
Evaluation of Advanced Clones for Suseptibility to Powdery Scab Root Galls
San Luis Valley, Colorado, 2006



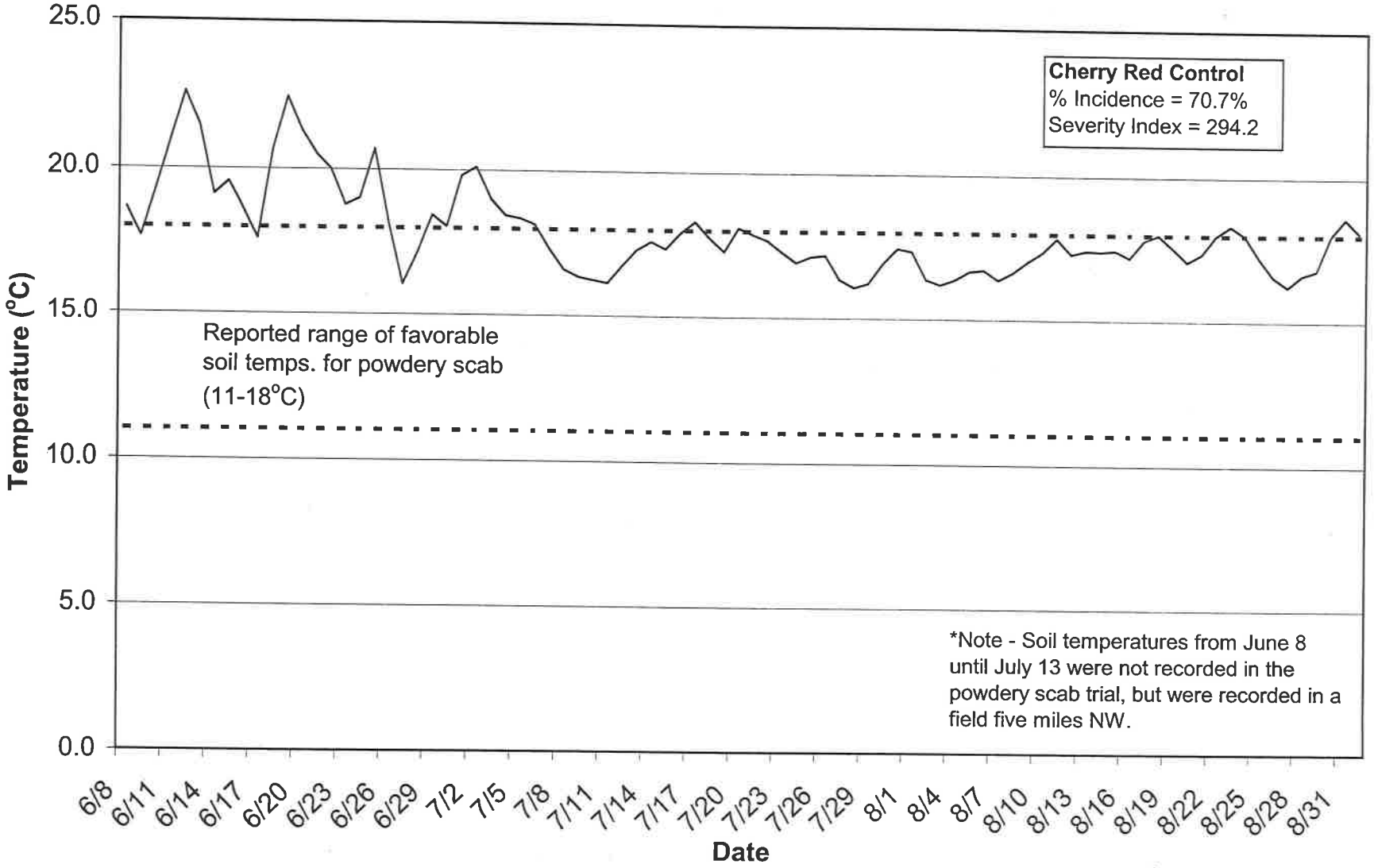
Powdery Scab Severity Index (% potatoes with powdery scab multiplied by severity - 1 to 5)
Evaluation of Advanced Clones for Tuber Susceptibility to Powdery Scab
San Luis Valley, Colorado, 2006



