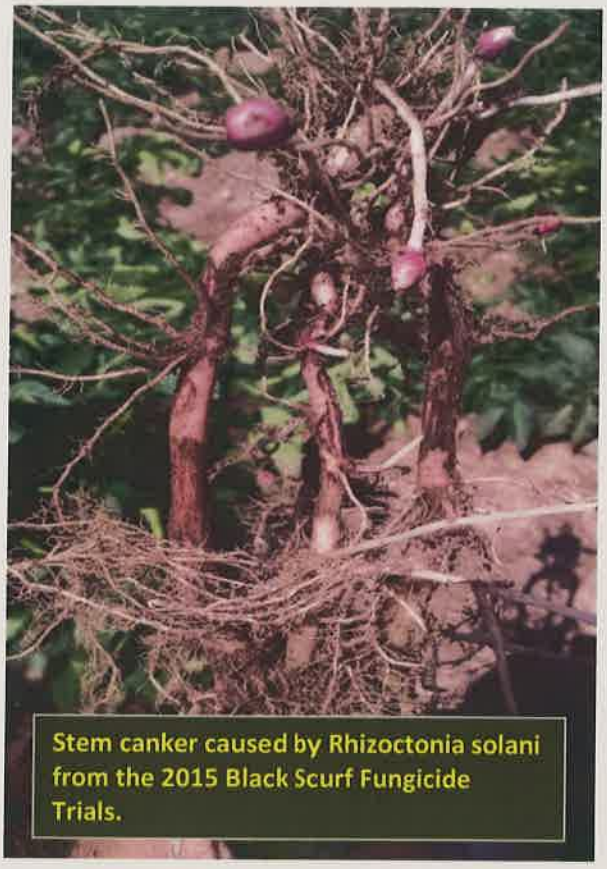
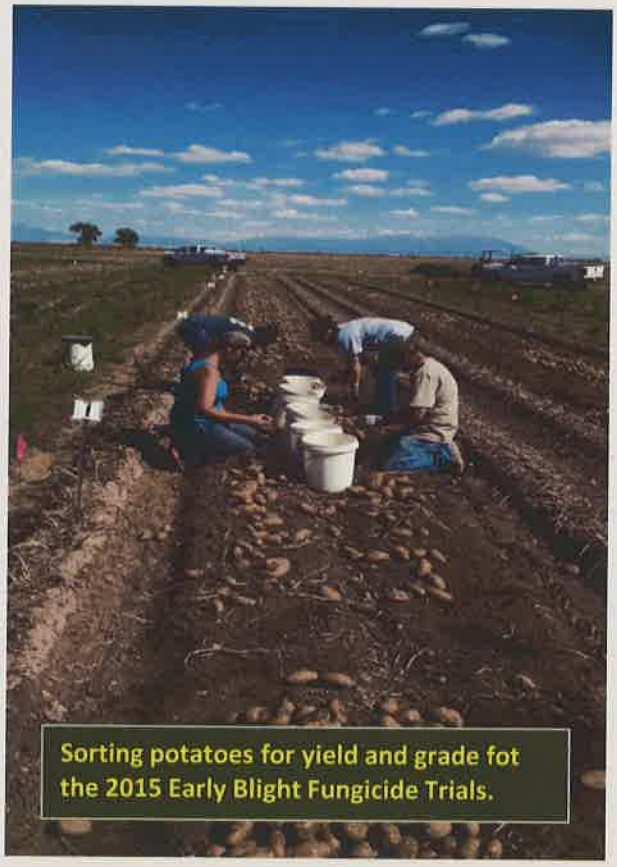
2015 Potato Pathology Research Report - Section 1

(Evaluating Fungicides for Potato Disease Control)



Stem canker caused by Rhizoctonia solani from the 2015 Black Scurf Fungicide Trials.



Sorting potatoes for yield and grade fot the 2015 Early Blight Fungicide Trials.

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Colorado State University, SLV Research Center

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Fungicide Trials

2015 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.

In 2015, two treatments included fungicide applictions that were applied approximatly 7 days before the Early Blight Degree Days were reached (see Early Blight Trial #3, trts 8 & 9). The data from these treatments indicate that there was not a significant decrease in early blight incidence for these two treatments when compared with applications made once the EBDD threshold was reached. Based on results from this study, the application of fungicides for the managment of Early Blight should begin when the EBDD threshold is reached. There appears to be no advantage to applying fungicides before this time.

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.

2015 POTATO - EARLY BLIGHT FUNGICIDE TRIAL #1

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 14, July 28, August 6, August 18

Treatments:
1. Untreated Control
2. Luna Tranquility @ 11.0 floz/A (4 apps during season)
3. Quadris Top @ 11.0 floz/A (4 apps during season)
4. Endura @ 5.5 oz/A (4 apps during season)

Planted: May 26, 2015
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 + Sencor @ 0.17 lb/A + Chateau @ 1.0 oz/A
Insecticide: None
Vine Killer: Vines chopped on September 11, 2015
Harvested: Septemeber 24, 2015

DATA:

Disease: Early blight disease incidence based on percent leaves infected, readings taken weekly starting August 6, 2015.

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 2. Early Blight Trial #1 - Effect of fungicide programs on the incidence of early blight in the cultivar Russet Norkotah Selection 8, San Luis Valley, Colorado, 2015; No Late Blight occurred within the trial.

	Percent Leaves Infected (with one or more lesions)[a]					
Treatment	August 6	August 15	August 21	August 27	September 3	AUDPC[b]
1	3.5	33.4 a	80.0 a	97.9 a	100.0 a	998.5 a
2	3.0	7.5 b	18.8 d	45.0 c	95.8 b	537.3 d
3	3.5	10.9 b	44.2 c	80.8 b	99.6 a	762.4 c
4	3.4	15.8 b	60.9 b	87.5 b	100.0 a	851.3 b
LSD(P=0.05)	0.84	13.13	16.39	8.59	1.80	48.90
CV	15.73	48.64	20.11	6.9	1.14	3.88
F value	0.5029	0.007	0.0001	0.0001	0.0013	0.0001

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

[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 #1 - Effect of fungicide programs on tuber yield and quality in the cultivar Russet Norkotah Selection 8, San Luis Valley, Colorado, 2015.

