2014

Potato Research Report

Potato Disease Control Project

Potatoes surrounded by a mix of flowering plant species (picture taken after potato vinekill).

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Colorado State University, SLV Research Center

CONTENTS

2014 Early Blight Fungicide Trials

Spraying schedules that include two or three fungicide applications during the season (with at least one of the fungicides being either a strobulirin or Fluopyram/Pyrimethanil - Luna), starting once degree days for early blight have been reached and continuing fungicide applications every 14 to 21 days, have worked well in the San Luis Valley. Other products such as Endura, Bravo, Dithane, Polyram, Super Tin, and various numbered compounds have also had success in controlling early blight, depending on application timing and which of the additional fungicides were used.

When yields (cwt/A) are analyzed for the early blight trial, a significant difference can be observed between different fungicide application regimens and the untreated control, however this is not always the case. This can depend on differences between environmental conditions, disease pressure, and fungicide combinations and application timing in any given year. When an effective fungicide program is used to control foliar early blight, yields can be improved.

2014 POTATO - EARLY BLIGHT FUNGICIDE TRIAL

Researcher: Andrew J. Houser, Colorado State University, SLVRC
Location: San Luis Valley Research Center, Center, CO
Cultivar: Russet Norkotah sel. 8
Objective: To evaluate the efficacy of various fungicides for the managmeent of early blight.
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 10, July 25, August 8, August 19

Planted: May 20, 2014
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: Solid set sprinkler, rate based on ET
Fertilizer: 80N-60P-0K-25S-2.5Z, preplant, 60N through sprinkler after tuber set.
Herbicide: Dual Magnum @ 1.25 pt/A + Eptam @ 4.0 pt/A + 0.17 lb Sencor/A
Insecticide: None
Fungicide: None
Vine Killer: Vines chopped on September 11, 2014
Harvested: Septemeber 16, 2014

DATA:

Disease: Early blight disease incidence based on percent leaves infected, readings taken weekly starting August 6, 2014.

AUDPC: Area Under the Disease Progress Curve (AUDPC) is a measure of the progression of Early Blight, starting on August 6th and ending with the last reading on September 3rd. 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 (trt. #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 & culls.

Table 1. Fungicide programs evaluated for early blight control, San Luis Valley, Colorado 2014

Program	Products	Rate	Application Schedule[a]
1	Untreated Control	-	-
2	Luna Tranquility	11.2 floz/A	1
	Induce	0.5 %v/v	1
3	Echo ZN	32 floz/A	1
4	Luna Tranquility	8 floz/A	1,3
	Induce	0.5 %v/v	1,3
	Scala	7 floz/A	5
	Echo ZN	24 floz/A	5
	Echo ZN	32 floz/A	7
5	Luna Tranquility	8 floz/A	1,5
	Induce	0.5 %v/v	1,5
	Scala	7 floz/A	3,7
	Echo ZN	24 floz/A	3,7
6	Echo ZN	32 floz/A	1
	Endura	2.5 oz/A	3,7
	Headline	9 floz/A	5
7	Echo ZN	32 floz/A	1,5
	Dithane Rainshield	32 oz/A	3,7
8	Quadris	6.1 floz/A	1
	Endura	2.5 oz/A	3
	Dithane Rainshield	2 lbs/A	5

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

Table 2. Early Blight Trial - Effect of fungicide programs on the incidence of early blight in the cultivar Russet Norkotah Selection 8, San Luis Valley, Colorado, 2014; No Late Blight occurred within the trial.

	Percent Leaves Infected (with one or more lesions)[a]					
Treatment	August 6	August 15	August 21	August 28	September 3	AUDPC[b]
1	15.4 a	37.5 a	83.8 a	99.4 a	100.0 a	1073 a
2	3.4 d	8.9 b	36.3 bc	84.2 b	98.8 a	717.4 b
3	6.4 b	28.2 a	83.4 a	98.5 a	100.0 a	1000.5 a
4	3.2 d	6.0 b	18.3 d	39.2 d	68.3 b	418.9 d
5	3.5 d	5.4 b	13.8 d	36.7 d	64.6 b	384.2 d
6	4.9 bcd	12.0 b	51.2 b	86.7 b	100.0 a	797.5 b
7	4.0 cd	10.9 b	24.2 cd	63.3 c	92.5 a	602.9 c
8	5.5 bc	12.8 b	43.3 b	87.9 b	99.6 a	777.4 b
LSD(P=0.05)	1.86	9.35	15.65	8.49	9.40	83.45
CV	21.84	41.78	24.03	7.75	7.06	7.86
F value	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

[a]Percent of leaflets with Early Blight lesions per plant (3 plants evaluated per treatment/rep,

[b]AUDPC is the Area Under the Disease Progress Curve, accumulated weekly from August 6 through September 3.

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

Table 3. Early Blight Trial - Effect of fungicide programs on tuber yield and quality in the cultivar Russet Norkotah Selection 8, San Luis Valley, Colorado, 2014.

	Percent[a]					
Treatment	< 4 oz	4-10 oz	> 10 oz	US # 2's & culls	Cwt/A[b]	Cwt/A (only US # 1's)[c]
1	16.5	53.7	25.9	4.0	396.2 bc	380.3 bc
2	18.8	50.5	25.5	5.4	398.9 bc	377.6 bc
3	19.4	54.0	21.4	5.2	385.6 c	365.5 c
4	20.8	56.6	20.0	2.6	376.3 c	366.5 c
5	19.8	49.4	26.0	4.9	429.6 ab	408.9 ab
6	19.0	53.2	23.5	4.3	400.0 bc	382.8 bc
7	14.7	51.0	30.6	3.7	454.2 a	437.5 a
8	16.2	51.0	27.6	5.3	410.0 bc	388.1 bc
LSD(P=0.05)	NS	NS	NS	NS	35.94	33.67
CV	27.99	9.11	28.01	32.34	6.01	5.89
F value	0.6826	0.4616	0.5054	0.1176	0.0049	0.0038

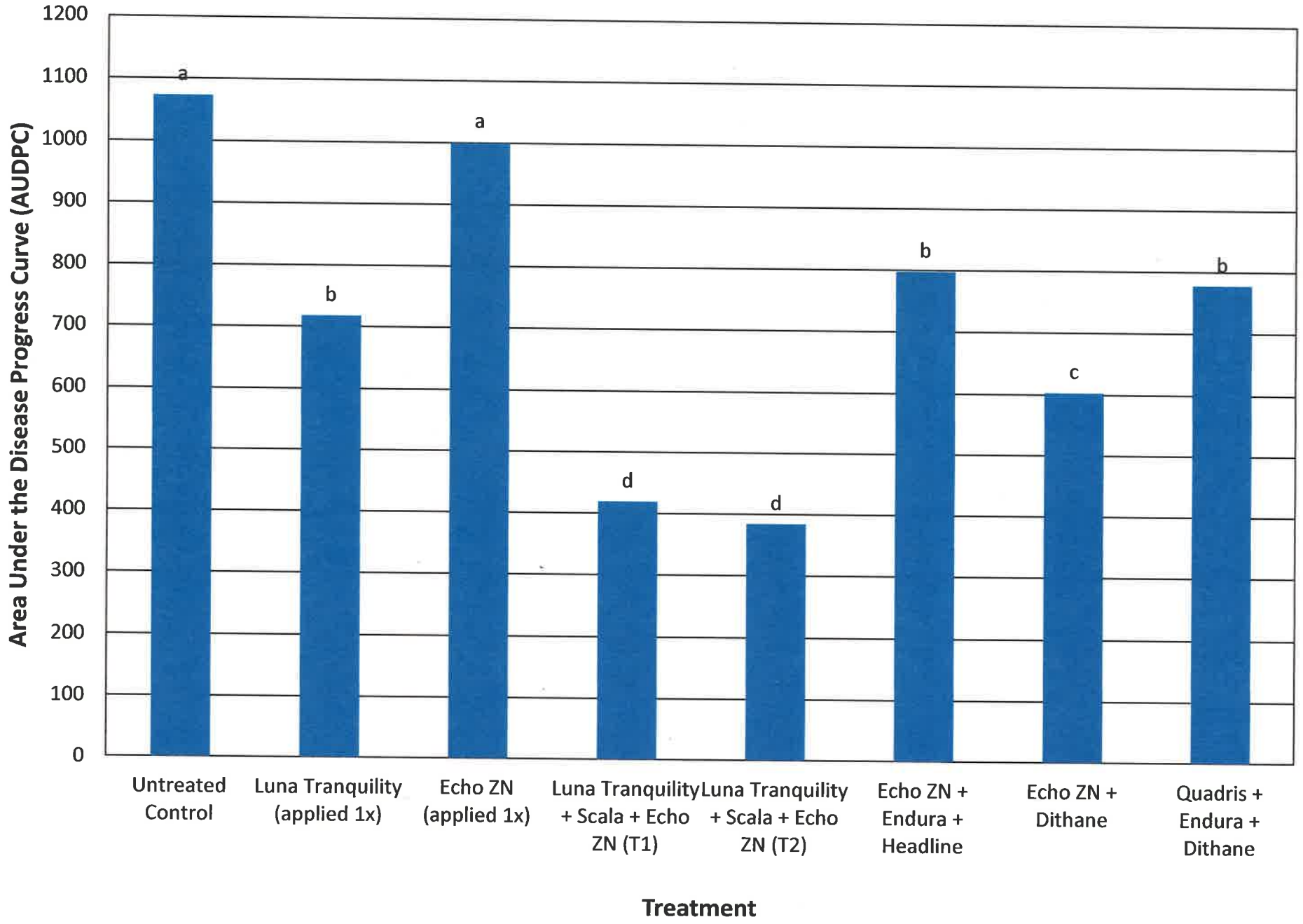
[a]Based on tuber weight in kilograms, mean of four replications.

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

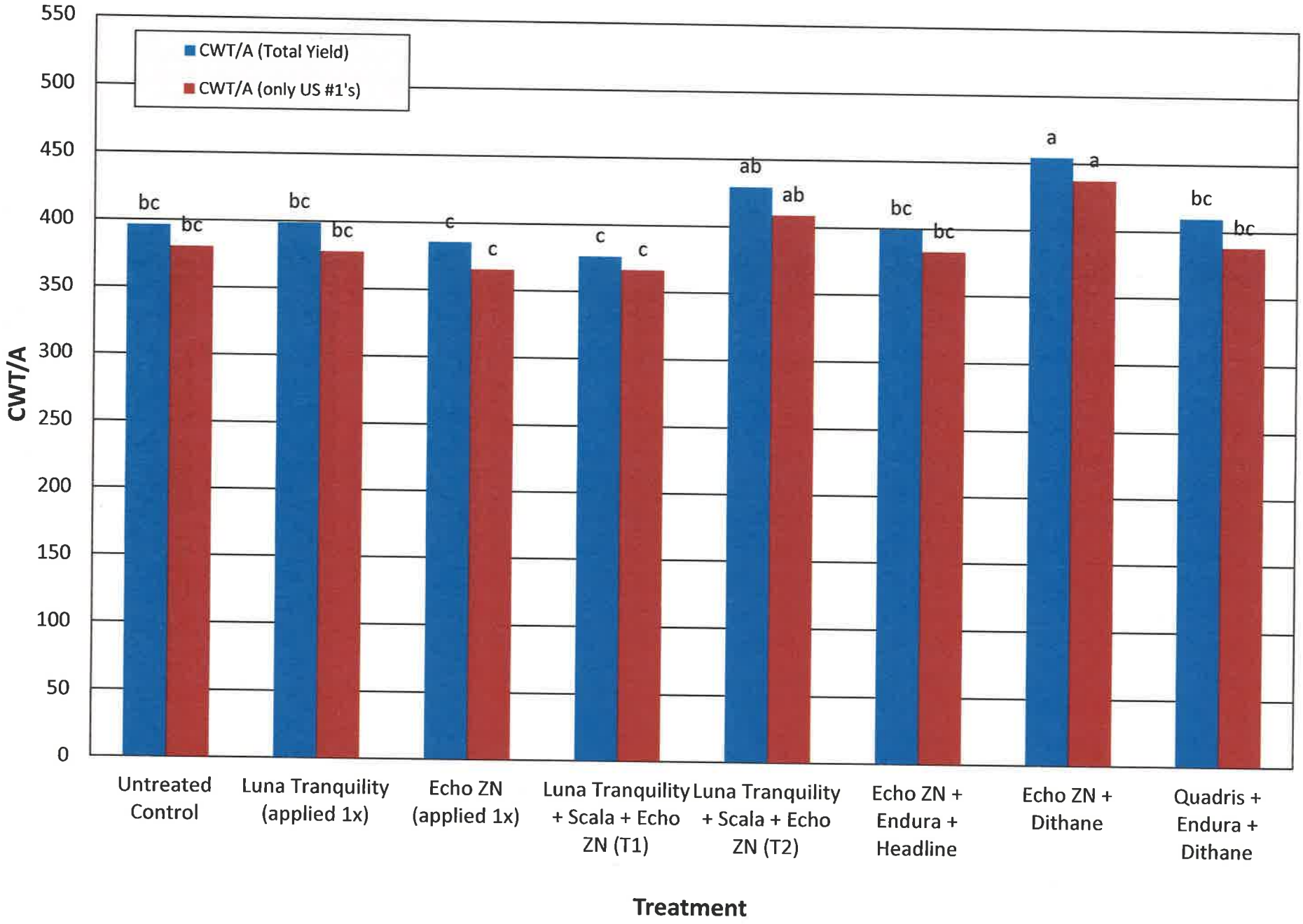
[c]Total yield expressed as hundred weight per acre (culls are removed from the cwt/A), 2-20 foot rows per treatment per replication, mean of four replications.

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

2014 Evaluation of Fungicides Applied in Season for the Management of Early Blight, Russet Norkotah sel. 8, SLVRC (AUDPC)



2014 Evaluation of Fungicides Applied in Season for the Management of Early Blight, Russet Norkotah sel. 8, SLVRC (Yield)



2014 Pink Rot Fungicide Trial

The fungicide Ridomil Gold has worked well at controlling pink rot in the San Luis Valley. However, in recent years the pink rot pathogen has become resistant to Ridomil in many potato growing regions across the United States. Due to the low level of disease pressure here at the station, resistance to Ridomil Gold has not been observed. We have evaluated various fungicide treatments during the last several years and have found a few to be somewhat effective at controlling pink rot, but Ridomil Gold has had the most success. Even though we have had success with this product, we are not recommending at this time for growers to use Ridomil for pink rot control in the San Luis Valley. In the 2014 pink rot fungicide trial, one product, Presidio (a.i. fluopicolide), was found to have the lowest level of pink rot when compared to the untreated control. Due to variability in the field plot, no significant differences were observed when compared with the untreated controls. However, since Presidio provided the best control of pink rot in this year's plots, it should continue to be evaluated to determine its long-term reliability in managing this disease. However, Presidio is not yet labeled for potatoes and is still in the evaluation stage for use on potatoes.

EVALUATION OF PRODUCTS APPLIED TO POTATO SEED IN-FURROW AND FOLIAR FOR THE MANAGEMENT OF PINK ROT, 2014

Researchers: Andrew J. Houser, Colorado State University, SLVRC

Location: San Luis Valley Research Center, Center, CO

Cultivar: Sangre S10

Objective: To evaluate the efficacy of various products on the management of pink rot. Additional data was collected on pink rot incidence, severity and overall yield.

Application: In-furrow (IF) treatments were applied using a CO^2 charged backpack sprayer with two XR8002VS nozzles (one per row) at 35psi with 10 gal. of water/A. Applications made at tuber initiation (TI) were made using a CO2 charged backpack sprayer with two XR8002VS nozzles (two per row for better coverage) at 35psi with 20 gal. of water/A. IF applications were made on May 16th and TI applcations were made on July 15th, 2014.

Treatments:

1. Untreated Control
2. Proprietary
3. Presidio @ 0.125 lbai/A (IF & TI)
4. Ridomil Gold @ 0.42 floz/1000 row ft (IF) & Phostrol @ 10.0 pt/A (TI)
5. Postrol @ 8.0 pt/A (IF & TI)
6. Untreated Control

Planted: May 16, 2014
Stand: Readings taken on July 10, 2014.
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: Solid set sprinkler, rate based on ET
Fertilizer: 80N-60P-0K-25S-2.5Z, preplant, 60N through sprinkler after tuber set.
Herbicide: Dual Magnum @ 1.5 pt/A + Eptam @ 4.0 pt/A + Sencor @ 0.17 lb/A
Insecticide: None
Fungicide: Applied Endura @ 2.5 oz/A on August 14, 2014.
Vine Killer: Vines were chopped on September 11, 2014.
Harvested: Septemeber 23, 2014

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 kilograms < 4 oz., 4-10 oz., > 10 oz., and US # 2's & culls.