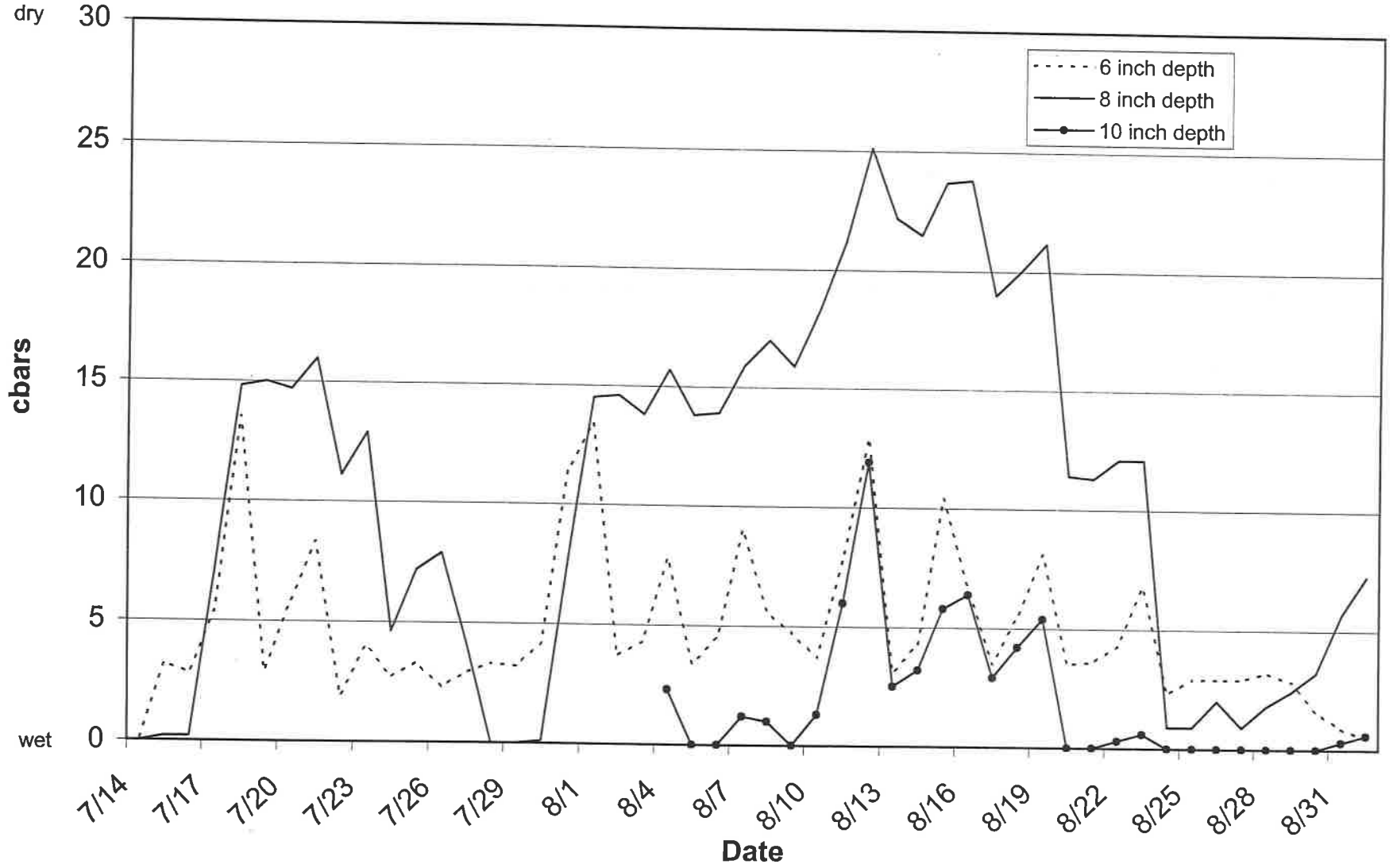
Percent of Potatoes at Harvest that are Unmarketable due to Powdery Scab Severity
Evaluation of Advanced Clones for Tuber Susceptibility to Powdery Scab
San Luis Valley, Colorado, 2006