	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	17.5	50.7	22.5 c	9.3	390.5	354.5
2	16.6	45.6	30.7 a	7.2	407.2	377.8
3	18.1	49.8	24.8 bc	7.2	421.2	390.9
4	18.3	45.1	27.9 ab	8.8	406.1	370.8
LSD(P=0.05)	NS	NS	5.18	NS	NS	NS
CV	15.98	10.82	12.24	24.11	8.56	9.35
F value	0.8396	0.3632	0.0291	0.362	0.6787	0.547

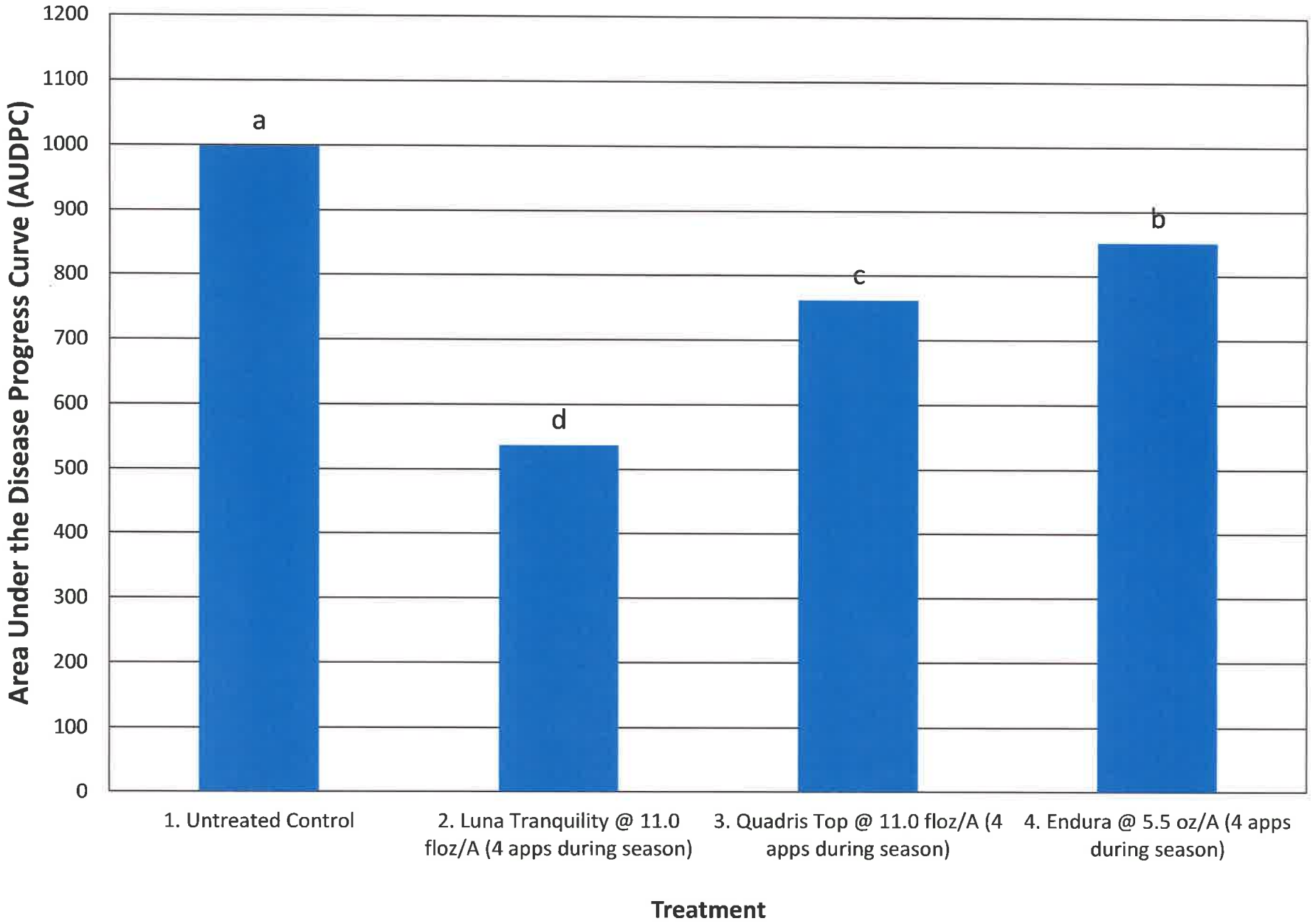
[a]Based on tuber weight in kilograms, mean of four replications.

[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.

2015 Evaluation of Fungicides Applied in Season for the Management of Early Blight (Trial #1), Russet Norkotah sel. 8, SLVRC (AUDPC)



2015 POTATO - EARLY BLIGHT FUNGICIDE TRIAL #2

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 14, July 28, August 6, August 18

Planted: May 26, 2015
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 @ 0.8 pt/A + Boundry @ 0.8 pt/A
Insecticide: None
Vine Killer: Vines chopped on September 11, 2015
Harvested: Septemeber 24, 2015

DATA:

Disease: Early blight disease incidence based on percent leaves infected, readings taken weekly starting August 6, 2015.

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. Early Blight Trial #2 - Fungicide programs evaluated for early blight control, San Luis Valley, Colorado 2015

Program	Products	Rate	Application Schedule[a]
1	Untreated Control	-	-
2	Priaxor	4 floz/A	1
	Endura	3.5 oz/A	3
	Bravo WS	1.5 pt/A	5
	Bravo WS	1.5 pt/A	7
3	Priaxor	4 floz/A	1
	Proprietary	NA	1
	Endura	3.5 oz/A	3
	Bravo WS	1.5 pt/A	5
	Bravo WS	1.5 pt/A	7
4	Priaxor	4 floz/A	1
	Endura	3.5 oz/A	3
	Proprietary	NA	3
	Bravo WS	1.5 pt/A	5
	Bravo WS	1.5 pt/A	7
5	Priaxor	4 floz/A	1
	Endura	3.5 oz/A	3
	Proprietary	NA	5
	Bravo WS	1.5 pt/A	7
6	Priaxor	4 floz/A	1
	Endura	3.5 oz/A	3
	Proprietary	NA	5
	Bravo WS	1.5 pt/A	7

[a]Schedule for applying treatments on a weekly basis, schedule started on July 14, 2015 (1 = week 1, 2 = week 2).
Every Fungicide Application was applied with a Non-Ionic Surfactant (0.1 %v/v).

Table 2. Early Blight Trial #2 - Effect of fungicide programs on the incidence of early blight in the cultivar Russet Norkotah Selection 8, San Luis Valley, Colorado, 2015; No Late Blight occurred within the trial.

	Percent Leaves Infected (with one or more lesions)[a]					
Treatment	August 6	August 15	August 21	August 27	September 3	AUDPC[b]
1	6.3	29.6 a	77.5 a	97.1 a	100.0	993.4 a
2	3.8	7.9 c	23.3 d	76.7 c	97.5	671.5 c
3	4.3	8.8 c	35.9 c	80.9 bc	99.2	733.7 c
4	3.8	6.7 c	29.2 cd	76.7 c	97.1	684.0 c
5	3.9	18.3 b	60.0 b	90.0 ab	100.0	867.2 b
6	3.5	11.7 bc	54.6 b	90.0 ab	99.6	828.3 b
LSD(P=0.05)	NS	6.85	12.44	11.43	NS	67.84
CV	29.4	32.88	17.66	8.9	2.54	5.65
F value	0.0537	0.0001	0.0001	0.0074	0.4243	0.0001

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

[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 #2 - Effect of fungicide programs on tuber yield and quality in the cultivar Russet Norkotah Selection 8, San Luis Valley, Colorado, 2015.