Table 1. Effect of applied products, for control of pink rot, on tuber yield and quality in the cultivar Sangre sel. 10, Colorado State University, San Luis Valley Research Center, Colorado, 2014.

			Percent[b]							
Trt. #	**Products/Timing**	**% Stand[a]**	**<4 oz.**	**4-10 oz.**	**>10 oz.**	**US #2's & culls**	**Total CWT[c]**	**CWT w/o 2's & culls[d]**	**% rot[e]**	**% rot x severity[f]**
1	Untreated Control	100.0	10.8	40.7	45.1	3.4	491.5	474.8	3.6	14.7
2	Proprietary	98.1	9.6	37.9	49.0	3.6	492.5	475.0	1.2	5.5
3	Presidio @ 0.125 lbai/A (IF & TI)	96.9	9.5	37.7	49.3	3.5	526.4	508.0	0.7	3.1
4	Ridomil Gold @ 0.42 floz/1000 row ft (IF) & Phostrol @ 10.0 pt/A (TI)	99.4	11.8	47.9	37.4	3.1	499.7	484.7	1.2	5.9
5	Phostrol @ 8.0 pt/A (IF & TI)	98.8	11.0	46.3	39.6	3.2	506.5	490.0	4.3	19.4
6	Untreated Control	99.4	14.2	39.9	41.8	4.2	529.6	507.6	3.3	14.1
LSD (P=.05)		NS	NS	NS	NS	NS	NS	NS	NS	NS
CV		3.04	27.08	17.63	18.87	44.67	7.66	7.36	87.47	90.43
F value		0.7334	0.3077	0.2805	0.2659	0.9299	0.6103	0.6398	0.1111	0.1552

[a]Percentage of plants emerged on July 10th, 2014; mean of 4 replications.

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

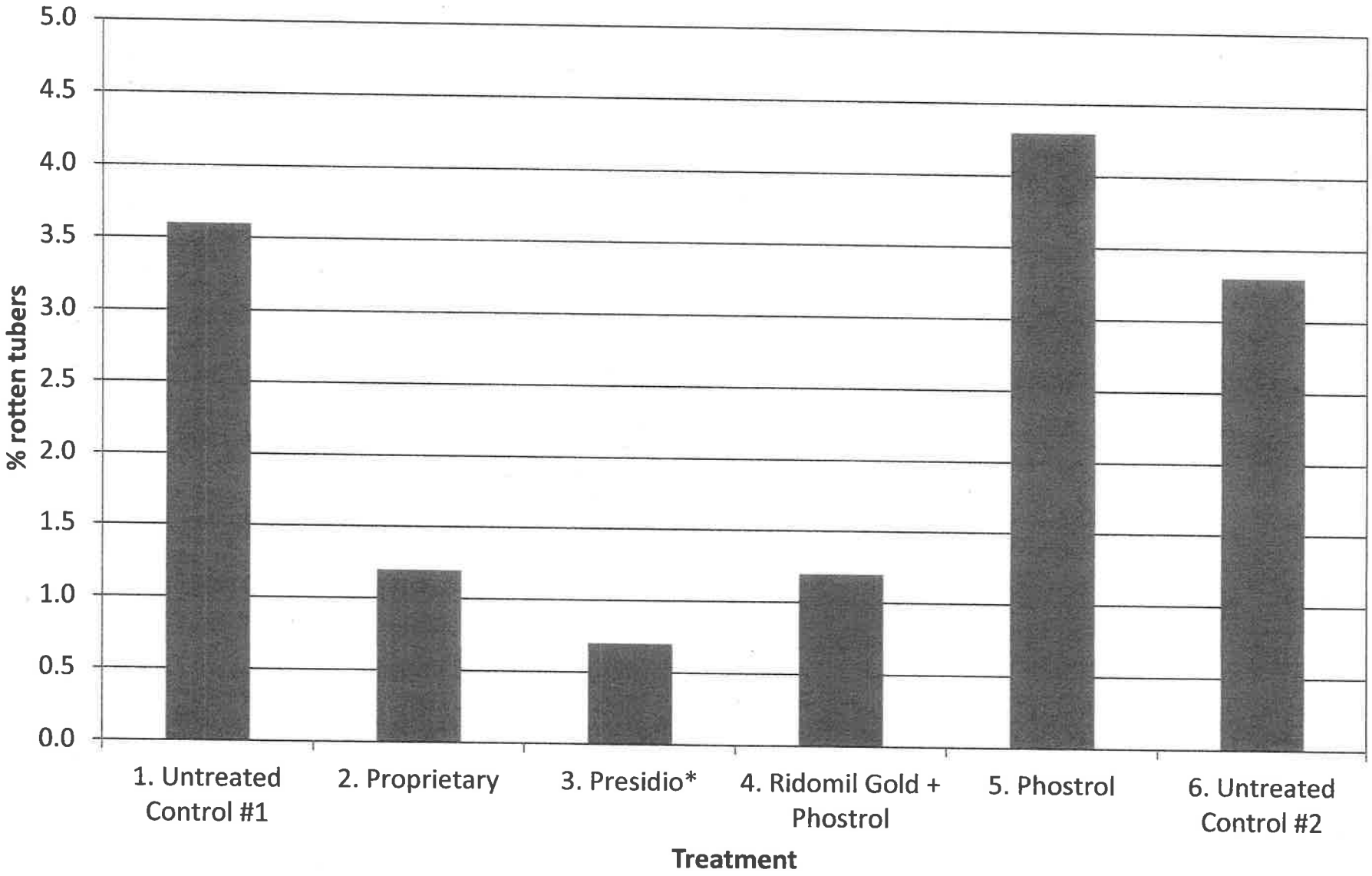
[c]Total yield expressed as hundred weight per acre, 2-20 foot rows per treatment per replication, mean of four replications.

[d]Hundred weight per acre minus the US #2s and culls, 2-20 foot rows per treatment per replication, mean of four replications.

[e]Mean percent of tubers with pink rot at harvest per treatment per replication (i.e. 0.86 = 0.86%).

[f]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).
Means followed by the same letters are not significantly different at P=0.05 (LSD).

2014 Pink Rot Fungicide Trial Results - % Rotten Tubers at Harvest, Colorado State University, San Luis Valley Research Center



*** Presidio is not currently registered for use in potatoes.**

2014 Black Scurf Fungicide Trials

In 2014, two different trials were set up to evaluate the effectiveness of eleven treatments (including several different compounds, rates, and application timings) for the management of black scurf and stem canker caused by *Rhizoctonia solani*. Several products were found to be effective for managing this disease. The use of Quadris, Serenade (a biological product) and a combination of Quadris + Serenade significantly reduced black scurf on tubers, which were evaluated several weeks post-harvest. The compounds, Priaxor and Vertisan, also reduced black scurf as well as stem canker; however this data was not significantly different from the untreated control. These products were also evaluated in 2013 with similar results, indicating that these products represent additional tools the grower can use to manage black scurf and stem canker in their potato crop.

EVALUATION OF SEED TREATMENTS APPLIED TO POTATO SEED FOR THE MANAGEMENT OF BLACK SCURF - Trial #1, 2014

Researcher: Andrew J. Houser, Colorado State University, SLVRC
Location: San Luis Valley Research Center, Center, CO
Cultivar: Crestone Russet
Objective: To evaluate the efficacy of various seed treatments. Additional data was collected on plant health, rhizoctonia severity, and overall yield.
Application: All seed treatments were applied directly to fresh cut seed on May 16, 2014. In-furrow(IF) and post emergence treatments were made using a CO2 charged backpack sprayer with two XR8002VS nozzles at 35psi. In-furrow applications were made on May 15th and products were applied on July 15, 2014.

Treatments:

1. Untreated Control
2. Vertisan @ 24 floz/a (IF)
3. Priaxor @ 6.74 floz/a (IF)
4. Quadris @ 9 floz/a (IF)
5. Moncot @ 12 oz/a (IF)
6. Priaxor @ 8 floz/a (IF)
7. Priaxor @ 8 floz/a (TI)

Planted: May 16, 2014
Plot Design: Randomized complete block
Plot Size: 2-25 foot rows 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-0K-25S-2.5Z, preplant, 60N through sprinkler after tuber set.
Herbicide: Dual Magnum @ 1.5 pt/A + Eptam @ 4.0 pt/A + Sencor @ 0.17 lb/A
Insecticide: None
Fungicide: Applied Endura @ 2.5 oz/A on August 14, 2014.
Vine Killer: Vines were chopped on September 11, 2014.
Harvested: Septemeber 18 & 19, 2014

DATA:

Plant stand count: % of emerged plants per treatment per replication. Readings taken on July 10th & July 29th.
Seed piece decay: Soft-rot and dry-rot combined rated 0-100, where 0 = no decay and 100 = complete decay; two seed pieces/treatment/replication. Readings taken on July 10th and July 24th.
% Stem canker: Percent stems infected with rhizoctonia; 2 plants/treatment/replication. Readings taken on July 10th and July 24th.
Severity index: Mean percent of stems infected with rhizoctonia, multiplied by the severity of damage, where 1 = small area of stem infected and 5 = entire stem infected.
Black scurf: % tubers with black scurf and black scurf severity post harvest, per treatment per replication. The sample evaluated contained the 10 tubers in the 4-10 ounce size range. Readings taken on October 21st.
Yield: 2-21 foot rows per treatment per replication, total yield expressed in cwt/A.
Grade: By hand, percent tubers by weight in kilograms < 4 oz., 4-10 oz., > 10 oz., US #2's & culls.

Table 1. Black Scurf Trial #1 - Effect of applied products for control of *Rhizoctonia solani*, on tuber yield and quality in the cultivar Crestone Russet, Colorado State University, San Luis Valley Research Center, Colorado, 2014.

Trt. #	Products/Timing	% Stand[a] (July 10th)	% Stand[b] (July 29th)	Percent[c] <4 oz.	Percent[c] 4-10 oz.	Percent[c] >10 oz.	Percent[c] US #2's & culls	Total CWT[d]	CWT w/o US #2's & culls[e]
1	Untreated Control	97.5	98.2 ab	14.5	46.1	37.9	1.6	455.4	448.2
2	Vertisan @ 24 floz/a (IF)	96.5	93.5 c	13.8	46.3	35.3	4.7	436.4	415.9
3	Priaxor @ 6.74 floz/a (IF)	99.0	94.7 bc	13.4	51.1	32.2	3.3	441.7	427.4
4	Quadris @ 9 floz/a (IF)	98.5	98.8 a	14.2	52.6	30.5	2.7	475.4	462.7
5	Moncot @ 12 oz/a (IF)	97.5	94.1 c	12.7	49.7	34.5	3.2	492.7	477.0
6	Priaxor @ 8 floz/a (IF)	100.0	97.0 abc	12.4	48.1	37.1	2.4	482.2	470.5
7	Priaxor @ 8 floz/a (TI)	100.0	98.2 ab	15.5	49.4	31.5	3.7	451.0	433.6
LSD (P=.05)		3.23	4.02	4.18	7.85	10.18	2.22	77.13	73.68
CV		2.21	2.81	20.43	10.78	20.09	48.44	11.24	11.07
F value		0.2309	0.0467	0.742	0.5626	0.6625	0.1676	0.6659	0.5336

[a]Percentage of plants emerged on July 10th, 2014; mean of 4 replications.

[b]Percentage of plants emerged on July 29th, 2014; mean of 4 replications.

[c]Based on tuber weight in kilograms, mean of four replications.

[d]Total yield expressed as hundred weight per acre, 2-21 foot rows per treatment per replication, mean of four replications.

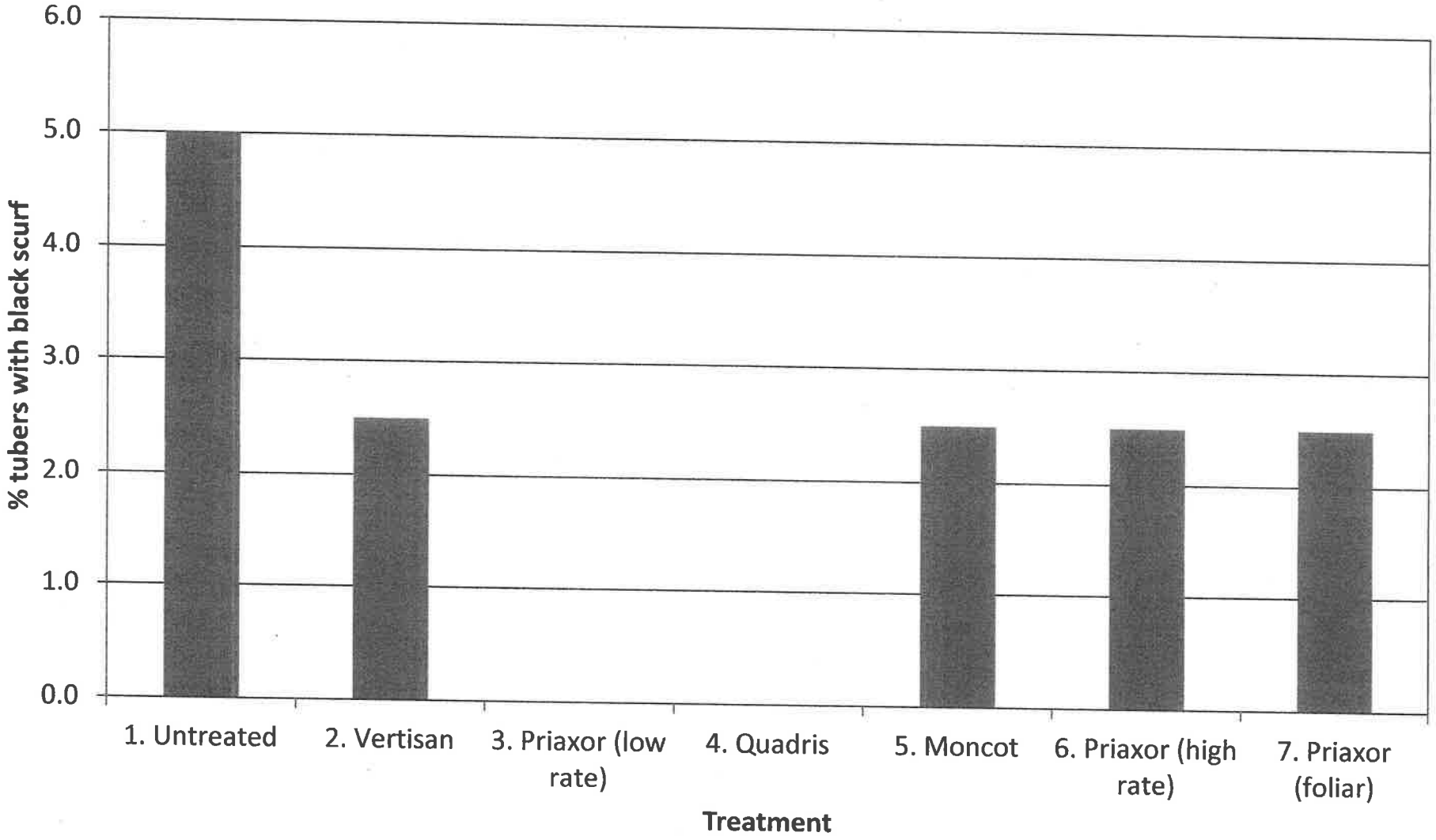
[e]Hundred weight per acre minus the US #2s and culls, 2-21 foot rows per treatment per replication, mean of four replications.
Means followed by same letter do not significantly differ (P=0.05)

Table 2. Black Scurf Trial #1 - Effects of seed treatments on in-season plant development and incidence of disease in the cultivar Crestone Russet, Colorado State University, San Luis Valley Research Center, Colorado, 2014.