Average Soil Temperature Readings 8" Under Potato Plant Canopy, Powdery Scab Trial, San Luis Valley, Coloardo, 2006



Soil Moisture Readings (Daily Average) 6, 8 & 10 Inches Below Soil Surface, Powdery Scab Trial, San Luis Valley, Coloardo, 2006



Beyond Soil Amendment Evaluation Trials

EVALUATION OF BEYOND (PLANT AMENDMENT) FOR INCREASED POTATO HEALTH AND YIELD ON THE CULTIVARS RANGER RUSSET AND YUKON GOLD, 2006

Researchers: Rob Davidson and Andrew Houser, Colorado State University, SLVRC

Location: San Luis Valley Research Center, Center, CO

Cultivar: Ranger Russet and Yukon Gold, cut seed, 2-4 oz.

Objective: To evaluate the efficacy of using Beyond plant amendment in increasing plant health and yield in potato.

Application: In-Furrow treatments were applied using an R & D CO_2 charged backpack sprayer at 35 PSI, with one XR 8002VS nozzle, at 10 gallons/acre as a directed in-furrow application. Foliar treatments were applied using an R & D CO_2 charged backpack sprayer at 35 PSI, with two XR 8002VS nozzles, at 20 gallons/acre.

Treatments:

1. Yukon Gold, untreated control
2. Yukon Gold, Beyond @ 16 floz./A (applied In-furrow and at tuber initiation)
3. Ranger Russet, untreated control
4. Ranger Russet, Beyond @ 16 floz./A (applied In-furrow and at tuber initiation)

Planted: May 22, 2006
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-60P-40K-25S-2.5Z, preplant, 40N through sprinkler after tuber set
Herbicide: Matrix, 1.5 oz./A + Eptam, 4.5 pt./A
Insecticide: None
Fungicide: Quadris, 12.3 floz./A
Vine Killer: Rotobeat vines on September 8, 2006
Harvested: September 18 & 20, 2006

DATA

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 Beyond (plant amendment), applied at planting and in season for increasing tuber yield and quality in the cultivars Yukon Gold and Ranger-Russet, San Luis Valley, Colorado, 2006.

Program	Treatment			Percent[a]					
	Cultivar	Rate	Application Schedule	< 4 oz.	4-10 oz.	> 10 oz.	US #2's	Culls	Cwt/A[b]
1.	Yukon Gold	Control, no treatment	-	21.8	66.3	11.9	0.6	0.4	358.59 b
2.	Yukon Gold	16 floz./A, In-furrow 16 floz./A, foliar	May 22, 2006 (At-planting) July 21, 2006 (At tuber set)	25.1	65.0	9.9	0.4	4.2	328.58 b
3.	Ranger Russet	Control, no treatment	-	26.7	63.4	9.9	0.2	3.0	432.84 a
4.	Ranger Russet	16 floz./A, In-furrow 16 floz./A, foliar	May 22, 2006 (At-planting) July 21, 2006 (At tuber set)	22.0	63.3	14.8	0.0	3.1	457.34 a
LSD(P=0.05)				NS	NS	NS	NS	NS	36.25

[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.

EVALUATION OF DIPPING THE CULTIVAR RANGER RUSSET IN BEYOND (PLANT AMENDMENT) FOR INCREASED POTATO HEALTH AND YIELD, 2006

Researchers:	Rob Davidson and Andrew Houser, Colorado State University, SLVRC
Location:	San Luis Valley Research Center, Center, CO
Cultivar:	Ranger Russet, cut seed, 2-4 oz.
Objective:	To evaluate the efficacy of using Beyond plant amendment for increasing plant health and yield in potato.
Application:	Seed potatoes were cut, then dipped in a 3% Beyond solution prior to planning. The seed was allowed to dry before planting.
Treatments:	1. Ranger Russet, untreated control 2. Ranger Russet, Beyond (seed pieces dipped in Beyond)
Planted:	June 9, 2006
Plot Design:	Randomized complete block
Plot Size:	1 - 25 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-60P-40K-25S-2.5Z, preplant, 40N through sprinkler after tuber set
Herbicide:	Matrix, 1.5 oz./A + Eptam, 4.5 pt./A
Insecticide:	None
Fungicide:	Quadris, 12.3 floz./A
Vine Killer:	Rotobeat vines on September 8, 2006
Harvested:	September 20, 2006