	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	16.9	53.9	22.6	6.6	330.5	308.7
2	13.9	57.2	22.1	6.8	356.4	333.5
3	14.2	48.9	26.7	10.2	383.7	344.3
4	15.5	51.7	26.5	6.4	380.5	356.0
5	14.1	50.1	27.7	8.1	400.2	367.0
6	15.8	54.8	20.9	8.6	383.0	350.2
LSD(P=0.05)	NS	NS	NS	NS	NS	NS
CV	11.43	7.91	14.87	38.76	9.45	9.99
F value	0.1611	0.1078	0.0766	0.4898	0.138	0.2795

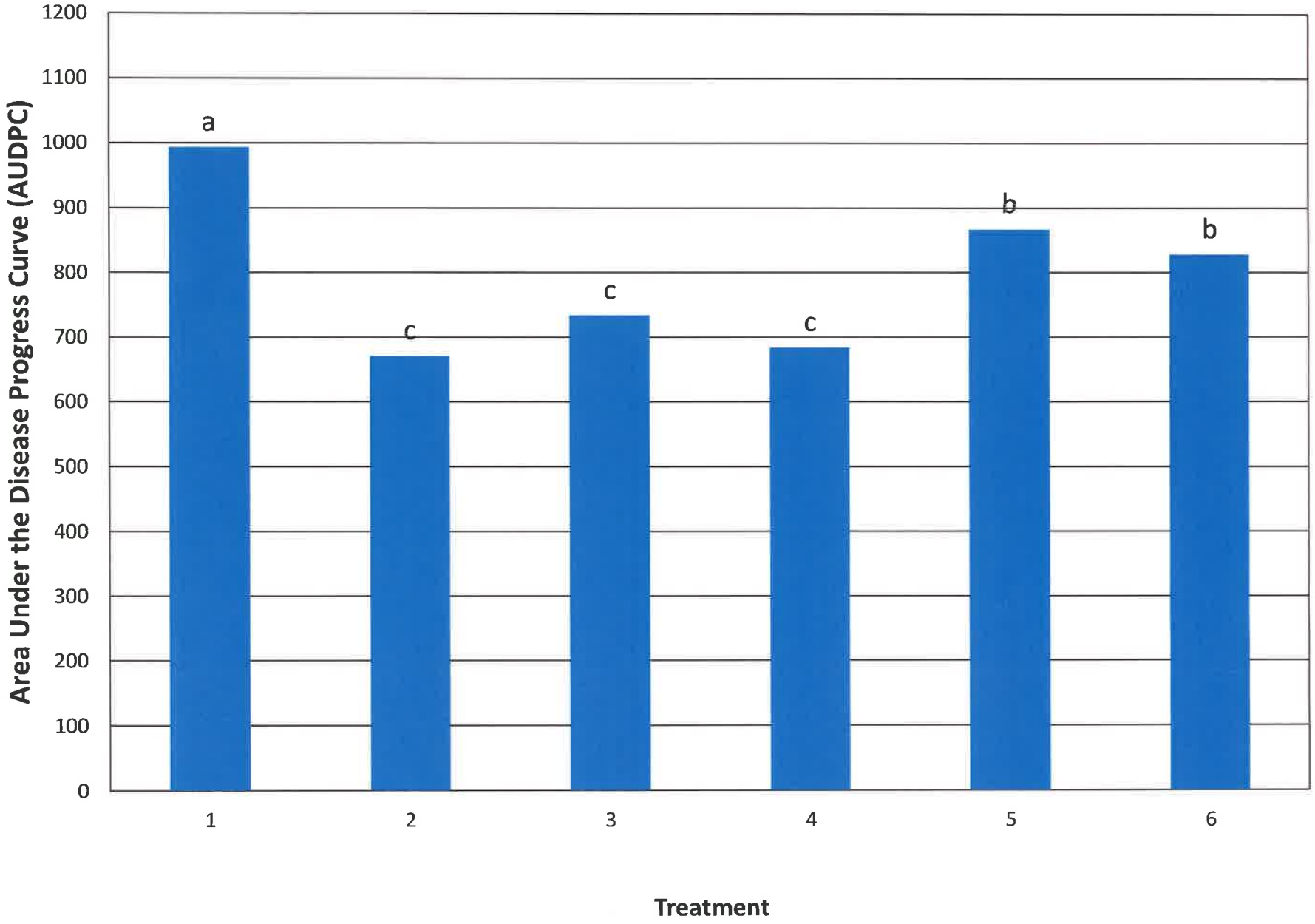
[a]Based on tuber weight in kilograms, mean of four replications.

[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.

2015 Evaluation of Fungicides Applied in Season for the Management of Early Blight (Trial #2), Russet Norkotah sel. 8, SLVRC (AUDPC)



2015 POTATO - EARLY BLIGHT FUNGICIDE TRIAL #3

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: June 30, July 14, July 28, August 6, August 18

Planted: May 26, 2015
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 @ 0.8 pt/A + Boundry @ 0.8 pt/A
Insecticide: None
Vine Killer: Vines chopped on September 11, 2015
Harvested: Septemeber 16 & 17, 2015

DATA:

Disease: Early blight disease incidence based on percent leaves infected, readings taken weekly starting August 5, 2015.

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. Early Blight Trial #3 - Fungicide programs evaluated for early blight control, San Luis Valley, Colorado 2015.

Program	Products	Rate	Application Schedule[a]
1	Untreated Control	-	-
2	Luna Tranquility	11.2 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
3	Luna Tranquility	11.2 floz/A	1,5
	Induce	0.5 %v/v	1,5
	Scala	7 floz/A	3,7
	Echo ZN	24 floz/A	3,7
4	Luna Tranquility	11.2 floz/A	1,3
	NIS	0.5 %v/v	1,3
	Echo ZN	2 pt/A	5
	Reason	5.5 oz/A	5
	Dithane Rainshield	32 oz/A	7
5	Echo ZN	32 floz/A	1
	Endura	2.5 oz/A	3,7
	Headline	9 floz/A	5
6	Echo ZN	32 floz/A	1,5
	Dithane Rainshield	32 oz/A	3,7
7	Quadris	6.1 floz/A	1
	Endura	2.5 oz/A	3
	Dithane Rainshield	2 lb/A	5
8	Luna Tranquility	11.2 floz/A	Early,3
	Induce	0.5 %v/v	Early,3
	Quadris	6.1 floz/A	1
	Endura	2.5 oz/A	5
9	Luna Tranquility	11.2 floz/A	Early,3
	Induce	0.5 %v/v	Early,3
	Quadris	6.1 floz/A	1
	Endura	2.5 oz/A	5
	Bravo WS	1.5 pt/A	7

[a]Schedule for applying treatments on a weekly basis, schedule started on June 30, 2015 (Early = Early week, 1 = week 1, 2 = week 2).

Table 2. Early Blight Trial #3 - Effect of fungicide programs on the incidence of early blight in the cultivar Russet Norkotah Selection 8, San Luis Valley, Colorado, 2015; No Late Blight occurred within the trial.