		Stems & Seed Pieces evaluated in season						Tubers evaluated for rhizoctonia post harvest		
		7/10/2014			7/24/2014					
Trt. #	Products/Timing	% Stems w/rhizoc[a]	Severity Index[b]	% Seed Decay[c]	% Stems w/rhizoc[a]	Severity Index[b]	% Seed Decay[c]	% w/Rhizoc[d]	% <1% SA[e]	% 1-5% SA[f]
1	Untreated Control	40.3	88.6	54.7	67.2	131.2	75.0	12.5	7.5	5.0
2	Vertisan @ 24 floz/a (IF)	21.9	42.7	50.0	60.7	81.9	64.1	12.5	10.0	2.5
3	Priaxor @ 6.74 floz/a (IF)	35.2	51.9	59.4	64.1	98.3	76.6	5.0	5.0	0.0
4	Quadris @ 9 floz/a (IF)	32.1	79.0	64.1	55.4	92.9	96.9	2.5	2.5	0.0
5	Moncot @ 12 oz/a (IF)	33.0	59.1	51.6	69.0	111.9	85.9	12.5	10.0	2.5
6	Priaxor @ 8 floz/a (IF)	19.5	24.3	51.6	57.6	109.3	79.7	12.5	10.0	2.5
7	Priaxor @ 8 floz/a (TI)	43.6	71.6	64.1	71.2	159.4	84.4	7.5	5.0	2.5
LSD (P=0.05)		29.2	90.5	23.4	21.3	68.3	20.4	12.8	12.2	5.8
CV		61.1	102.2	27.9	22.5	41.0	17.1	92.8	114.7	181.2
F value		0.5733	0.7782	0.7406	0.664	0.313	0.0885	0.4678	0.7635	0.5897

[a]Mean % of stems with rhizoctonia stem canker per plant; 2 plants/treatment/rep. Readings taken on July 10th & July 24th; mean of 4 rep.
[b]Mean % of stems infected with rhizoctonia, multiplied by the severity of damage, where 1 = small % of stem infected and 5 = entire stem infected. Readings taken on July 10th & July 24th; mean of 4 replications.
[c]Mean % of seed piece decay per seed piece, Readings taken on July 10th & July 24th; mean of 4 replications.
[d]Mean % of tubers with black scurf, collected at harvest. Harvested on Sept. 19 and readings taken on October 21, 2014; mean of 4 reps.
[e]Mean % of tubers with black scurf, with less than 1% surface area covered by black scurf, collected at harvest; mean of 4 replications.
[f]Mean % of tubers with black scurf, with 1 to 5% surface area covered by black scurf, collected at harvest; mean of 4 replications.
Means followed by same letter do not significantly differ (P=0.05)

2014 Black Scurf/Stem Canker Fungicide Trial #1 Results
% tubers with black scurf (1 - 5% surface area) post-harvest, SLVRC



No statistical differences were observed between treatments.

EVALUATION OF SEED TREATMENTS APPLIED TO POTATO SEED FOR THE MANAGEMENT OF BLACK SCURF - Trial #2, 2014

Researcher: Andrew J. Houser, Colorado State University, SLVRC
Location: San Luis Valley Research Center, Center, CO
Cultivar: Crestone Russet
Objective: To evaluate the efficacy of various seed treatments. Additional data was collected on plant health, rhizoctonia severity, and overall yield.
Application: All seed treatments were applied directly to fresh cut seed on May 14, 2014. In-furrow(IF) and post emergence treatments were made using a CO2 charged backpack sprayer with two XR8002VS nozzles at 35psi. In-furrow applications were made on May 15th.

Treatments:

1. Untreated Control

2. Emesto Silver @ 0.31 floz/CWT + Nubark Mancozeb @ 12.0 oz/CWT (Seed Trt) & Quadris @ 8.7 floz/A (IF)

3. Emesto Silver @ 0.31 floz/CWT + Nubark Mancozeb @ 12.0 oz/CWT (Seed Trt) & Serenade Soil @ 2.0 qt./A (IF)

4. Emesto Silver @ 0.31 floz/CWT + Nubark Mancozeb @ 12.0 oz/CWT (Seed Trt) & Quadris @ 8.7 floz/A + Serenade Soil @ 2.0 qt./A (IF)

5. Emesto Silver @ 0.31 floz/CWT + Nubark Mancozeb @ 12.0 oz/CWT (Seed Trt) & Serenade Soil @ 3.0 qt./A (IF)

6. Emesto Silver @ 0.31 floz/CWT + Nubark Mancozeb @ 12.0 oz/CWT (Seed Trt) & Serenade Soil @ 4.0 qt./A (IF)

Planted: May 15, 2014
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: Solid set sprinkler, rate based on ET
Fertilizer: 80N-60P-0K-25S-2.5Z, preplant
Herbicide: Dual Magnum @ 1.5 pt/A + Chateau @ 1.0 oz/A + Sencor @ 0.33 lb/A
Insecticide: None
Fungicide: None
Vine Killer: Vines allowed to die naturally.
Harvested: Septemeber 19 & 22, 2014

DATA:

Plant stand count: % of emerged plants per treatment per replication. Readings taken on July 11th & July 30th.
Seed piece decay: Soft-rot and dry-rot combined rated 0-100, where 0 = no decay and 100 = complete decay; two seed pieces/treatment/replication. Readings taken on July 11th and July 24th.
% Stem canker: Percent stems infected with rhizoctonia; 2 plants/treatment/replication. Readings taken on July 11th and July 24th.
Severity index: Mean percent of stems infected with rhizoctonia, multiplied by the severity of damage, where 1 = small area of stem infected and 5 = entire stem infected.
Black scurf: % tubers with black scurf and black scurf severity post harvest, per treatment per replication. The sample evaluated contained the 10 tubers in the 4-10 ounce size range. Readings taken on October 20th.
Yield: 2-16 foot rows per treatment per replication, total yield expressed in cwt/A.
Grade: By hand, percent tubers by weight in kilograms < 4 oz., 4-10 oz., > 10 oz., US #2's & culls.

Table 1. Black Scurf Trial #2 - Effect of applied products for control of *Rhizoctonia solani* , on tuber yield and quality in the cultivar Crestone Russet, Colorado State University, San Luis Valley Research Center, Colorado, 2014.

				Percent[c]					
Trt. #	Products/Timing	% Stand[a] (July 11th)	% Stand[b] (July 30th)	<4 oz.	4-10 oz.	>10 oz.	US #2's & culls	Total CWT[d]	CWT w/o US #2's & culls[e]
1	Untreated Control	89.4 b	90.7	14.4	41.6	41.4	2.6	425.9	414.5
2[f]	Quadris @ 8.7 floz/A (IF)	98.1 a	93.0	19.6	47.0	29.3	4.1	433.0	416.3
3[f]	Serenade Soil @ 2.0 qt./A (IF)	98.1 a	92.2	16.2	52.3	28.9	2.6	453.9	442.0
4[f]	Quadris @ 8.7 floz/A + Serenade Soil @ 2.0 qt./A (IF)	100.0 a	95.3	14.3	50.1	34.1	1.5	447.0	440.1
5[f]	Serenade Soil @ 3.0 qt./A (IF)	99.4 a	94.6	17.9	53.2	26.5	2.4	419.5	409.2
6[f]	Serenade Soil @ 4.0 qt./A (IF)	97.5 a	92.2	16.1	55.2	27.0	1.9	466.6	457.9
LSD (P=.05)		4.7	NS	NS	NS	NS	NS	NS	NS
CV		3.21	4.87	24.16	20.79	35.08	73.11	8.78	8.87
F value		0.0026	0.7206	0.416	0.5078	0.4121	0.4742	0.5297	0.4325

[a]Percentage of plants emerged on July 11th, 2014; mean of 4 replications.

[b]Percentage of plants emerged on July 30th, 2014; mean of 4 replications.

[c]Based on tuber weight in kilograms, mean of four replications.

[d]Total yield expressed as hundred weight per acre, 2-16 foot rows per treatment per replication, mean of four replications.

[e]Hundred weight per acre minus the US #2s and culls, 2-16 foot rows per treatment per replication, mean of four replications.

[f]Seed from treaments 2, 3, 4, 5,& 6 were treated with Emesto Silver @ 0.31 floz/CWT + Nubark Mancozeb @ 12.0 oz/CWT.

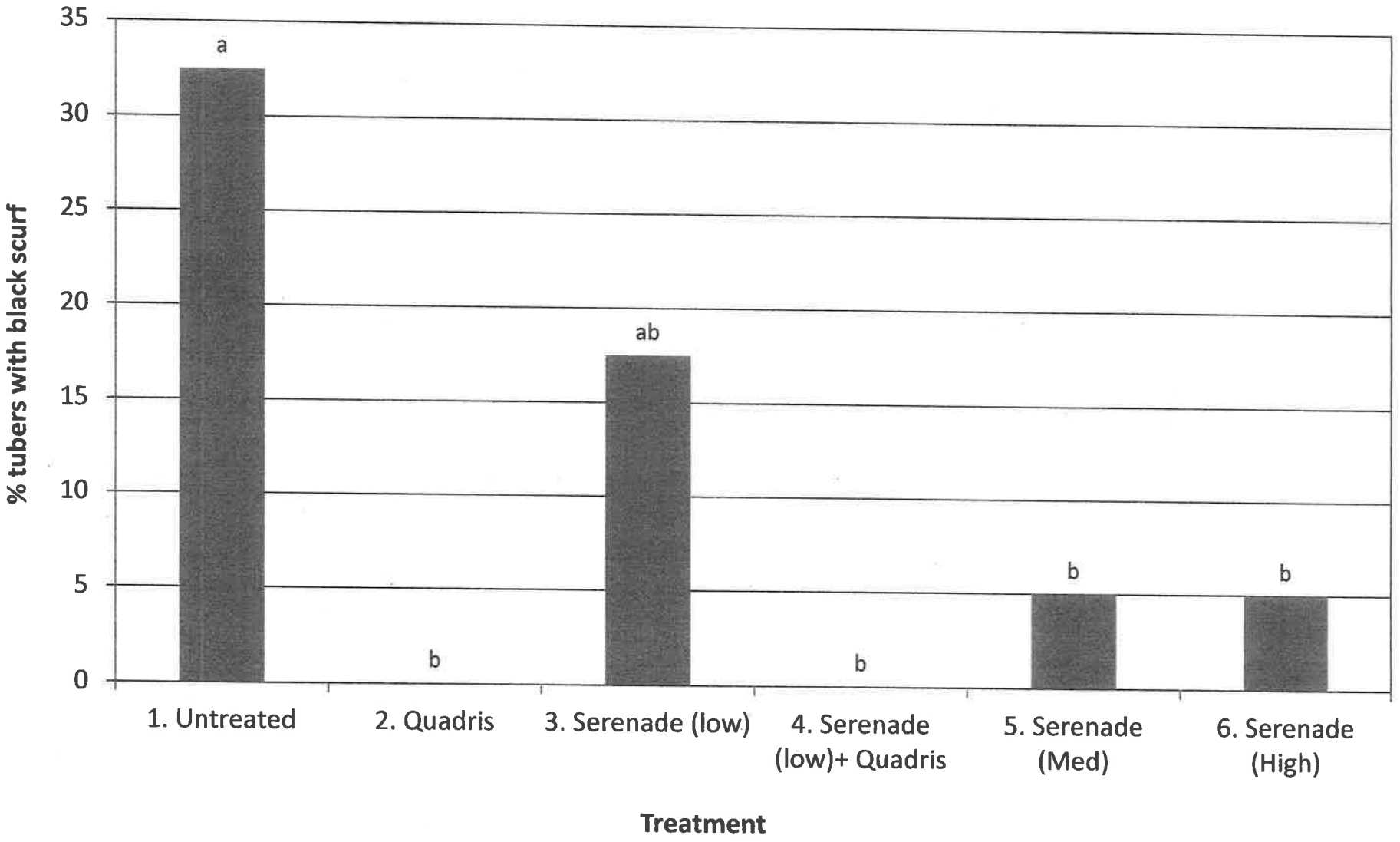
Means followed by same letter do not significantly differ (P=0.05)

Table 2. Black Scurf Trial #2 - Effects of seed treatments on in-season plant development and incidence of disease in the cultivar Crestone Russet, Colorado State University, San Luis Valley Research Center, Colorado, 2014.

		Stems & Seed Pieces evaluated in season						Tubers evaluated for rhizoctonia post harvest		
		7/11/2014			7/24/2014					
Trt. #	Products/Timing	% Stems w/rhizoc[a]	Severity Index[b]	% Seed Decay[c]	% Stems w/rhizoc[a]	Severity Index[b]	% Seed Decay[c]	% w/Rhizoc[d]	% 1-5% SA[e]	% 5-25% SA[f]
1	Untreated Control	60.7 a	74.7 a	67.2 a	68.6 a	113.1 a	65.6 a	32.5 a	15.0 a	10.0 a
2[g]	Quadris @ 8.7 floz/A (IF)	61.8 a	64.9 a	48.4 a	54.3 a	91.4 a	64.1 a	0.0 b	0.0 b	0.0 a
3[g]	Serenade Soil @ 2.0 qt./A (IF)	46.8 a	56.6 a	32.8 a	61 a	94.4 a	57.8 a	17.5 ab	0.0 b	2.5 a
4[g]	Quadris @ 8.7 floz/A + Serenade Soil @ 2.0 qt./A (IF)	52.8 a	52.8 a	31.3 a	56.4 a	62.2 a	42.2 a	0.0 b	0.0 b	0.0 a
5[g]	Serenade Soil @ 3.0 qt./A (IF)	53.7 a	53.7 a	29.7 a	60.7 a	74.9 a	68.8 a	5.0 b	0.0 b	0.0 a
6[g]	Serenade Soil @ 4.0 qt./A (IF)	73.5 a	73.5 a	46.9 a	79.7 a	98.4 a	67.2 a	5.0 b	2.5 b	0.0 a
LSD (P=0.05)		NS	NS	NS	NS	NS	NS	18.99	6.3	NS
CV		29.45	33.72	54.32	27.97	46.08	43.77	126.05	143.43	384.5
F value		0.3627	0.5258	0.2314	0.3979	0.5849	0.7329	0.0153	0.0006	0.4509

[a]Mean % of stems with rhizoctonia stem canker per plant; 2 plants/treatment/rep. Readings taken on July 10th & July 24th; mean of 4 rep.
[b]Mean % of stems infected with rhizoctonia, multiplied by the severity of damage, where 1 = small % of stem infected and 5 = entire stem infected. Readings taken on July 11th & July 24th; mean of 4 replications.
[c]Mean % of seed piece decay per seed piece, Readings taken on July 11th & July 24th; mean of 4 replications.
[d]Mean % of tubers with black scurf, collected at harvest. Harvested on Sept. 22 and readings taken on October 20, 2014; mean of 4 reps.
[e]Mean % of tubers with black scurf, with less than 1-5% surface area covered by black scurf, collected at harvest; mean of 4 replications.
[f]Mean % of tubers with black scurf, with 5 to 25% surface area covered by black scurf, collected at harvest; mean of 4 replications.
[g]Seed from treaments 2, 3, 4, 5,& 6 were treated with Emesto Silver @ 0.31 floz/CWT + Nubark Mancozeb @ 12.0 oz/CWT.
Means followed by same letter do not significantly differ (P=0.05)

2014 Black Scurf/Stem Canker Fungicide Trial #2 Results
% tubers with black scurf post-harvest, SLVRC



All treatments (excluding untreated) had Emesto Silver and Nubark Mancozeb applied in-furrow.
Means followed by same letter are not significantly different at p=0.05.

2014 Flowering Cover Crop PVY Trial

The purpose of this trial was to evaluate the effectiveness of using a mix of different plant species which produced flowers at different times throughout the course of the season for reducing the spread of PVY in a potato crop. A flowering plant species mix was planted adjacent to four rows of Russet Norkotah sel. 8 potatoes. The initial level of PVY in the potatoes was roughly 0% and 8%. Two control plots were also set up and evaluated (one without insecticide application and one with several insecticide applications through the season). Plants were visually evaluated for PVY two times in the summer and a sample was collected at harvest and sent to Hawaii for evaluation.

The results indicated that potatoes planted next to a flowering species mix had a final PVY level of 25%, which was more than in the crop where insecticides were applied (16%); however, this difference was not statistically significant. The potatoes without any flowers planted nearby or insecticides applied had a final PVY level of 39%, which was statistically higher (treatments were analyzed using a LSD mean separation, $p=0.05$). The use of a flowering species mix, when planted adjacent to potatoes, appears to reduce the spread of PVY. Further evaluation of this management strategy will be evaluated again next year.