DATA

Yield:	1-25 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. Clonal Evaluation for Bacterial Ring Rot Foliar Symptom Expression												
Year	Clone	DAP to First Symptoms	# Reps Positive	# Plants Positive	% Plants Positive	Date 50% or More +	Total # Reps Positive	% Plants + 100 DAP	Summary of Symptoms	SS	*Ave DAP to 1st Symptoms	Rating
05	ADTC9801-3P	44	1	1	4.8		3	47.6	ALL			
06		59	1	1	4.8		3	33.3	ALL	-	52 (+/- 10)	5
05	CO98012-5R	81	2	5	23.8	89	3	71.4	IVC,IVN,MN,W			
06		59	1	1	4.8		2	28.6	ALL	+	70 (+/- 10)	5
05	CO98067-7RU	81	2	5	23.8	89	3	66.7	IVC,IVN,MN,W			
06		59	2	3	14.3	100	3	66.7	ALL	+	70 (+/- 10)	5
05	CO98277-4W	81	1	1	4.8		2	19.0	IVC,IVN,MN,W			
06		59	1	1	4.8		3	23.8	ALL	+	70 (+/- 10)	5
05	CO98368-2RU	44	1	1	4.8	96	3	66.7	ALL			
06		59	2	3	14.3		3	38.1	ALL	+	52 (+/- 10)	5
05	CO97215-2P/P	44	1	1	5.3	96	3	63.2	ALL			
06		59	1	1	5.9		1	11.8	ALL	-	52 (+/- 10)	4
05	CO97222-1R/R	68	1	1	4.8	89	3	57.1	ALL			
06		59	2	2	10.0	100	3	50.0	ALL	-	64 (+/- 5)	5
05	CO97227-2P/PW	68	1	2	9.5	96	3	71.4	ALL			
06		59	1	2	11.1	87	3	66.7	ALL	-	64 (+/- 5)	5
05	CO97274-2W/Y	44	1	1	4.8	81	3	90.4	ALL			
06		59	1	1	5.3	87	3	73.7	ALL	-	52 (+/- 10)	5
05	ATC98444-1R/Y	68	1	1	4.8		3	23.8	IVC,IVN,MN,W			
06		59	2	3	15.0		3	40.0	ALL	-	64 (+/- 5)	5
05	ATC98495-1W/Y	54	1	1	4.8	89	3	66.7	ALL			
06		59	3	6	28.6	100	3	52.4	ALL	-	57 (+/- 5)	5
05	ATC98509-1R/Y	54	1	2	9.5	96	3	52.3	ALL			
06		70	1	2	9.5		3	47.6	ALL	+	62 (+/- 10)	5
06	AC97044-4RU	59	2	3	14.3		3	38.1	ALL	+		
06	AC99375-1RU	100	2	2	9.5		2	9.5	IVC,IVN,MN,W	-		
06	AC99178-2RU	59	3	9	40.9	70	3	81.8	ALL	-		
06	AC99213-8W	59	3	7	33.3	87	3	61.9	ALL	+		
06	AC99329-7RW/Y	59	1	1	5.0		3	30.0	ALL	+		
06	AC99330-1P/Y	59	1	1	4.8		3	33.3	ALL	+		
06	CO99028-2RU	59	1	2	10.5		3	31.6	ED,R,IVC,IVN,MN	-		
06	CO99045-1W/Y	59	3	8	38.1		3	47.6	ALL	+		
06	CO99053-3RU	59	1	4	19.0		2	28.6	ED,R,IVC,W	-		
06	CO99053-4RU	70	2	5	23.8	87	3	71.4	ALL	-		
06	CO99076-6R	59	2	2	11.1		3	44.4	ALL	-		
06	CO99100-1RU	59	1	1	5.0		3	35.0	ALL	+		
06	CO99199-1RU	59	1	2	10.5	87	3	57.9	ALL	+		
06	CO99256-2R	59	2	4	19.0		2	28.6	ALL	-		
06	CO99256-3R	59	1	1	4.8		2	23.8	ALL	+		