	Percent Leaves Infected (with one or more lesions)[a]					
Treatment	August 5	August 13	August 21	August 27	September 3	AUDPC[b]
1	6.3 a	30.0 a	77.1 a	95.9 a	100.0 a	996.7 a
2	6.0 a	5.4 cd	15.4 ef	35.0 d	73.3 c	431.7 e
3	4.1 ab	5.3 cd	17.5 ef	42.5 d	81.7 bc	481.0 e
4	5.8 a	5.4 cd	14.2 f	30.4 d	79.2 bc	428.4 e
5	3.4 b	5.9 cd	40.0 bc	90.0 a	100.0 a	769.1 bc
6	3.2 b	8.3 c	30.8 cd	76.7 b	100.0 a	702.7 c
7	4.6 ab	14.6 b	44.2 b	84.2 ab	100.0 a	796.5 b
8	3.0 b	4.3 d	24.2 de	57.5 c	97.9 a	594.7 d
9	3.2 b	7.9 cd	20.8 ef	55.4 c	92.5 ab	574.3 d
LSD(P=0.05)	2.24	3.83	9.85	12.72	14.73	92.34
CV	35.12	27.13	21.38	13.82	11.01	9.86
F value	0.0185	0.0001	0.0001	0.0001	0.002	0.0001

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

[b]AUDPC is the Area Under the Disease Progress Curve, accumulated weekly from August 5 through September 3.

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

Table 3. Early Blight Trial #3 - Effect of fungicide programs on tuber yield and quality in the cultivar Russet Norkotah Selection 8, San Luis Valley, Colorado, 2015.

	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	19.2	53.0	24.1	3.7	385.4 d	371.3
2	19.1	48.7	24.4	7.7	417.6 abc	385.0
3	21.0	49.9	22.8	6.3	395.6 bcd	371.6
4	19.9	46.6	26.4	7.2	393.5 cd	365.7
5	17.9	49.5	22.9	9.8	396.4 bcd	358.1
6	18.3	49.1	23.1	9.5	391.8 d	355.5
7	17.8	51.0	26.0	5.2	418.9 ab	397.1
8	21.7	54.5	17.3	6.6	401.5 a-d	375.0
9	21.5	50.0	21.8	6.8	425.2 a	395.6
LSD(P=0.05)	NS	NS	NS	NS	25.0	NS
CV	15.09	11.51	18.01	49.56	4.24	5.24
F value	0.4414	0.7179	0.1662	0.3179	0.0289	0.0554

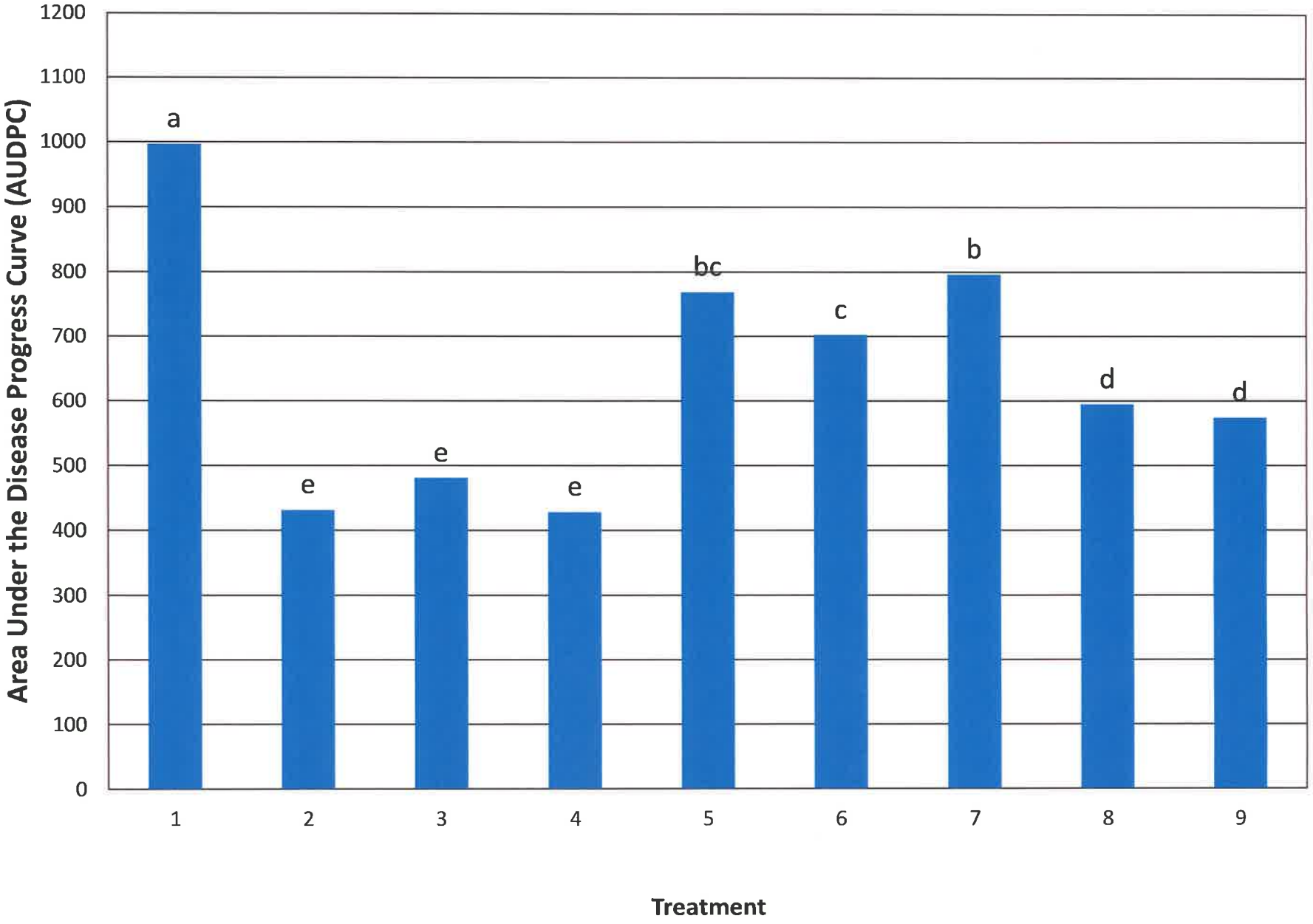
[a]Based on tuber weight in kilograms, mean of four replications.

[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.

2015 Evaluation of Fungicides Applied in Season for the Management of Early Blight (Trial #3), Russet Norkotah sel. 8, SLVRC (AUDPC)



2015 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 2015 pink rot fungicide trial, one product, Orondis, when tank mixed with Ridomil Gold, was found to have the lowest level of pink rot when compared to the untreated controls. However, since Orondis was not evaluated without Ridomil Gold, it should continue to be evaluated to determine its long-term reliability in managing this disease. Also, Oronidis is not yet labeled for pink rot control and is still in the evaluation stage for the managment of pink rot.

EVALUATION OF PRODUCTS APPLIED TO POTATO SEED IN-FURROW AND FOLIAR FOR THE MANAGEMENT OF PINK ROT, 2015

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 22nd (Treatment #2 was planted on June 1st) and Foliar applcations were made on July 16th, 2015.