EVALUATION OF USING A FLOWERING SPECIES MIX TO REDUCE PVY SPREAD IN THE POTATO CULTIVAR RUSSET NORKOTAH SELECTION 8, SLVRC, 2014

Researcher: Andrew J. Houser, Colorado State University, SLVRC (in cooperation with Brendon Rockey of Rockey Farms)

Location: San Luis Valley Research Center, Center, CO

Cultivar: Russet Norkotah sel. 8

Objective: To evaluate the use of a flowering species mix to manage the spread of Potato Virus Y (PVY).

Treatments:

1. Insecticides Used - Russet Norkotah sel. 8 (0% initial PVY level)
2. No Insecticides Used - Russet Norkotah sel. 8 (0% initial PVY level)
3. Flowering crop mix - Russet Norkotah sel. 8 (0% initial PVY level)
4. Insecticides Used - Russet Norkotah sel. 8 (8% initial PVY level)
5. No Insecticides Used - Russet Norkotah sel. 8 (8% initial PVY level)
6. Flowering crop mix - Russet Norkotah sel. 8 (8% initial PVY level)

Planted: May 8 & 9, 2014 (planted the potatoes); June 3, 2014 (planted the flowering species mix)

Plot Design: Complete Block Design

Plot Size: 1-80 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-0K-25S-2.5Z, preplant, 60N through sprinkler after tuber set.

Herbicide: Dual Magnum @ 1.25 pt/A + Eptam @ 4.0 pt/A + 0.17 lb Sencor/A (trts 2,3,5,6); Outlook (trts 1 & 4)

Insecticide: Leverage 360 @ 2.8 oz./A & Belay @ 2.8 oz/A & Movento @ 5.0 oz/A (trts 1 & 4); None on trts 2,3,5,6.

Fungicide: Quadris @ 1.6 pt/A & Luna Tranquility @ 11.2 floz/A (trts 1 & 4); Endura @ 2.5 oz/A (trts 2,3,5,6).

Vine Killer: Applied Reglone on August 12 & 13, 2014.

Harvested: September 16 & 17, 2014

DATA:

Mosaic Readings: Evaluated all plants for mosaic symptoms twice during the summer (June 23 & July 22, 2014). Also pulled a sample of 80 tubers (evenly distributed down each row) per treatment per replication. The samples were gassed with Rindite (November 7, 2014) and planted (December 1st & 2nd) on Oahu, HI and were evaluated for mosaic on January 15, 2015. A total percentage of potato plants with mosaic symptoms was calculated from each disease reading.

Table 1. Effect of a flowering species mix on reducing PVY spread in the potato cultivar Russet Norkotah sel. 8, Colorado State University, San Luis Valley Research Center, Colorado, 2014.

Trt. #	Treatment	First Mosaic Reading June 23, 2014[a]	Second Mosaic Reading July 22, 2014[b]	Final Mosaic Reading January 15, 2015[c]
1	Insecticides Used (0% initial PVY level)	2.2 a	3.5 a	7.1 a
2	No Insecticides Used (0% initial PVY level)	0.3 b	1.1 b	10.6 a
3	Flowering Species Mix (0% initial PVY level)	0.5 b	0.8 b	11.1 a
LSD (P=0.05)		1.61	1.08	NS
CV		93.72	34.68	39.04
F value		0.0459	0.0016	0.327

Trt. #	Treatment	First Mosaic Reading June 23, 2014[a]	Second Mosaic Reading July 22, 2014[b]	Final Mosaic Reading January 15, 2015[c]
4	Insecticides Used (8% initial PVY level)	9.6 a	6.4 a	16.4 b
5	No Insecticides Used (8% initial PVY level)	6.7 a	8.5 a	39.0 a
6	Flowering Species Mix (8% initial PVY level)	7.9 a	7.4 a	25.2 b
LSD (P=0.05)		NS	NS	9.25
CV		26.16	21.02	19.9
F value		0.2306	0.2468	0.0028

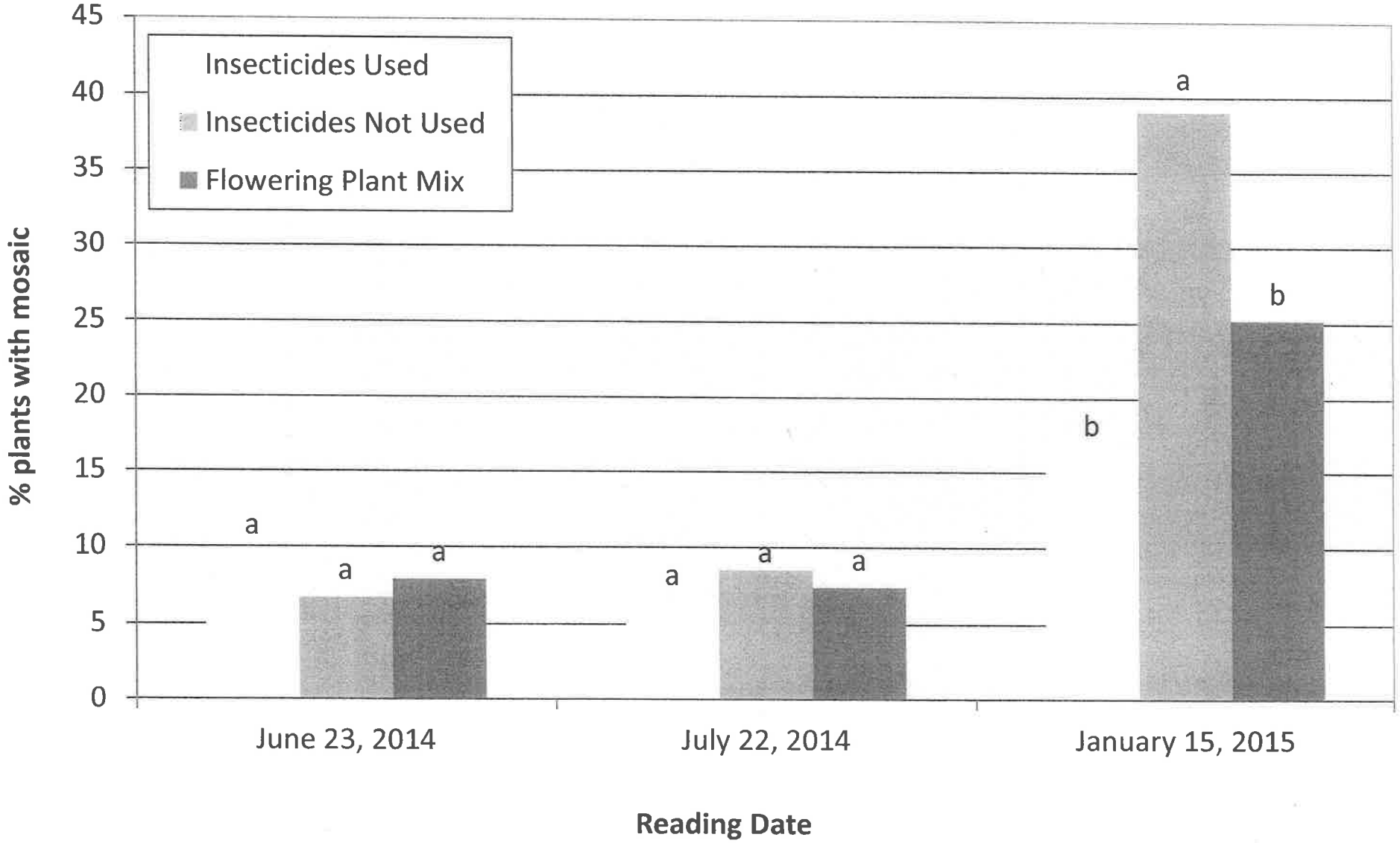
[a]Percentage of plants expressing visual mosaic symptoms on June 23, 2014, one 80 foot row per treatment per replication, mean of four replications.

[b]Percentage of plants expressing visual mosaic symptoms on July 22, 2014, one 80 foot row per treatment per replication, mean of four replications.

[c]A sample of 80 drop seed sized potatoes (3-4 ounces each) was collected from each treatment/replication and were planted in Oahu, HI. The percentage of plants expressing visual mosaic symptoms was recorded on January 15, 2015,

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

2014 Evaluation of a Flowering Species Mix to Reduce PVY Spread Results
% Mosaic in Russet Norkatah sel. 8 (Initial PVY Level of 8%),
Colorado State University, San Luis Valley Research Center



Means folllowed by the same letter are not significantly different at p=0.05.

2014 Advanced Clone Evaluations

In 2013, 39 potato clones evaluated for soft rot (caused by *Pectobacerium* sp.) and dry rot (caused by *Fusarium* sp.) resistance. There was a wide range of symptom development in all the clones evaluated. Clones that had relatively low levels of dry rot included AC05175-3P/Y, CO05024-11RU, CO04067-8R/Y, and Rio Grande Russet. Clones with relatively low levels of bacterial soft rot included CO05035-5W/Y, AC05153-1W, CO05175-1RU, CO05228-4R, and Rio Grande Russet. In 2014, there were 25 new clones evaluated for soft and dry rot resistance. These results are still pending.

2014 Powdery Scab Clonal Evaluation Trial

In 2014, there were 26 cultivars, including 15 new clones from the breeding program were evaluated for powdery scab resistance. Unfortunately, the results from this trial are still pending. Results for this study should be available by the end of May, 2015.

2013 Storage Rot Clonal Evaluation

In 2013, 39 potato clones evaluated for soft rot (caused by *Pectobacerium* sp.) and dry rot (caused by *Fusarium* sp.) resistance. There was a wide range of symptom development in all the clones evaluated. Clones that had relatively low levels of dry rot included AC05175-3P/Y, CO05024-11RU, CO04067-8R/Y, and Rio Grande Russet. Clones with relatively low levels of bacterial soft rot included CO05035-5W/Y, AC05153-1W, CO05175-1RU, CO05228-4R, and Rio Grande Russet. In 2014, there were 25 new clones evaluated for soft and dry rot resistance. These results are still pending.

EVALUATION OF ADVANCED CLONES FOR SUSCEPTIBILITY TO DIFFERENT STORAGE ROTS, 2013

Researchers: Andrew J. Houser & Robert D. Davidson (advisory role), Colorado State University

Location: San Luis Valley Research Center, Greenhouse, Center, CO

Objective: To evaluate the susceptibility of advanced potato clones to *Fusarium* sp. and *Pectobacterium* sp.

Inoculation Protocol: For *Pectobacterium* sp. - 50ul of 7.0 x 104 cfu/ml was injected into 3 inoculation sites per tuber near the stem end on May 21, 2014; two tubers per replication, three replications.

For *Fusarium* sp. - 50ul of 250 spores/tuber was injected into 3 inoculation sites per tuber near the stem end on February 19 & 20, 2014; four tubers per replication, three replications.

Temperature: Tubers kept at 55-60°F after inoculation for 4-6 weeks.

Cultivars:

1. AC03534-2R/Y
2. AC05039-2RU
3. CO04220-7RU
4. CO05028-4P/PY
5. CO05028-6P/PY
6. CO05028-11P/RWP
7. CO05030-5W/Y
8. CO05035-1PW/Y
9. CO05035-5PW/Y
10. CO05035-8PW/Y
11. CO05079-4P/PW
12. CO06024-7RU
13. CO06057-3RU
14. CO06062-3RU
15. CO06215-2R
16. CO06215-11R
17. TC05276-7P/PW
18. AC05153-1W
19. AC05175-3P/Y
20. CO05024-11RU
21. CO05037-2R/Y
22. CO05037-3W/Y
23. CO05040-1RU
24. CO05061-2P
25. CO05061-6W
26. CO05068-1RU
27. CO05110-6RU
28. CO05132-2RU
29. CO05152-5RU
30. CO05175-1RU
31. CO05189-2RU
32. CO05211-4R
33. CO05228-4R
34. AC00206-2W
35. AC03452-2W
36. CO04056-3P/PW
37. CO04063-4R/R
38. CO04067-8R/Y
39. CO04099-3W/Y
40. Canela Russet
41. Rio Grande Russet
42. Russet Norkotah
43. Russet Nugget
44. Sangre S-10

Plot Design: Completely Randomized Design

Seed: Four potatoes were evaluated per cultivar per replication.

Replications: Three (for the *Fusarium* sp. inoculation) & Two (for the *Pectobacterium* sp. inoculation)

Rating Scale:
1 = No symptoms
2 = Localized damage
3 = 25-50% tuber damage
4 = > 50% tuber damage
5 = 100% tuber damage

Data Collection: Tubers were cut and evaluated using the above rating scale on March 25th, 2014 for the *Fusarium* sp. inoculation and on July 17th, 2014 for the *Pectobacterium* sp. inoculation.

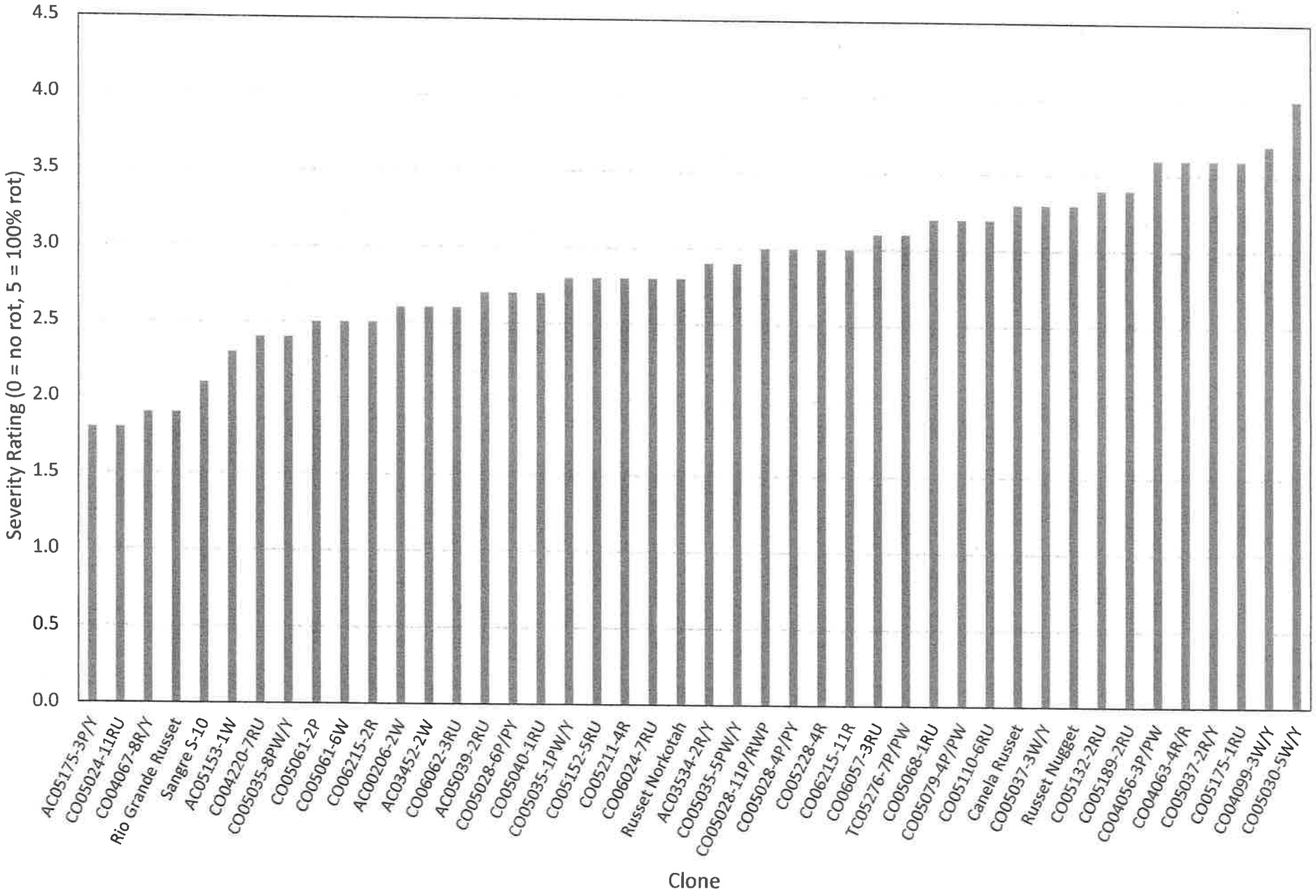
Grade loss occurs at 2+ for *Fusarium* a sp., 3+ for *Pectobacterium* sp.