Year	Clone	DAP to First Symptoms	# Reps Positive	# Plants Positive	% Plants Positive	Date 50% or More +	Total # Reps Positive	% Plants + 100 DAP	Summary of Symptoms	SS	*Ave DAP to 1st Symptoms	Rating
06	CO99338-3RU/Y	59	1	1	5.0		3	33.3	ALL	+		
06	VC1115-1RU	87	1	1	4.8		1	4.8	IVC,IVN,MN,W	-		
05	A95409-1	68	3	10	47.6	74	3	90.5	ALL			
06		59	3	16	76.2	59	3	90.4	ALL	-	64 (+/- 5)	5
05	A96104-2	74	1	1	4.8		3	33.3	IVC,IVN,MN,W			
06		MISSING										
05	AO96164-1	74	1	1	5.3		2	36.8	IVC,IVN,MN,W			
06		59	1	2	12.5		2	18.8	ED,R,IVC	-	67 (+/- 10)	4
05	AOA95154-1	96	2	4	33.3		2	41.7	IVC,IVN,MN,W			
06		59	3	6	28.6		3	38.1	ED,R,IVC	-	78 (+/- 20)	4
05	AOA95155-7	54	1	1	4.8		3	47.7	ALL			
06		MISSING										
05	MWTX2609-2RU	68	2	3	14.3		3	42.9	ALL			
06		59	3	4	19.0	100	3	61.9	ALL	+	64 (+/- 5)	5
05	TXA549-1RU	54	1	1	4.8		1	4.8	R			
06		59	1	2	9.5		3	23.8	ALL	+	57 (+/- 5)	4
04	A95074-6											
05		68	1	1	4.8		2	33.3	ALL			
04	A95109-1											
05		68	3	4	19.0	84	3	57.1	ALL			
04	AO96160-3											
05		44	1	2	9.5		3	47.6	ALL			
04	ATX91137-1RU											
05		68	3	4	19.0	96	3	52.3	ALL			
06	AO96141-3	59	2	3	14.3	100	3	57.1	ALL	-		
06	AOTX95265-2ARU	59	3	8	38.1	87	3	71.4	ALL	+		
06	AOTX95265-4RU	59	2	10	52.6	59	3	94.7	ALL	-		
06	MWTX2609-4RU	59	3	5	23.8		3	28.6	ALL	+		
06	POR01PG20-12	59	2	4	19.0		3	42.9	ALL	+		
06	ATTX95490-2W	77	2	2	9.5		3	42.9	ALL	-		
06	B0766-3T	59	1	2	9.5		3	38.1	ALL	+		
04	WNC230-14RU											
05		68	1	1	5.0		3	35.0	ALL			
06		59	1	2	9.5		3	28.6	ED,R,IVC,W	+		
04	Ute Russet											
05		54	1	1	4.8	89	3	57.1	ALL			
06		59	2	6	30.0	100	2	50.0	ALL	+		
04	Centennial Russet											

Year	Clone	DAP to First Symptoms	# Reps Positive	# Plants Positive	% Plants Positive	Date 50% or More +	Total # Reps Positive	% Plants + 100 DAP	Summary of Symptoms	SS	*Ave DAP to 1st Symptoms	Rating
05		68	1	1	4.8		3	33.3	ED,R,IVC,IVN,MN			
06		77	1	3	16.7	87	3	61.1	IVC,IVN,MN,W	+		
04	Russet Burbank											
05		44	1	1	4.8	81	3	66.7	ALL			
06		59	3	11	55.0	59	3	85.0	ALL	+		
04	Sangre											
05		44	1	1	4.8	96	3	90.5	ALL			
06		87	2	7	35.0	100	3	55.0	ALL	+		
04	Russet Norkotah											
05		68	3	5	25.0	89	3	75.0	ALL			
06		59	3	9	42.9	87	3	76.2	ALL	+		

Planting dates - 5/9/05, 5/9/06. Key to symptoms: ED-Early Dwarf, R-Rosette, IVC-Interveinal Chlorosis, IVN-Interveinal Necrosis, MN - Marginal necrosis, and W - Wilt. All - All symptoms seen during season. DAP-days after planting, SS-stem squeeze.