Treatments:

1. Untreated Control (1)
2. Orondis @ 0.62 fl oz/1000 row-ft (IF) and Ridomil Gold @ 0.42 floz/1000 rowft (IF)
3. Serenade Soil @ 4 qt/A (IF)
4. Orondis @ 6.8 fl oz/A (Foliar) & Ridomil Gold Copper @ 3.2 floz/A (Foliar)
5. Ridomil Gold Copper @ 2.0 lbs/A (Foliar)
6. Untreated Control (2)

Planted: May 22 & June 1, 2015
Stand: Readings taken on July 8, 2015.
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 @ 0.8 pt/A + Boundry @ 0.8 pt/A
Insecticide: None
Fungicide: Endura @ 2.5 oz/A
Vine Killer: Vines were chopped on September 11, 2015.
Harvested: Septemeber 23, 24 & 25, 2015

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, 2015.

		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 (1)	96.9	20.8 a	44.2 a	24.1 a	11.0 a	426.7 a	381.8 a	3.5 a	16.0 a
2. Orondis @ 0.62 floz/1000 rowft (IF) and Ridomil Gold @ 0.42 floz/1000 rowft (IF)	92.5	27.4 a	44.4 a	19.7 a	8.4 a	417.6 a	382.3 a	0.3 b	1.1 d
3. Serenade Soil @ 4 qt/A (IF)	96.9	25.8 a	41.7 a	22.3 a	10.2 a	440.5 a	396.2 a	3.4 a	14.0 ab
4. Orondis @ 6.8 fl oz/A (Foliar) & Ridomil Gold Copper @ 3.2 floz/A (Foliar)	95.0	19.4 a	45.8 a	27.8 a	7.0 a	473.3 a	440.0 a	1.1 b	4.7 bcd
5. Ridomil Gold Copper @ 2.0 lbs/A (Foliar)	96.9	19.7 a	50.5 a	18.4 a	11.5 a	442.8 a	392.6 a	0.5 b	2.4 cd
6. Untreated Control (2)	95.6	19.0 a	44.3 a	27.3 a	9.5 a	439.4 a	399.0 a	2.3 ab	11.6 abc
LSD (P=.05)	NS	NS	NS	NS	NS	NS	NS	2.2	10.4
CV	3.48	20.76	13.43	27.36	47.77	9.78	13.08	79.93	82.95
F value	0.4172	0.076	0.4891	0.2608	0.7493	0.5831	0.647	0.023	0.032

[a]Percentage of plants emerged on July 8th, 2015; mean of 4 replications.

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

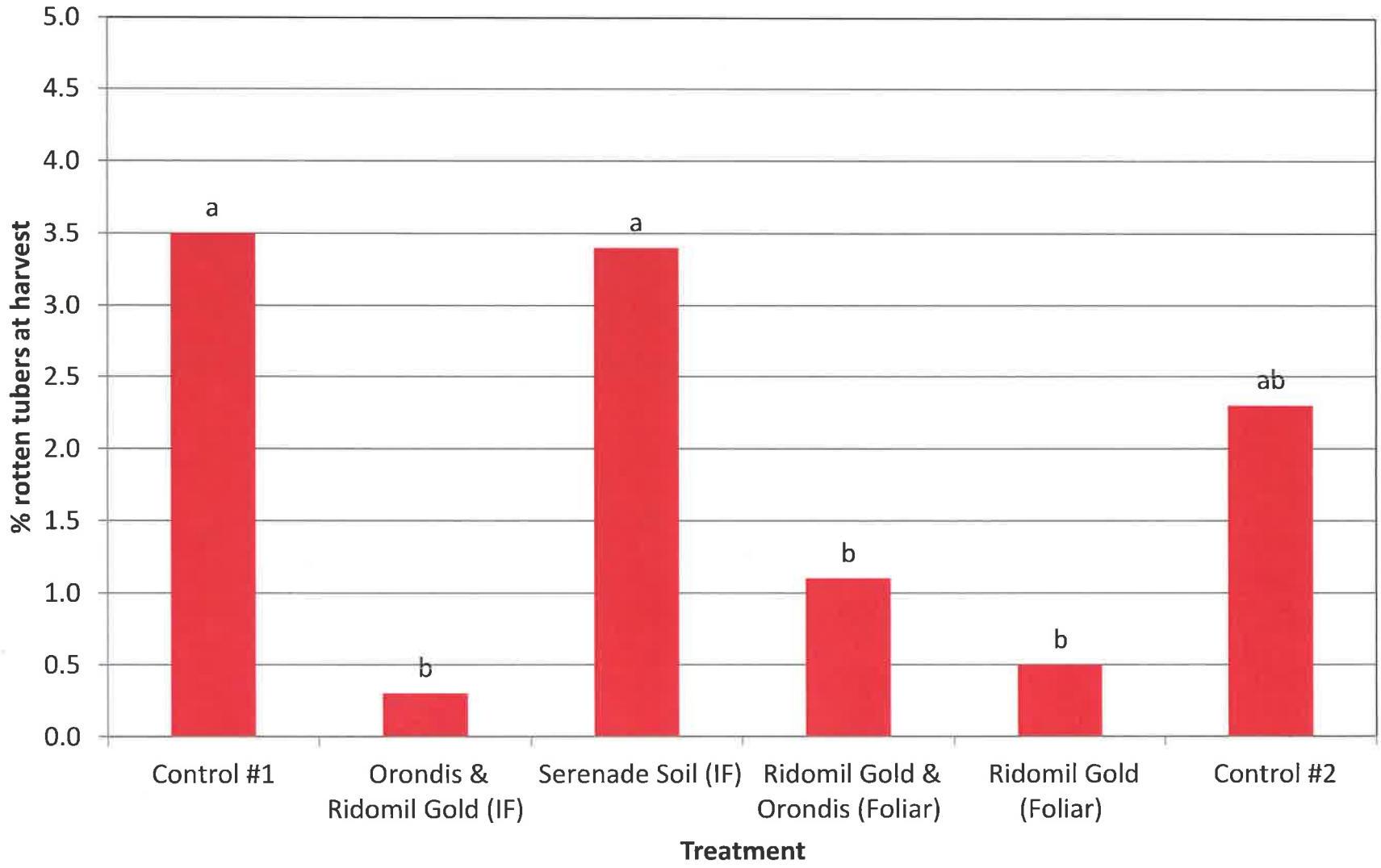
[c]Total yield expressed as hundred weight per acre, 2-20 foot rows per treatment per replication, mean of four replications.

[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).

2015 Pink Rot Fungicide Trial Results - % Rotten Tubers at Harvest, Colorado State University, San Luis Valley Research Center



*** Orondis is not currently registered for use in pink rot control.**

2015 Black Scurf Fungicide Trials

In 2015, 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*. The products Priaxor, Integral, Headline, Elatus, Emesto Silver and Cruiser Maxx Potato Extreme were found to managing this disease. There was a significant reduction in stem canker caused by Rhizoctonia solani when the seed treatments Emesto Silver and Cruiser Maxx Potato Extreme were used. The fungicides Priaxor + Integral and Elatus significantly reduced the amount of black scurf on the tubers. Priaxor has been evaluated for black scurf control over the last several years with similar results. 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, 2015

Researcher: Andrew J. Houser, Colorado State University, SLVRC
Location: San Luis Valley Research Center, Center, CO
Cultivar: Colorado Rose
Objective: To evaluate the efficacy of various seed treatments. Additional data was collected on plant health, rhizoctonia severity, and overall yield.
Application: In-furrow(IF) treatments were made using a CO2 charged backpack sprayer with two XR8002VS nozzles at 35psi. In-furrow applications were made on May 22nd, 2015.