Table 1. Evaluation of advenced clones for tuber susceptibility to soft rot (*Pectobacterium* sp.) and dry rot (*Fusarium* sp.), Colorado State University, San Lus Valley Research Center, Center, CO, 2013.

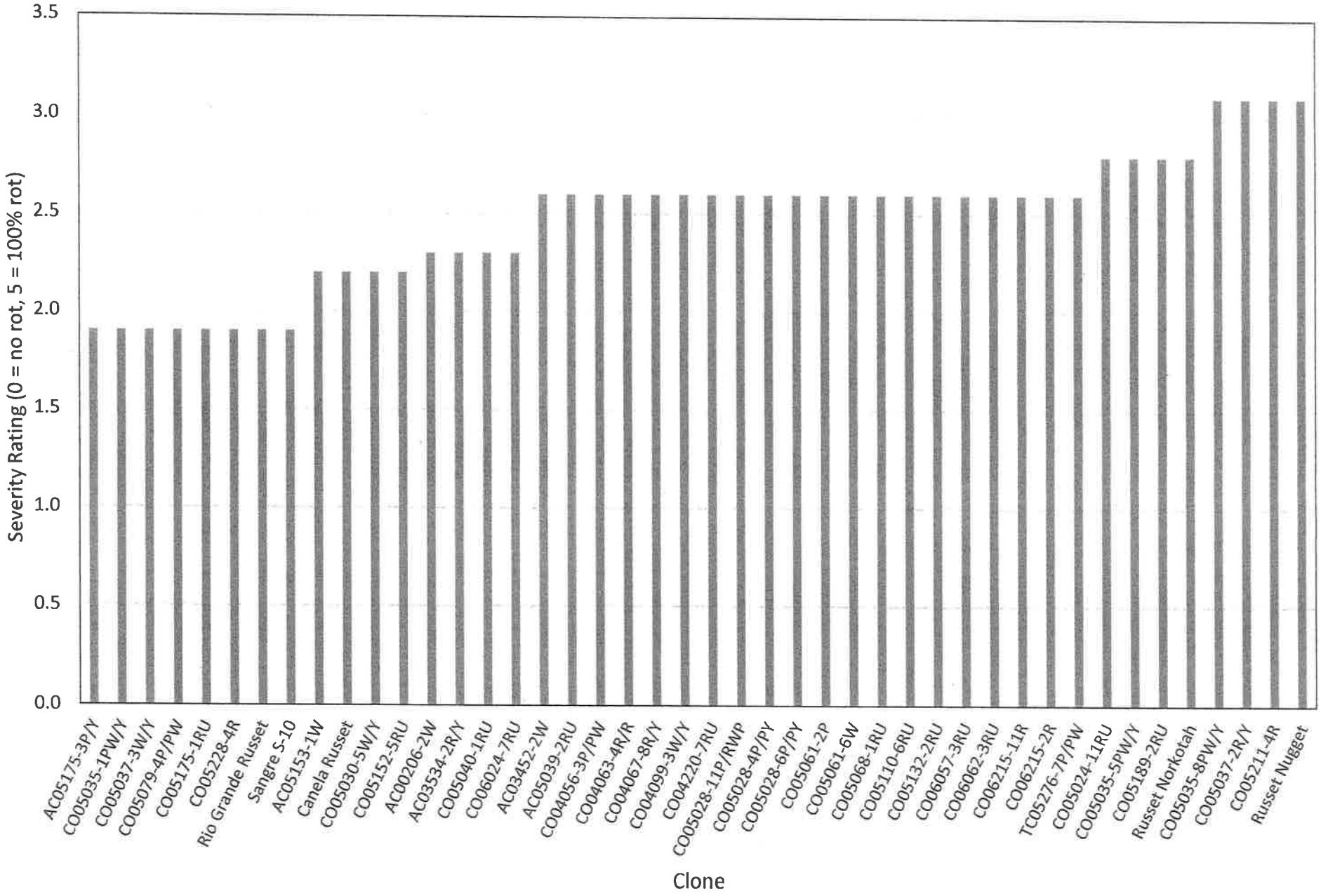
Clone	Soft Rot (*Pectobacterium* sp.) Severity[a]	Dry Rot (*Fusarium* sp.) Severity[b]
1. AC03534-2R/Y	2.9 d-i	2.3 cd
2. AC05039-2RU	2.7 f-k	2.6 bc
3. CO04220-7RU	2.4 i-m	2.6 bc
4. CO05028-4P/PY	3.0 c-i	2.6 bc
5. CO05028-6P/PY	2.7 f-k	2.6 bc
6. CO05028-11P/RWP	3.0 c-i	2.6 bc
7. CO05030-5W/Y	4.0 a	2.2 cd
8. CO05035-1PW/Y	2.8 d-j	1.9 d
9. CO05035-5PW/Y	2.9 d-i	2.8 ab
10. CO05035-8PW/Y	2.4 i-m	3.1 a
11. CO05079-4P/PW	3.2 b-g	1.9 d
12. CO06024-7RU	2.8 e-j	2.3 cd
13. CO06057-3RU	3.1 b-h	2.6 bc
14. CO06062-3RU	2.6 g-k	2.6 bc
15. CO06215-2R	2.5 h-l	2.6 bc
16. CO06215-11R	3.0 c-i	2.6 bc
17. TC05276-7P/PW	3.1 b-h	2.6 bc
18. AC05153-1W	2.3 j-m	2.2 cd
19. AC05175-3P/Y	1.8 m	1.9 d
20. CO05024-11RU	1.8 m	2.8 ab
21. CO05037-2R/Y	3.6 abc	3.1 a
22. CO05037-3W/Y	3.3 b-e	1.9 d
23. CO05040-1RU	2.7 f-k	2.3 cd
24. CO05061-2P	2.5 h-l	2.6 bc
25. CO05061-6W	2.5 h-l	2.6 bc
26. CO05068-1RU	3.2 b-g	2.6 bc
27. CO05110-6RU	3.2 b-g	2.6 bc
28. CO05132-2RU	3.4 a-d	2.6 bc
29. CO05152-5RU	2.8 d-j	2.2 cd
30. CO05175-1RU	3.6 abc	1.9 d
31. CO05189-2RU	3.4 a-d	2.8 ab
32. CO05211-4R	2.8 e-j	3.1 a
33. CO05228-4R	3.0 c-i	1.9 d
34. AC00206-2W	2.6 g-k	2.3 cd
35. AC03452-2W	2.6 g-k	2.6 bc
36. CO04056-3P/PW	3.6 abc	2.6 bc
37. CO04063-4R/R	3.6 abc	2.6 bc
38. CO04067-8R/Y	1.9 lm	2.6 bc
39. CO04099-3W/Y	3.7 ab	2.6 bc
40. Canela Russet	3.3 b-e	2.2 cd
41. Rio Grande Russet	1.9 lm	1.9 d
42. Russet Norkotah	2.8 e-j	2.8 ab
43. Russet Nugget	3.3 b-f	3.1 a
44. Sangre S-10	2.1 klm	1.9 d
LSD (P=0.05)	0.6	0.5
CV	12.87	11.75
F value	0.0001	0.0001

[a]Avg. severity rating for soft rot caused by *Pectobacterium* sp., readings taken on July 17, 2014, mean of 2 reps.
[b]Avg. severity rating for soft rot caused by *Fusarium* sp., readings taken on March 24, 2014, mean of 3 reps.
Means followed by the same letters are not significantly different at P=0.05.

Clonal Evaluation of Tuber Dry Rot caused by *Fusarium* sp., SLV Research Center, Center, CO 2013



Clonal Evaluation of Tuber Dry Rot caused by *Pectobacterium* sp., SLV Research Center, Center, CO 2013



2014 Potato Virus Y (PVY) Clonal Evaluation

In 2014, a trail was set up to determine the level of PVY resistance in new potato stocks as well as in potato cultivars that are currently being grown in the San Luis Valley. An approach was implemented which took advantage of high PVY inoculum levels and natural aphid spread in a field planted to Russet Norkotah potatoes. Thirty-seven different potato clones and cultivars were evaluated using this strategy. As expected, the Russet Norkotahs that were included in the trial showed a high level of PVY spread. This cultivar has been known to be highly susceptible to PVY, which was confirmed in this trial. Conversely, Fortress Russet has been known to be highly resistant to PVY, which was also confirmed in this trial. Several of the new clones that were evaluated in this trial showed some moderate resistance to PVY. These clones could be used by growers to manage PVY on their farm where PVY is a concern.

EVALUATION OF POTATO CLONES FOR SYMPTOM EXPRESSION AND RESISTANCE TO POTATO VIRUS Y (PVY), SLVRC, 2014

Researcher: Andrew J. Houser, Colorado State University, SLVRC
Location: Off-station, on a commercial potato growers farm, SLV
Objective: To evaluate new potato clones for symptom expression and resistance to PVY.

Clones:

1. Centennial Russet
2. Centennial Russet
3. Classic Russet
4. CO05035-1PW/Y
5. CO05079-4P/PW
6. CO07015-4RU
7. CO07049-1RU
8. CO07070-10W
9. CO07070-13W
10. CO07102-1R
11. CO07131-1W/Y
12. CO07153-3RW/Y
13. CO07205-4RU
14. CO07322-3R
15. CO07329-1P/Y
16. CO07370-1W/Y
17. Crestone Russet
18. Fortress Russet
19. Innovator
20. Katahdin
21. La Ratte
22. Masquarade
23. Mercury Russet
24. Mesa Russet
25. Penobscot
26. Rio Grande
27. Russet Burbank
28. Russet Nugget
29. Tebina Russet
30. Teton Russet
31. Ute Russet
32. WNC230-14RU
33. Yukon Gold
34. Russet Norkotah sel 112
35. Russet Norkotah sel 8
36. Russet Norkotah border 1
37. Russet Norkotah border 2

Planted: May 7, 2014
Plot Design: Randomized Complete Block Design
Plot Size: 1-15 foot row per treatment per replication
Plant Spacing: 12 inches
Row Spacing: 34 inches
Replications: Three
Irrigation: Center Pivot, rate based on ET
Fertilizer: NA
Herbicide: NA
Insecticide: NA
Fungicide: NA
Vine Killer: NA
Harvested: September 15, 2014

DATA:

Mosaic Readings: Evaluated all plants for mosaic symptoms twice during the summer (July 3 & August 5, 2014). Also pulled a sample of 15 tubers (evenly distributed throughout each plot) per cultivar per replication. The samples were gassed with Rindite (November 7, 2014) and planted (December 1st & 2nd) in Oahu, HI and were evaluated for mosaic on January 15, 2015. A total percentage of potato plants with mosaic symptoms was calculated from each disease reading.

Table 1. Evaluation of advenced clones for susceptibility to Potato Virus Y (PVY) spread, Colorado State University, San Lus Valley Research Center, Center, CO, 2014.

Clone	% PVY July 3, 2014[a]		% PVY August 5, 2014[b]		% PVY January 15, 2015[c]		Visual Rating[d]
1. Centennial Russet	0.0	d	5.1	de	11.2	i-m	3
2. Centennial Russet	0.0	d	19.6	bc	14.9	i-m	3 & 4
3. Classic Russet	0.0	d	0.0	e	30.6	g-k	3
4. CO05035-1PW/Y	4.6	cd	7.8	de	14.7	i-m	4
5. CO05079-4P/PW	0.0	d	9.4	de	2.4	lm	4
6. CO07015-4RU	0.0	d	0.0	e	6.4	j-m	4 & 5
7. CO07049-1RU	0.0	d	9.4	de	16.4	i-m	5
8. CO07070-10W	0.0	d	0.0	e	17.8	i-m	5
9. CO07070-13W	6.7	c	0.0	e	12.8	i-m	3
10. CO07102-1R	2.2	cd	11.1	cd	6.7	j-m	5
11. CO07131-1W/Y	5.0	cd	2.2	de	2.6	klm	5
12. CO07153-3RW/Y	0.0	d	2.4	de	2.4	lm	4
13. CO07205-4RU	0.0	d	0.0	e	8.6	i-m	5
14. CO07322-3R	14.6	b	5.0	de	14.8	i-m	4 & 5
15. CO07329-1P/Y	20.8	a	20.3	bc	77.8	a-d	4 & 5
16. CO07370-1W/Y	0.0	d	2.4	de	18.8	i-m	5
17. Crestone Russet	0.0	d	0.0	e	59.4	b-f	3 & 4
18. Fortress Russet	0.0	d	0.0	e	0.0	m	NA
19. Innovator	0.0	d	9.5	de	20.4	i-m	3
20. Katahdin	0.0	d	0.0	e	4.3	klm	5
21. La Ratte	0.0	d	7.1	de	33.8	f-j	2 & 5
22. Masquarade	0.0	d	2.6	de	0.0	m	NA
23. Mercury Russet	0.0	d	0.0	e	22.0	h-m	3
24. Mesa Russet	0.0	d	7.5	de	11.5	i-m	3
25. Penobscot	6.9	c	0.0	e	4.8	klm	5
26. Rio Grande	0.0	d	0.0	e	14.7	i-m	3 & 5
27. Russet Burbank	0.0	d	0.0	e	73.6	a-d	5
28. Russet Nugget	0.0	d	0.0	e	36.3	e-i	4 & 5
29. Tebina Russet	0.0	d	2.4	de	0.0	m	NA
30. Teton Russet	0.0	d	0.0	e	11.9	i-m	3
31. Ute Russet	2.2	cd	2.2	de	25.3	g-m	3 & 4
32. WNC230-14RU	13.2	b	0.0	e	28.5	g-l	4 & 5
33. Yukon Gold	0.0	d	0.0	e	25.1	g-m	3 & 5
34. Russet Norkotah sel 112	0.0	d	2.2	de	51.4	c-g	3
35. Russet Norkotah sel 8	4.5	cd	11.1	cd	52.6	c-g	3
36. Russet Norkotah border 1	No Reading		27.3	ab	79.1	abc	3
37. Russet Norkotah border 2	No Reading		34.0	a	81.5	ab	3
LSD (P=0.05)	5.98		9.75		28.17		-
CV	159.75		128.11		64.16		-
F value	0.0001		0.0001		0.0001		-

[a]Percent potato plants expressing visual mosaic symptoms expressing on July 3, 2014, mean of three

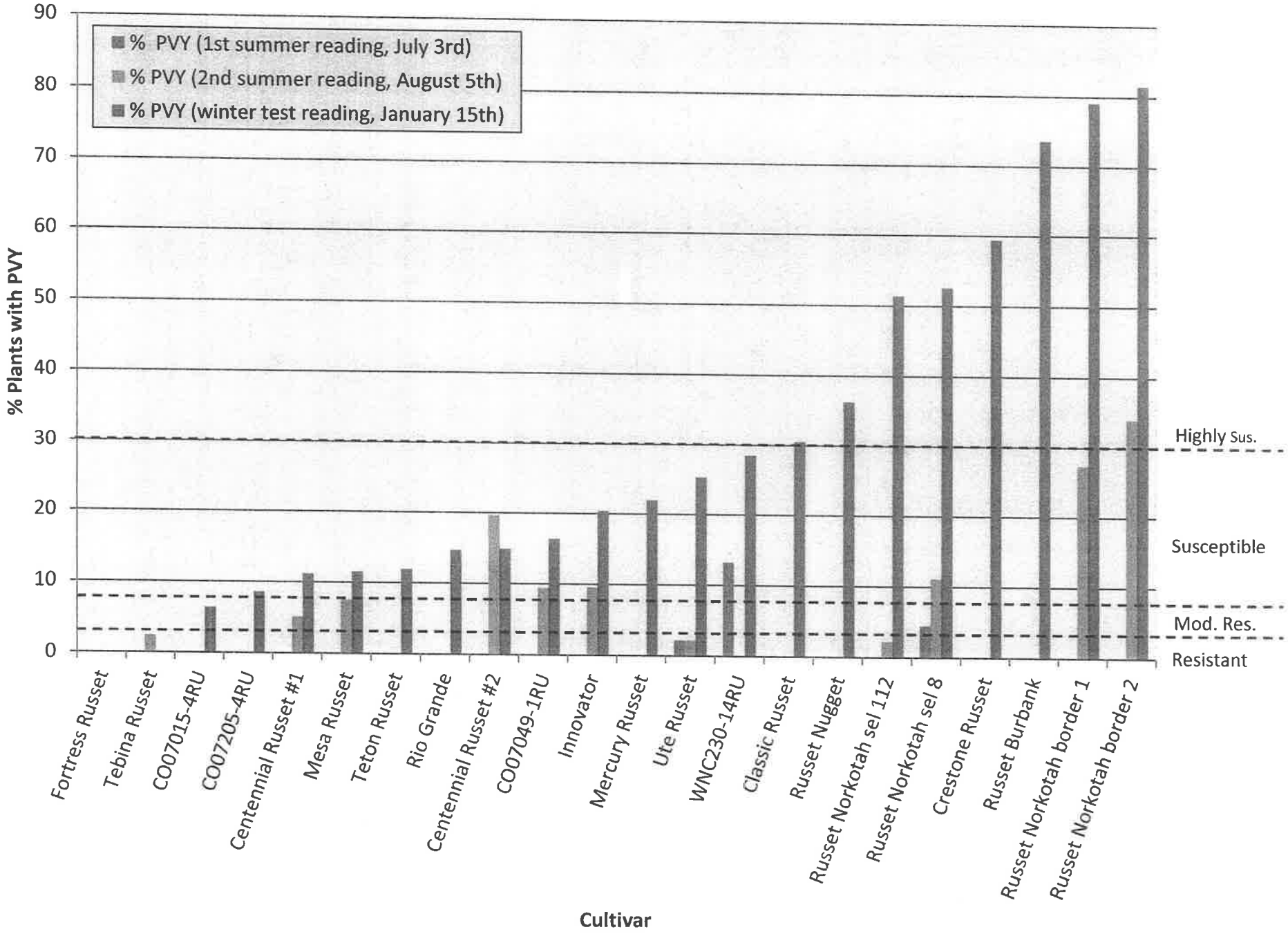
[b]Percent potato plants expressing visual mosaic symptoms expressing on August 5, 2014, mean of three

[c]A sample of 15 tubers, representing one tuber per plant, was taken at harvest and was sent to Oahu, HI to be evaluated for mosaic symptoms. Percent potato plants expressing visual mosaic symptoms on January 15, 2015, mean of three replications.