BRR foliar rating 1-5 with 1 = no symptoms; 2 = mild symptoms which appear late, acceptable ?; 3 to 5 = acceptable with 5 best.

* Normal symptom expression for controls (compilation of several years) DAP to 1st symptoms (Rating) = WNC230-14RU, 90-100 DAP (4); Ute Russet, 100+ DAP (2-3);Centennial Russet, 90-100 DAP (2-3); Russet Burbank, 55-65 DAP (5); Sangre, 85-95 DAP (4); Russet Norkotah, 85-95 DAP (5).

Critical dates for seed certification range around 90-100 DAP or near the date of final inspection. Any clone demonstrating symptoms within this time frame at a level above 15-20% of the infected plants vs. stand is considered a reasonable risk for BRR detection.

2005 Clonal Evaluation for Bacterial Ring Rot Tuber Symptom Expression			
Clone	**# Reps +**	**# Tubers +**	**%Tubers +**
AC98350-2RU	0	0	0
ADTC9801-3P	2	3	15
CO98009-3RU	0	0	0
CO98012-5R	1	1	5
CO98067-7RU	1	1	5
CO98277-4W	0	0	0
CO98303-8W	1	2	10
CO98368-2RU	0	0	0
CO97215-2P/P	0	0	0
CO97216-3P/P	1	1	5
CO97222-1R/R	0	0	0
CO97227-2P/P	0	0	0
CO97274-2W/Y	1	1	5
ATC98444-1R/Y	0	0	0
ATC98495-1W/Y	1	1	5
ATC98509-1R/Y	1	2	10
ATC98515-1R/Y	1	1	5
AC97068-2RU	1	1	5
AC97097-14W	1	1	5
AC97521-1R/Y	2	2	10
CO97043-14W	2	3	15
CO97065-7W	2	3	15
CO97078-5R	1	1	5
CO97087-2RU	0	0	0
CO97090-4RU	0	0	0
CO97137-1W	1	1	5
CO97138-3RU	1	1	5
CO97138-7RU	1	1	5
CO97226-2R/R	0	0	0
CO97232-1R/Y	0	0	0
CO97232-2R/Y	0	0	0
CO97233-3RY	0	0	0
VC1123-2W/Y	0	0	0
A95074-6	1	2	10
A95109-1	0	0	0
AO96160-3	0	0	0
ATX91137-1RU	0	0	0
A95409-1	1	1	5
A96095-3	0	0	0
A96104-2	1	2	10
AO96164-1	0	0	0
AOA95154-1	0	0	0
AOA95155-7	0	0	0
MWTX2609-2RU	1	1	5
TXA549-1RU	0	0	0
COA96141-2C	2	2	10
COA96142-3C	0	0	0
A96741-1R	0	0	0
A96741-2R	1	1	5
Western Russet	0	0	0
WNC230-14RU	0	0	0
Ute Russet	0	0	0
Centennial Russet	0	0	0

Clone	# Reps +	# Tubers +	%Tubers +
Russet Burbank	2	4	20
Sangre	1	1	5
Russet Norkotah	0	0	0
2 of 3 reps screened with 10 tubers cut/treatment (at least 5 plants).			
% tubers (+) is based upon #pos/#cut. Harvest = 9/12/05			

Table 1. Effects of Beyond, applied prior to planting, for increasing tuber yield and quality in the cultivar Ranger Russet, San Luis Valley, Colorado, 2006.

Program	Treatment		Percent[a]					
	Cultivar	**Rate/Application Schedule**	**< 4 oz.**	**4-10 oz.**	**> 10 oz.**	**US #2's**	**Culls**	**Cwt/A[b]**
1.	Ranger Russet	Control, no treatment	33.1	66.3	0.6	3.6	5.8	327.56
2.	Ranger Russet	Dipped in 3% Beyond solution prior to planting.	28.6	71.0	0.4	1.7	6.7	327.71
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, 1-25 foot row per treatment per replication, mean of four replications.