Treatments:

1. Untreated Control
2. Headline @ 9.0 fl oz/A (IF) & Integral @ 9.6 floz/A (IF)
3. Headline @ 9.0 floz/A (IF) & Integral @ 19.2 floz/A (IF)
4. Priaxor @ 6.75 floz/A (IF)
5. Priaxor @ 6.75 floz/A (IF) & Integral @ 9.6 floz/A (IF)
6. Priaxor @ 8 floz/A (IF)
7. Priaxor @ 8 floz/A (IF) & Integral @ 9.6 floz/A (IF)

Planted: May 22, 2015
Plot Design: Randomized complete block
Plot Size: 2-30 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: 80N-60P-0K-25S-2.5Z, preplant, 60N through sprinkler after tuber set.
Herbicide: Dual Magnum @ 1.5 pt/A + Sencor @ 0.33 lb/A + Chateau @ 1.0 oz/A
Insecticide: Leverage 360 @ 2.8 oz./A & Belay @ 2.8 oz/A & Movento @ 5.0 oz/A.
Fungicide: Quadris @ 1.6 pt/A & Luna Tranquility @ 11.2 floz/A.
Vine Killer: Vines were chopped on September 11, 2015.
Harvested: Septemeber 22, 2015

DATA:

Plant stand count:
Seed piece decay: % of emerged plants per treatment per replication. Readings taken on July 6th.

% Stem canker: 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 6th and August 4th.

Severity index: Percent stems infected with rhizoctonia; 2 plants/treatment/replication. Readings taken on July 6th and August 4th.

Black scurf: 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.

Yield: % 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 27th.

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

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 Colorado Rose, Colorado State University, San Luis Valley Research Center, Colorado, 2015.

			Percent[b]					
Trt. #	**Products/Timing**	**% Stand[a] (July 6th)**	**<4 oz.**	**4-10 oz.**	**>10 oz.**	**US #2's & culls**	**Total CWT[c]**	**CWT w/o US #2's & culls[d]**
1	Untreated Control	84.6	17.8	60.7	17.0	4.6	412.3	393.6
2	Headline @ 9.0 fl oz/A (IF) & Integral @ 9.6 floz/A (IF)	88.3	23.8	52.9	17.7	5.6	393.3	371.8
3	Headline @ 9.0 floz/A (IF) & Integral @ 19.2 floz/A (IF)	85.4	20.5	46.5	26.8	6.2	416.9	390.5
4	Priaxor @ 6.75 floz/A (IF)	87.1	19.7	56.6	20.3	3.5	413.2	398.7
5	Priaxor @ 6.75 floz/A (IF) & Integral @ 9.6 floz/A (IF)	85.8	16.8	55.0	23.6	4.6	470.7	448.7
6	Priaxor @ 8 floz/A (IF)	90.4	15.5	55.0	25.1	4.5	442.4	422.2
7	Priaxor @ 8 floz/A (IF) & Integral @ 9.6 floz/A (IF)	91.1	24.1	54.5	17.7	3.7	473.5	455.7
LSD (P=.05)		NS	NS	NS	NS	NS	NS	NS
CV		6.07	24.3	13.63	34.12	36.91	13.43	13.4
F value		0.5245	0.1362	0.2998	0.3482	0.3278	0.3801	0.3107

[a]Percentage of plants emerged on July 6th, 2015; 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.

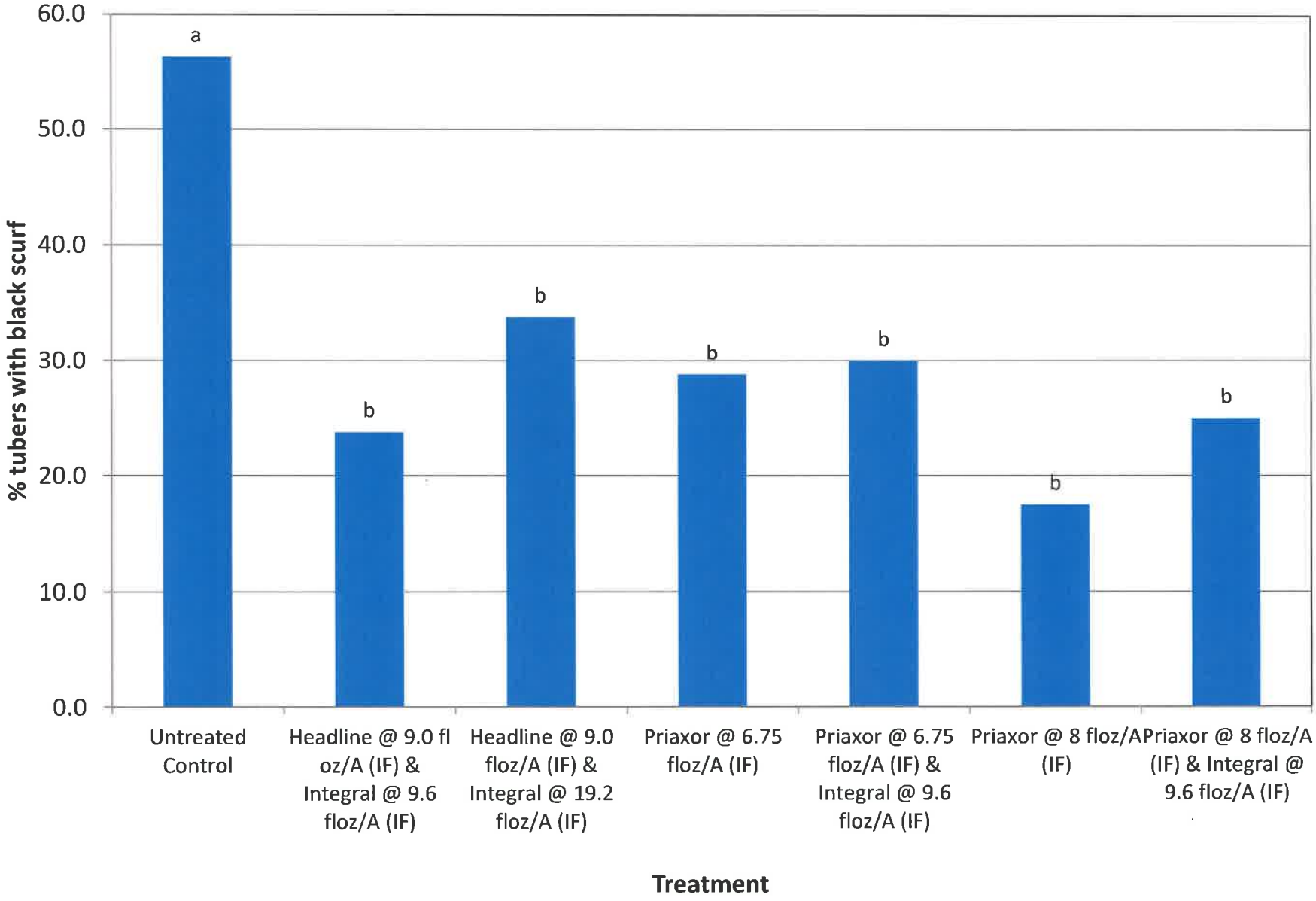
[d]Hundred weight per acre minus the US #2s and culls, 2-20 foot rows per treatment per replication, mean of four replications.
Means followed by same letter do not significantly differ (P=0.05)

Table 2. Black Scurf Trial #1 - Effects of seed treatments on in-season plant development and incidence of disease in the cultivar Colorado Rose, Colorado State University, San Luis Valley Research Center, Colorado, 2015.