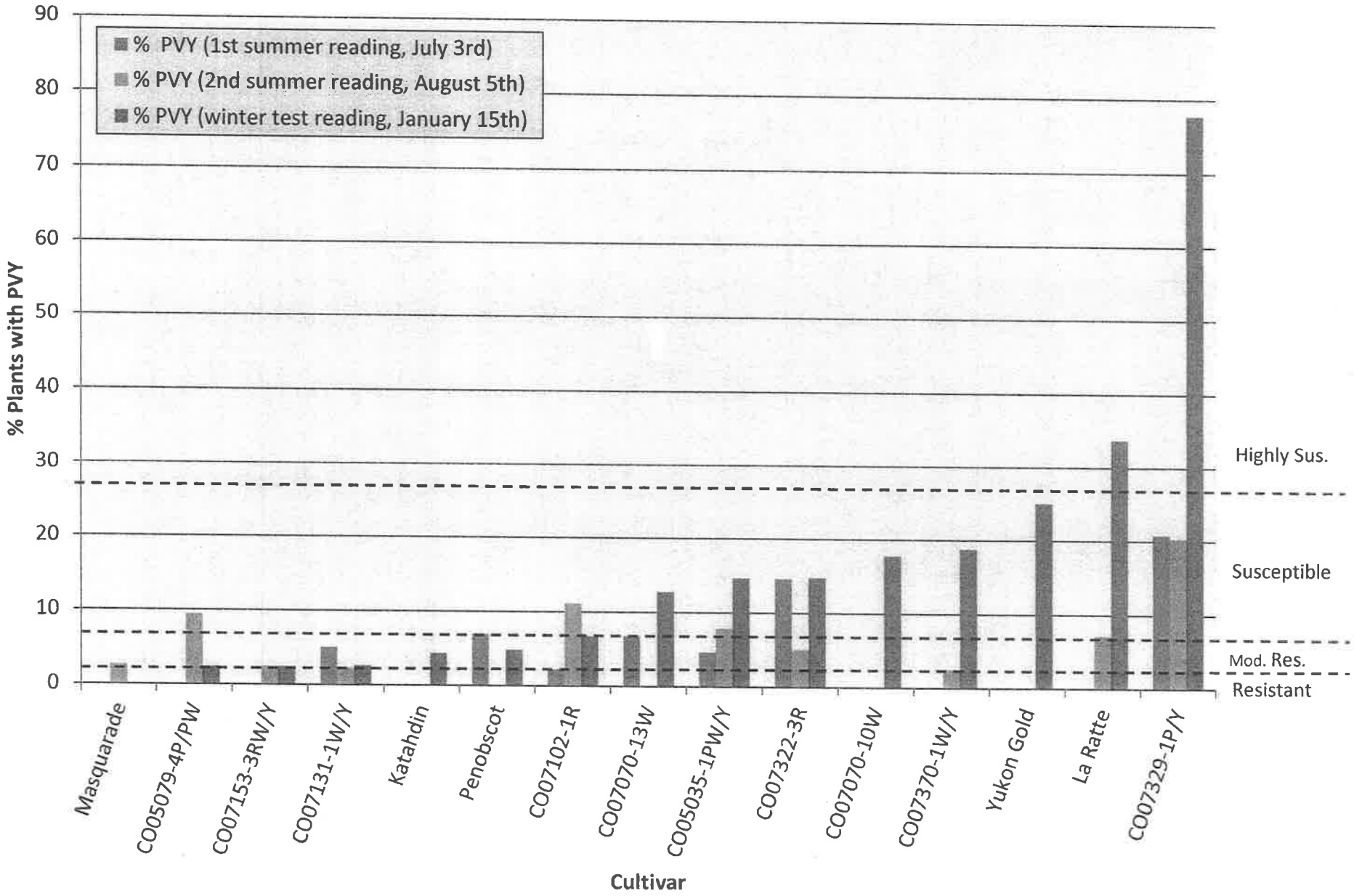
[d]Visual symptom expression (1-5; 1 = very difficult to see mosaic symptoms, 5 = very easy to see mosiac symptoms). Where more than one rating is given, two or more strains of PVY are present in the sample. These ratings were determined at the winter test plots in Hawaii. Due to environment differences, visual symptom expressionmay be differnet in the SLV.

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

2014 Evaluation of Potato Cultivars for PVY Susceptibility (Russet Potatoes), Colorado State University, SLVRC



2014 Evaluation of Potato Cultivars for PVY Susceptibility (Red and Specialty Potatoes), Colorado State University, SLVRC



2014 Bacterial Ring Rot Clonal Evaluation

There were a total of 56 different cultivars evaluated for bacterial ring rot expression in 2014. Overall, new clones from the breeding program expressed ring rot symptoms in the foliage prior to the 90 DAP threshold. Ninety DAP is the standard for determining whether or not a given seed lot contains any plants that are infected with ring rot. This trial confirms that new potato clones from the breeding program, when grown under SLV conditions, will express ring rot within the 90 day timeframe.

EVALUATION OF ADVANCED CLONES FOR SYMPTOM EXPREESSION TO BACTERIAL RING ROT, 2014

Researchers: Andrew J. Houser & Robert D. Davidson (advisory role), Colorado State University

Location: San Luis Valley Research Center, Center, CO

Objective: To evaluate the symptom expression of advanced potato clones to bacterial ring rot, caused by *Clavibacter michigenensis* ssp. *Sepedonicus* (Cms).

Seed: Fourteen potatoes (seven were inoculated with Cms and seven were uninoculated) were evaluated per cultivar per replication.

Inoculation Protocol: Twenty one cut seed pieces per clone were placed in a Cms solution for five minutes on May 2nd, 2014.

Cultivars:

1. CO07015-4RU
2. CO07049-1RU
3. CO07070-10W
4. CO07070-13W
5. CO07102-1R
6. CO07131-1W/Y
7. CO07153-3RW/Y
8. CO07205-4RU
9. CO07322-3R
10. CO07329-1P/Y
11. CO07370-1W/Y
12. AC05039-2RU
13. CO05028-4P/PY
14. CO05028-11P/RWP
15. CO05035-1PW/Y
16. CO05079-4P/PW
17. CO06057-3RU
18. A02062-1TE
19. A02138-2
20. A02267-1Y
21. A02424-83LB
22. A03921-2
23. A05180-3PY
24. A05182-7RY
25. A06021-1T
26. A06084-1TE
27. AO01114-4
28. NDA081451CB-1CY
29. OR05039-4
30. CO86030-1RU
31. CO86153-2RU
32. WNC230-14RU
33. Centennial Russet
34. Russet Burbank
35. Russet Norkotah-S3
36. Sangre-S10
37. Ute Russet

Plant Date: May 5, 2014 (by hand)

Plot Design: Randomized complete block

Plot Size: 1-14 foot row per trt per replication (7 ft are inoculated with Cms, 7 ft are uninoculated).

Plant Spacing: 12 inches

Row Spacing: 34 inches

Replications: Three

Irrigation: Solid set sprinkler, rate based on ET

Fertilizer: 80N-60P-0K-25S-2.5Z, preplant

Herbicide: Dual Magnum @ 1.5 pt/A + Chateau @ 1.0 oz/A + Sencor @ 0.33 lb/A

Insecticide: None

Fungicide: None

Vine Killer: Vines allowed to die naturally.

Harvest: September 25, 2014 (by hand)

Symptoms: ED = Early Dwarf, R = Rossette, IVC = Interveinal Chlorosis, IVN = Interveinal Necrosis, MN = Marginal Necrosis, W = Wilt

Data Collection: Plants were evaluated for ring rot symptom expression on the following dates: July 11 (67 DAP), July 18 (74 DAP), July 25 (81 DAP), August 6 (93 DAP), August 14 (102 DAP), August 21 (109 DAP), August 26 (114 DAP). A sample of 10 tubers collected from sympomatic plants were harvested and evaluated for ring rot tuber symptoms on September 25, 2014.

Table 1. Clonal Evaluation for Foliar Ring Rot Symptom Expression, Colorado State University, SLV Research Center, Center, CO, 2014.

Treatment	DAP to 1st symptom[a]	# Reps Positive[b]	# Plants Positive[c]	% Plants Positive[d]	DAP 50% or more Positive[e]	Total # Reps Positive[f]	% Plants Positive at 99 DAP[g]	Summary of Symptoms[h]
1. CO07015-4RU	67	3	4	19.0	81	3	81.0	All
2. CO07049-1RU	67	2	3	14.3	-	-	38.1	All
3. CO07070-10W	67	1	1	4.8	93	3	76.2	All
4. CO07070-13W	67	1	1	4.8	93	3	66.7	All
5. CO07102-1R	67	3	3	14.3	109	3	47.6	All
6. CO07131-1W/Y	81	1	1	5.6	-	-	26.2	All
7. CO07153-3RW/Y	67	3	10	47.6	74	3	61.9	All
8. CO07205-4RU	67	2	2	9.5	-	-	42.9	All
9. CO07322-3R	67	2	2	9.5	-	-	19.0	ED,R,W
10. CO07329-1P/Y	67	2	5	23.8	81	3	57.1	IVC,ED,R
11. CO07370-1W/Y	81	2	2	10.3	-	-	40.5	IVC,ED,R,MN
12. AC05039-2RU	67	1	1	4.8	93	3	57.1	All
13. CO05028-4P/PY	74	2	2	9.5	-	-	33.3	All
14. CO05028-11P/RWP	67	1	1	4.8	-	-	42.9	All
15. CO05035-1PW/Y	67	2	5	23.8	109	3	47.6	All
16. CO05079-4P/PW	74	2	2	9.5	109	3	47.6	All
17. CO06057-3RU	74	3	4	21.0	93	3	60.0	All
18. A02062-1TE	93	1	1	4.8	-	-	9.5	All
19. A02138-2	93	3	3	19.1	-	-	28.6	All
20. A02267-1Y	67	2	5	23.8	81	3	66.7	All
21. A02424-83LB	67	2	2	9.5	-	-	42.9	IVC,ED,R
22. A03921-2	74	1	2	9.5	-	-	33.3	All
23. A05180-3PY	74	2	6	28.6	109	3	47.6	All
24. A05182-7RY	74	3	5	23.8	-	-	42.9	ED,R
25. A06021-1T	67	2	4	19.0	102	3	52.4	All
26. A06084-1TE	67	1	1	4.8	-	-	42.9	All
27. AO01114-4	67	1	1	4.8	-	-	14.3	All
28. NDA081451CB-1CY	67	1	1	4.8	-	-	28.6	IVN,ED,R,W
29. OR05039-4	74	2	2	9.5	-	-	19.0	All
30. CO86030-1RU	67	1	1	4.8	-	-	9.5	All
31. CO86153-2RU	67	1	1	4.8	-	-	33.3	IVC,ED,R,W
32. WNC230-14RU	67	1	2	9.5	-	-	33.3	IVC,ED,R,MN,W
33. Centennial Russet	74	1	3	14.3	-	-	38.1	All
34. Russet Burbank	67	2	3	14.3	-	-	42.9	IVC,ED,R,W
35. Russet Norkotah-S3	67	3	11	52.4	67	3	81.0	All
36. Sangre-S10	67	1	1	4.8	-	-	28.6	All
37. Ute Russet	67	1	1	5.6	109	3	46.0	IVC,ED,R

[a]Number of days after planting (DAP) when the first foliar ring rot symptoms were observed.
[b]Number of replications that had plants expressing symptoms when symptoms were first observed.
[c]Total number of plants expressing symptoms when symptoms were first observed.
[d]Total percent of plants expressing symptoms when symptoms were first observed.
[e]Number of DAP when the >50% of the inoculated plants were expressing foliar ring rot symptoms.
[f]Number of replications that had >50% inoculated plants expressing symptoms when symptoms were first observed.
[g]Total percent of plants expressing symptoms at 99 DAP.
[h]All foliar ring rot sympotms that were observed throughout the 2014 growing season.

Table 2. Clonal Evaluation for Ring Rot Symptom Expression in Potato Tubers, Colorado State University, SLV Research Center, Center, CO, 2014.

Clone	# reps positive[a]	# tubers positive[b]	% tubers positive[c]	External (E) or Internal (I) Symptoms[d]
1. CO07015-4RU	1	1	5.0	E & I
2. CO07049-1RU	-	-	-	-
3. CO07070-10W	-	-	-	-
4. CO07070-13W	1	1	5.0	E & I
5. CO07102-1R	-	-	-	-
6. CO07131-1W/Y	-	-	-	-
7. CO07153-3RW/Y	1	2	10.0	E & I
8. CO07205-4RU	1	1	5.0	E & I
9. CO07322-3R	1	1	5.0	I
10. CO07329-1P/Y	-	-	-	-
11. CO07370-1W/Y	1	1	5.0	E & I
12. AC05039-2RU	1	2	10.0	E & I
13. CO05028-4P/PY	1	1	5.0	E & I
14. CO05028-11P/RWP	-	-	-	-
15. CO05035-1PW/Y	1	2	10.0	E & I
16. CO05079-4P/PW	-	-	-	-
17. CO06057-3RU	-	-	-	-
18. A02062-1TE	-	-	-	-
19. A02138-2	1	2	10.0	E & I
20. A02267-1Y	-	-	-	-
21. A02424-83LB	1	1	5.0	E & I
22. A03921-2	-	-	-	-
23. A05180-3PY	1	1	5.0	E & I
24. A05182-7RY	1	1	5.0	E & I
25. A06021-1T	1	1	5.0	E & I
26. A06084-1TE	-	-	-	-
27. AO01114-4	-	-	-	-
28. NDA081451CB-1CY	-	-	-	-
29. OR05039-4	1	1	5.0	E & I
30. CO86030-1RU	-	-	-	-
31. CO86153-2RU	-	-	-	-
32. WNC230-14RU	-	-	-	-
33. Centennial Russet	1	1	5.0	E & I
34. Russet Burbank	1	1	5.0	E & I
35. Russet Norkotah-S3	1	1	5.0	E & I
36. Sangre-S10	2	2	10.0	E & I
37. Ute Russet	-	-	-	-

[a]Number of replications that had tubers expressing ring rot symptoms at harvest.

[b]Number of tubers that were expressing ring rot symptoms at harvest, sum of two replications.

[c]Percent tubers that were expressing ring rot symptoms at harvest, sum of two replications.

[d]Tuber symtoms that were visible at harvest; External tuber symptoms, Intenal tubers sympoms, or both.

2013 Powdery Scab Green Manure Trial

A study was conducted in the greenhouse evaluating the use of different green manure crops to manage powdery scab (in cooperation with Patrick O'Neil with Agro Engineering). Different green manures were grown in soil with different levels of *Spongospora subterranea* inoculum in the greenhouse. The green manure crop was then incorporated into the soil at around 60 DAP. The susceptible cultivar DT6063-1R was then planted into this soil.

Overall, results indicate that the use of green manures can have a positive impact on powdery scab levels. Statistically, all the green manure crops evaluated resulted in lower powdery scab levels on the tubers when compared with potatoes planted in soil where green manures were not used. Although these results are promising, this study was conducted in a greenhouse using sand + bagged soil as the soil type. The next step needs to be evaluating the use of green manures under field conditions.

EVALUATION OF GREEN MANURES FOR THE REDUCTION IN POWDERY SCAB SPOREBALL LEVELS IN THE SOIL, 2013

Researchers: Robert D. Davidson and Andrew J. Houser, Colorado State University, SLVRC; Patrick O'Neil, Agro Engineering

Location: San Luis Valley Research Center, Greenhouse, Center, CO

Objective: To evaluate the use of green manure crops in reducing powdery scab sporeball levels in infested soils.

Treatments:
1. Monida Oat
2. Caliente Mustard 61
3. Sordan 79
4. Radish (Defender)
5. Elbon Rye
6. Winfred Turnip

Planted: August 19, 2013

Plot Design: Randomized complete block

Plot Size: One 6" pot per treatment per replication.

Soil: Green manure seeds were planted into a soil mix (60% sand, 40% potting soil) with three different powdery scab sporeball inoculum levels (0 sb/g of soil, 5 sb/g of soil, & 50 sb/g of soil).

Seed: For green manure planting: The number of seeds planted for each plant species was determined based on field seeding rate.

For bioassay: potato eyes were removed from seed tubers using a melon scoop and allowed to suberize for several days. One eyeball was planted per pot, two inches deep in the soil.

Replications: Four

Irrigation: Overhead irrigation, rate predetermined based on the optimal irrigation regime for powdery scab symptom development.

Fertilizer: For bioassay: 20N-20P-20K, applied six times

Herbicide: -

Insecticide: -

Fungicide: -

Vine Killer: Vines were removed at harvest time.

Harvested: November 20th, December 3rd and December 4th, 2013

DATA: Mean percent per pot showing galls on roots, rated 0 to 4; 0 = none, 4 = heavily infected.
Mean percent of per pot 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.
Mean percent of tubers per pot which are unmarketable due to powdery scab severity.
Both root gall and tuber readings were taken on January 28, 29, and 30th, 2013.

Table 1. Evaluation of Green Manures for tuber susceptibility to powdery scab in a greenhouse environment, Colorado State University, San Lus Valley Research Center, Center, CO, 2013.

Treatment	0 sb/g (initial scab levels in soil)			5 sb/g (initial scab levels in soil)			50 sb/g (initial scab levels in soil)		
	% Incidence[a]	Severity Index[b]	Total Tuber Wt.[c]	% Incidence[a]	Severity Index[b]	Total Tuber Wt.[c]	% Incidence[a]	Severity Index[b]	Total Tuber Wt.[c]
1. Control (0 sb/g)	47.5	57.5 b	102.4	47.5 b	57.5 b	102.4	47.5 b	57.5 c	102.4
2. Control (5 sb/g)	100.0	500.0 a	90.4	100.0 a	500.0 a	90.4	100.0 a	500.0 a	90.4
3. Control (50 sb/g)	100.0	500.0 a	78.9	100.0 a	500.0 a	78.9	100.0 a	500.0 a	78.9
4. Monida Oat	33.3	100.0 b	63.2	68.8 ab	143.8 b	70.3	100.0 a	233.3 bc	63.1
5. Caliente Mustard 61	27.1	33.4 b	81.1	34.4 b	46.9 b	86.0	100.0 a	300.0 b	89.0
6. Sordan 79	16.7	33.3 b	62.5	52.1 b	102.1 b	78.1	100.0 a	300.0 b	102.8
7. Radish (Defender)	28.6	28.6 b	101.7	43.8 b	81.3 b	86.3	87.5 a	312.5 b	83.3
8. Elbon Rye	33.3	83.3 b	103.8	77.8 ab	144.4 b	94.5	100.0 a	275.0 b	72.3
9. Winfred Turnip	40.0	80.0 b	96.3	53.8 b	73.8 b	78.4	66.7 ab	241.7 b	87.6
LSD (P=0.05)	NS	132.33	NS	44.83	124.65	NS	34.75	181.00	NS
CV	85.60	56.83	26.68	47.33	46.10	18.61	26.15	40.14	27.08
F value	0.0615	0.0001	0.1088	0.0465	0.0001	0.2057	0.0396	0.0026	0.3275

[a]Percent Incedence = Mean percent of tubers with powdery scab lesions.

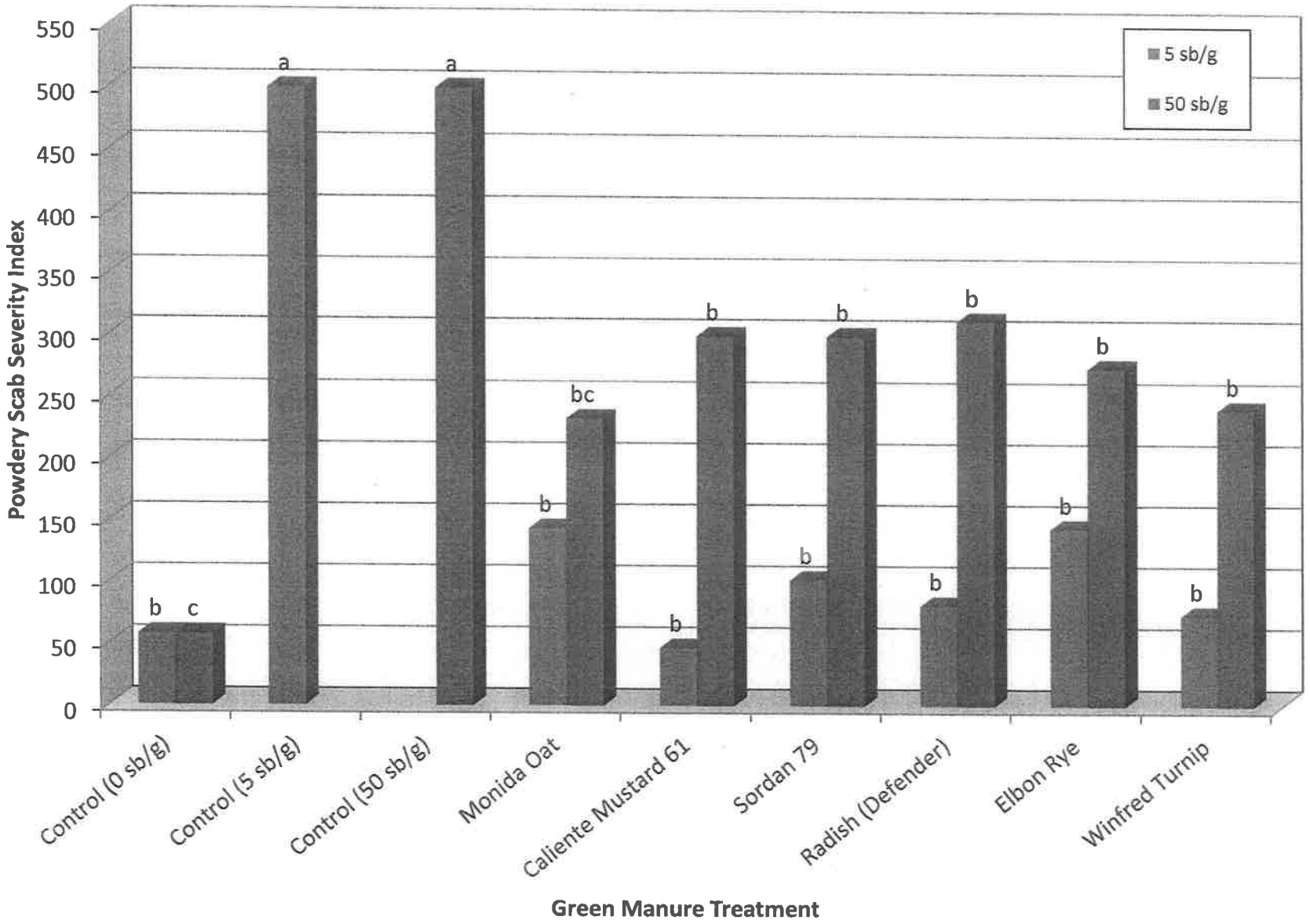
[b]Severity Index = mean percent of the number of affected tubers multiplied by the severity of the lesions, where 1 = very little or no disease and 5 = heavily infested.

[c]Mean root weight data (grams) was collected when disease readings were taken. Mean of four replications/treatment/soil inoculum level.

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

Note: Seed used in this bioassy was field grown DT6063-1R's (Cherry Red). Due the the high level of susceptibility of this cultivar to powdery scab tuber lesion development, there may have been sporeballs present on the seed. This may have resulted in some contamination of sporeballs in the soil for each of the pots. Based on previous work, the introduction of sporeballs on seed impacts the levels of powdery scab much less than when sporeballs are mixed uniformly throughout the pot.

Evaluation of Using Green Manures to Manage Powdery Scab in the Potato Cultivar DT6063-1R, SLVRC Research Greenhouse, 2013 (Powdery Scab Severity Index = % Tubers with Scab x Severity)



Potato/Cover Crop Rotational Trial

EVALUATION OF DIFFERENT CROP ROTATIONS FOR THE MANAGEMENT OF BLACK SCURF, SILVER SCURF, AND POWDERY SCAB ON POTATO, 2014

Researchers: Andrew J. Houser and Robert D. Davidson (in cooperation with Merl Dillon & Samuel Essah), Colorado State University, SLVRC

Location: San Luis Valley Research Center, Center, CO

Cultivar: Colorado Rose

Objective: To evaluate different rotational crops for the management of potato diseases (black scurf, silver scurf & powdery scab).

Treatments:
1. Potato/Barley (2 year rotation)
2. Potato-Rye/Sudan GM (2 year rotation)
3. Potato-Rye/Cocktail GM (2 year rotation)
4. Potato/Barley/Canola (3 year rotation)
5. Potato/Barley/Sudan GM (3 year rotation)
6. Potato/Barley/Camolina (3 year rotation)
7. Potato/Barley/Sudan GM+Compost (3 year rotation)
8. Potato/Barley/Sudan GM+Manure (3 year rotation)
9. Potato/Barley/Cocktail GM (3 year rotation)
10. Potato/Barley/Mustard GM (Minimum Till) (3 year rotation)
11. Potato-Rye/Cocktail GM/Sudan GM (3 year rotation)

Planted: May 20, 2014
Plot Design: Randomized complete block
Plot Size: 6-20 foot rows 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-0K-25S-2.5Z, preplant, 20N through sprinkler after tuber set.
Herbicide: Dual Magnum @ 1.5 pt/A + Chateau @ 1.0 oz/A + Sencor @ 0.33 lb/A
Insecticide: None
Fungicide: None
Vine Killer: Vines were allowed to die naturally.
Harvested: September 23 & 24, 2014

DATA:

Disease: Percent number of tubers, (sample was taken from the medium sized tubers collected at harvest), evaluated for black scurf, silver scurf, and powdery scab incidence. For the black scurf and powdery scab results, a severity rating was also determined for each tuber with disease symptoms.

Disease Severity: Severity rating for black scurf and powdery scab: 1 = < 1% surface area (SA) of tuber covered, 2 = 1-5% SA covered, 3 = 5-25% of SA covered, 4 = >25% SA covered.

Severity Index: For powdery scab, the total % of tubers with powdery scab lesions was multiplied by the overall severity rating.

Table 1. EPA NRCS crop rotational project (disease results: Black scurf, Silver Scurf, and Powdery Scab), Colorado State University, San Luis Valley Research Center, Center, CO, 2014

Trt	Treatment	Black Scurf (Rating 1)[a]	Black Scurf (Rating 2)[a]	Black Scurf (Rating 3)[a]	Black Scurf (Rating 4)[a]	Total % of tubers with black scurf	Total % of tubers with a high black scurf rating[b]	Total % of tubers with Silver Scurf	Total % of tubers with powdery scab	Powdery scab severity index[c]
1	Potato/Barley (2 yr)	22.5	42.5	27.5	7.5	100.0 a	77.5 ab	45.0	42.5	80.0
2	Potato-Rye/Sudan GM (2 yr)	15.0	30.0	15.0	5.0	65.0 bcd	50.0 bcd	25.0	25.0	35.0
3	Potato-Rye/Cocktail GM (2 yr)	12.5	25.0	15.0	10.0	62.5 bcd	50.0 bcd	30.0	15.0	22.5
4	Potato/Barley/Canola (3 yr)	12.5	37.5	15.0	2.5	67.5 bcd	55.0 abcd	30.0	7.5	20.0
5	Potato/Barley/Sudan GM (3 yr)	7.5	52.5	22.5	10.0	92.5 ab	85.0 a	52.5	30.0	57.5
6	Potato/Barley/Camolina (3 yr)	15.0	32.5	17.5	15.0	80.0 ab	65.0 abc	40.0	20.0	40.0
7	Potato/Barley/Sudan GM+Compost (3 yr)	27.5	30.0	27.5	7.5	92.5 ab	65.0 abc	70.0	17.5	37.5
8	Potato/Barley/Sudan GM+Manure (3 yr)	7.5	27.5	10.0	5.0	50.0 cd	42.5 cd	52.5	2.5	2.5
9	Potato/Barley/Cocktail GM (3 yr)	5.0	40.0	37.5	7.5	90.0 ab	85.0 a	47.5	7.5	22.5
10	Potato/Barley/Mustard GM (Min Till) (3 yr)	12.5	12.5	10.0	7.5	42.5 d	30.0 d	65.0	7.5	7.5
11	Potato-Rye/Cocktail GM/Sudan GM (3 yr)	25.0	32.5	27.5	0.0	85.0 ab	60.0 abcd	60.0	5.0	5.0
LSD (P=0.05)		NS	NS	NS	NS	32.1	32.7	NS	NS	NS
CV		79.7	58.4	77.6	138.1	29.5	37.4	58.8	119.2	138.4
F value		0.1170	0.2311	0.4758	0.7301	0.0103	0.0208	0.3495	0.1757	0.2920

[a]For the Black scurf and Powdery scab results, a severity rating was also determined for each tuber with disease symptoms. Severity rating for Black Scurf and Powdery Scab: 1 = < 1% SA of tuber covered, 2 = 1-5% SA covered, 3 = 5-25% of SA covered, 4 = >25% SA covered.

[b]Percent of tubers with a black scurf severity of 2, 3 and 4.