		Stems & Seed Pieces evaluated in season						Tubers evaluated for rhizoctonia post harvest		
		7/6/2015			8/4/2015					
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	25.1	80.9	76.6	54.7	173.4	95.3	56.3 a	12.5	33.8 a
2	Headline @ 9.0 fl oz/A (IF) & Integral @ 9.6 floz/A (IF)	13.5	38.0	84.4	32.8	95.1	100.0	23.8 b	0.0	10.0 b
3	Headline @ 9.0 floz/A (IF) & Integral @ 19.2 floz/A (IF)	26.4	93.3	81.3	28.1	78.1	95.3	33.8 b	1.3	17.5 b
4	Priaxor @ 6.75 floz/A (IF)	8.7	26.3	80.6	20.8	47.9	100.0	28.8 b	5.0	15.0 b
5	Priaxor @ 6.75 floz/A (IF) & Integral @ 9.6 floz/A (IF)	7.7	26.3	67.2	35.9	106.3	94.4	30.0 b	10.0	12.5 b
6	Priaxor @ 8 floz/A (IF)	9.8	14.0	71.9	32.1	97.6	100.0	17.5 b	7.5	8.8 b
7	Priaxor @ 8 floz/A (IF) & Integral @ 9.6 floz/A (IF)	8.5	19.8	81.3	18.4	51.3	98.9	25.0 b	8.8	11.3 b
LSD (P=0.05)		NS	NS	NS	NS	NS	NS	20.0	NS	10.9
CV		84.4	107.3	24.2	67.3	70.1	6.7	43.9	102.4	47.0
F value		0.1543	0.1381	0.8534	0.333	0.1836	0.7051	0.0207	0.1284	0.0022

[a]Mean % of stems with rhizoctonia stem canker per plant; 2 plants/treatment/rep. Readings taken on July 6th & August 4th; 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 6th & August 4th; mean of 4 replications.
[c]Mean % of seed piece decay per seed piece, Readings taken on July 6th & August 4th; mean of 4 replications.
[d]Mean % of tubers with black scurf, collected at harvest. Harvested on Sept. 22 and readings taken on October 27, 2015; 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)

2015 Black Scurf/Stem Canker Fungicide Trial #1 Results
% tubers with black scurf post-harvest, SLVRC, CO



EVALUATION OF SEED TREATMENTS APPLIED TO POTATO SEED FOR THE MANAGEMENT OF BLACK SCURF - TRIAL #2, 2015

Researcher: Andrew J. Houser, Colorado State University, SLVRC
Location: San Luis Valley Research Center, Center, CO
Cultivar: Colorado Rose
Objective: To evaluate the efficacy of various seed treatments. Additional data was collected on plant health, rhizoctonia severity, and overall yield.
Application: In-furrow (IF) treatments were made using a CO2 charged backpack sprayer with two XR8002VS nozzles at 35psi. In-furrow applications were made on May 21st, 2015. Cruiser Maxx Potato Extreme was applied to all cut seed pre-plant at a rate of 0.31 floz/100 lbs.

Treatments:

1. Untreated Control
2. Quadris @ 0.80 floz/1000 row ft (IF)
3. Priaxor @ 0.46 floz/1000 row ft (IF)
4. Elatus @ 0.34 floz/1000 row ft (IF)
5. Vertisan @1.60 floz/1000 row ft (IF)

Planted: May 21, 2015
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 irrigation system, rate based on ET
Fertilizer: 80N-60P-0K-25S-2.5Z, preplant, 60N through sprinkler after tuber set.
Herbicide: Dual Magnum @ 0.8 pt/A + Boundry @ 0.8 pt/A
Insecticide: None
Fungicide: Endura @ 2.5 oz/A
Vine Killer: Vines were chopped on September 11, 2015.
Harvested: Septemeber 23, 2015

DATA:

Plant stand count:
Seed piece decay: % of emerged plants per treatment per replication. Readings taken on July 8th and August 5th.

% Stem canker: 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 8th and August 5th.

Severity index: Percent stems infected with rhizoctonia; 2 plants/treatment/replication. Readings taken on July 8th and August 5th.

Black scurf: 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.

Yield: % 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 27th, 2015.

Grade: 2-10 foot rows per treatment per replication, total yield expressed in cwt/A.

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 Colorado Rose, Colorado State University, San Luis Valley Research Center, Colorado, 2015.

			Percent[b]					
Trt. #	Products/Timing	% Stand[a] (July 8th)	<4 oz.	4-10 oz.	>10 oz.	US #2's & culls	Total CWT[c]	CWT w/o US #2's & culls[d]
1	Untreated Control	73.8	20.1	50.3	18.7	11.0	437.5	389.2
2	Quadris @ 0.80 floz/1000 row ft (IF)	74.4	14.4	49.7	26.4	9.6	390.1	354.0
3	Priaxor @ 0.46 floz/1000 row ft (IF)	70.0	17.6	50.5	23.7	8.3	440.9	404.5
4	Elatus @ 0.34 floz/1000 row ft (IF)	76.3	20.6	50.4	16.7	12.4	398.1	349.8
5	Vertisan @1.60 floz/1000 row ft (IF)	69.4	15.6	52.7	21.2	10.5	429.9	385.8
LSD (P=.05)		NS	NS	NS	NS	NS	NS	NS
CV		13.62	3.7	5.99	6.05	5.03	56.02	59.49
F value		0.8358	0.1377	0.9596	0.229	0.8211	0.6036	0.6474

[a]Percentage of plants emerged on July 8th, 2015; mean of 4 replications.

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

[c]Total yield expressed as hundred weight per acre, 2-10 foot rows per treatment per replication, mean of four replications.

[d]Hundred weight per acre minus the US #2s and culls, 2-10 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 #2 - Effects of seed treatments on in-season plant development and incidence of disease in the cultivar Colorado Rose, Colorado State University, San Luis Valley Research Center, Colorado, 2015.