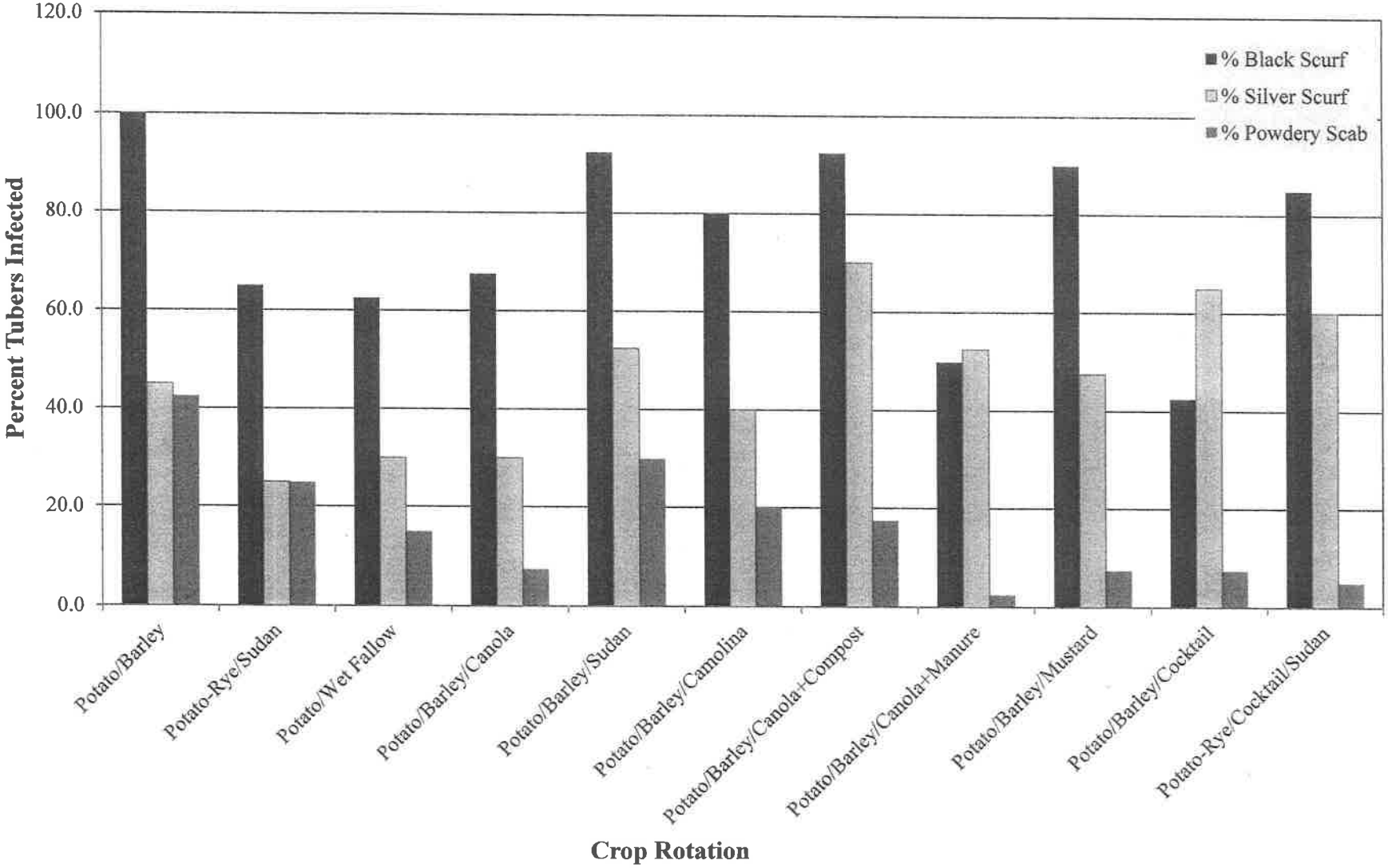
[c]For Powdery Scab, the total % of tubers with powdery scab lesions was multiplied by the overall severity rating.

Sample collection: A 10 tuber sample was evaluated after harvest from each plot

Disease Evaluation: Diseases were evaluated on January 22 & 23, 2105 by Andrew Houser

Powdery Scab Note: Based on the findings from this year, it appears that having a 3 yr rotation, with barley (yr 1) followed by a cover crop (yr 2), will greatly reduce powdery scab levels in the potato crop (yr 3). This may be the case, however, it is also of note that the location of the treatments may also explain the difference in powdery scab levels. The 2 yr rotational treatments (1,2,3) are grouped together in one area in the field, while the 3 yr treatments (4 - 11) are grouped together in a different area. The development of powdery scab is highly dependent on the presence of inoculum in the soil as well as having a favorable environment. An alternative explanation for the differences in powdery scab levle between treatments could be that the 2 yr and 3 yr rotational treatments are located in different areas of the field.

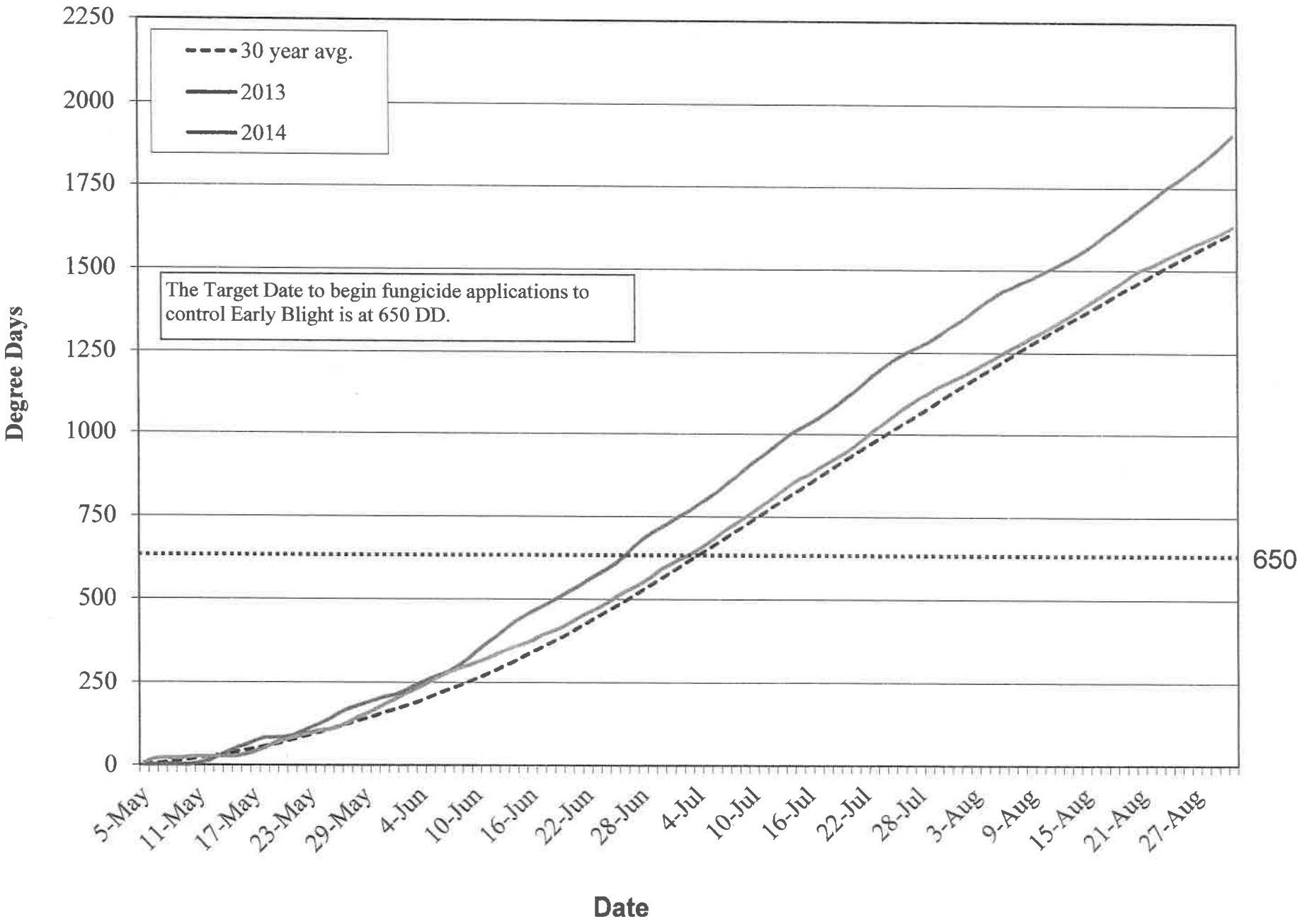
2014 NRCS EPA Trial Evaluating the Effect of Different Crop Rotations on Potato Disease Severity
Potato Variety: Colorado Rose



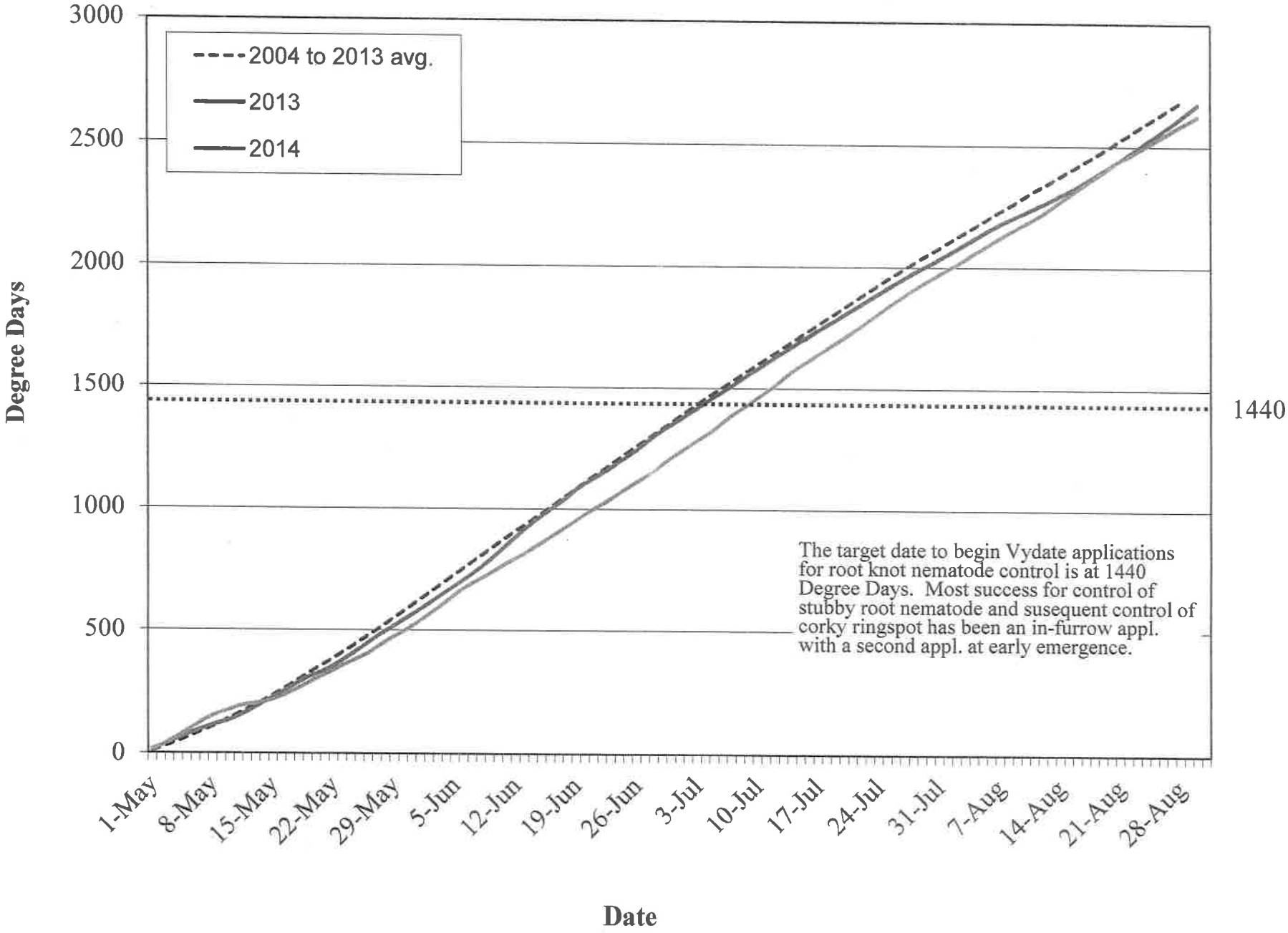
2014 Early Blight, Root-Knot Nematode, and Late Blight Degree Day Reporting

For early blight, the threshold to apply fungicides was reached on July 4th, which is one day ahead of the 30 year average and about one week behind the 2013 degree day threshold. For Root-Knot Nematode management, the 1440 DD threshold was reached on July 9th in 2014. This was six days later than the 10 year average and 4 days later than 2013. For late blight, monitoring was continued in 2014 in the Blanca, Hooper, and Sargent areas. Conditions favorable for late blight were reached at each of the three sites by mid to late July. This is consistent with findings from previous years and should continue to be monitored in 2015.

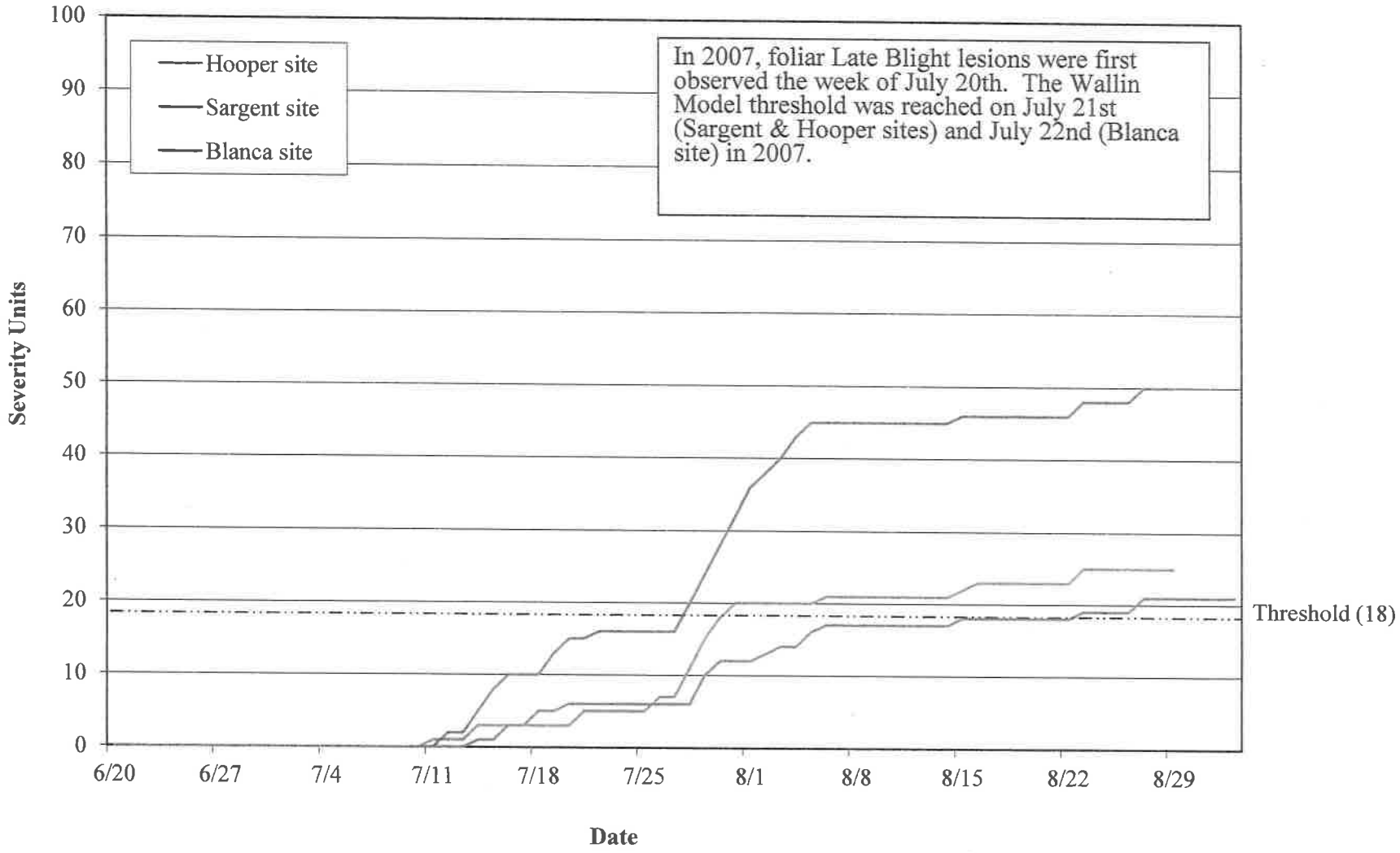
2014 Early Blight Degree Days for the San Luis Valley
Temperature Data Collected from the CoAgMet Station Located at the SLV Research Center



Root Knot Nematode Degree Days for the San Luis Valley
Temperature Data Collected from the CoAgMet Station Located at the SLV Research Center



Potato Late Blight Severity Values - Wallin Model, San Luis Valley, Colorado, 2014



Footnote:

- The Sargent weather station began collecting data on June 20, 2014. Conditions favorable for Late Blight were reached on July 29th.
- The Hooper weather station began collecting data on July 2, 2013. Conditions favorable for Late Blight were reached on July 30th.
- The Blanca weather station began collecting data on June 20, 2014. Conditions favorable for Late Blight were reached on July 16th.