		Stems & Seed Pieces evaluated in season						Tubers evaluated for rhizoctonia post harvest		
		7/8/2015			8/5/2015					
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	67.1 a	214.5 a	71.9 a	68.5 a	192.7 a	98.4 a	39.2 ab	13.1 b	22.0 a
2	Quadris @ 0.80 floz/1000 row ft (IF)	20.5 a	53.9 a	71.9 a	23.3 a	67.4 a	100.0 a	20.0 b	6.3 b	11.3 a
3	Priaxor @ 0.46 floz/1000 row ft (IF)	24.2 a	75.8 a	73.4 a	45.2 a	100.9 a	100.0 a	63.8 a	26.3 a	33.8 a
4	Elatus @ 0.34 floz/1000 row ft (IF)	25.2 a	52.6 a	60.9 a	54.6 a	110.2 a	100.0 a	13.8 b	7.5 b	6.3 a
5	Vertisan @1.60 floz/1000 row ft (IF)	18.1 a	60.1 a	64.1 a	47.6 a	122.8 a	100.0 a	38.8 ab	12.5 b	21.3 a
LSD (P=0.05)		NS	NS	NS	NS	NS	NS	26.2	13.1	NS
CV		88.9	102.4	47.3	68.1	93.8	1.4	48.5	65.0	63.4
F value		0.1334	0.1301	0.9733	0.4369	0.615	0.4449	0.0107	0.0421	0.0542

[a]Mean % of stems with rhizoctonia stem canker per plant; 2 plants/treatment/rep. Readings taken on July 8th & August 5th; 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 8th & August 5th; mean of 4 replications.

[c]Mean % of seed piece decay per seed piece, Readings taken on July 8th & August 5th; mean of 4 replications.

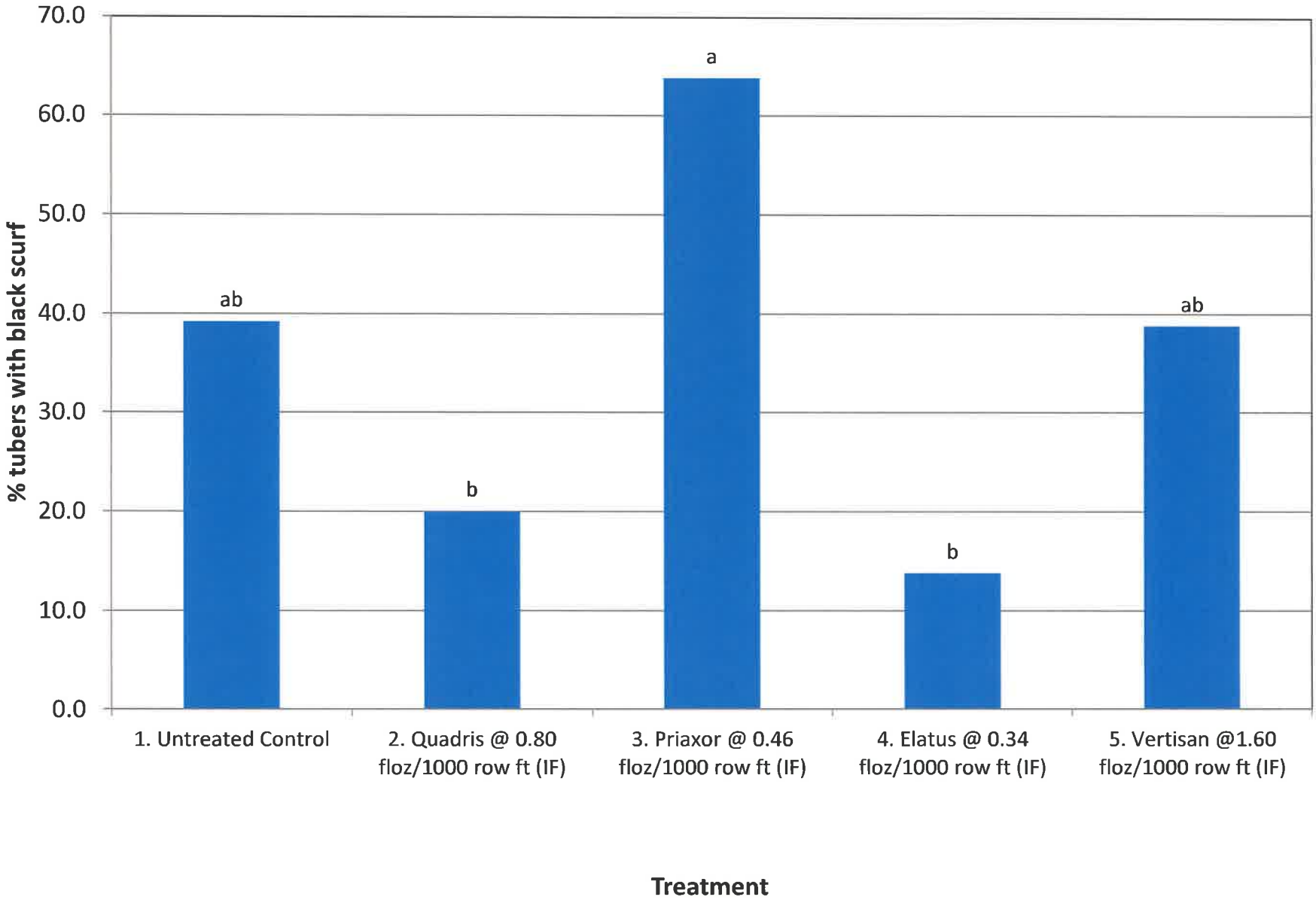
[d]Mean % of tubers with black scurf, collected at harvest. Harvested on Sept. 23 and readings taken on October 27, 2015; mean of 4 reps.

[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)

2015 Black Scurf/Stem Canker Fungicide Trial #2 Results
% tubers with black scurf post-harvest, SLVRC, CO



EVALUATION OF SEED PIECE FUNGICIDE TREATMENTS APPLIED TO POTATO SEED FOR THE MANAGEMENT OF BLACK SCURF - TRIAL #1, 2015

Researcher: Andrew J. Houser, Colorado State University, SLVRC
Location: San Luis Valley Research Center, Center, CO
Cultivar: Colorado Rose
Objective: To evaluate the efficacy of various seed treatments. Additional data was collected on plant health, rhizoctonia severity, and overall yield.
Application: All treatments were applied to freshly cut seed potatoes 24 hours prior to planting.

Treatments:

1. Untreated Control
2. Fir Bark @ 1 lb/cwt
3. Emesto Silver @ 0.31 floz/cwt
4. Cruiser Maxx Potato Extreme @ 0.31 floz/cwt

Planted: May 21, 2015
Plot Design: Randomized complete block
Plot Size: 3-15 foot rows per treatment per replication
Plant Spacing: 12 inches
Row Spacing: 34 inches
Replications: Four
Irrigation: Solid set irrigation system, rate based on ET
Fertilizer: 80N-60P-0K-25S-2.5Z, preplant, 60N through sprinkler after tuber set.
Herbicide: Dual Magnum @ 0.8 pt/A + Boundry @ 0.8 pt/A
Insecticide: None
Fungicide: Endura @ 2.5 oz/A
Vine Killer: Vines were chopped on September 11, 2015.
Harvested: Septemeber 23, 2015

DATA:

Plant stand count:
Seed piece decay: % of emerged plants per treatment per replication. Readings taken on July 7th and August 5th.

% Stem canker: 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 7th and August 5th.

Severity index: Percent stems infected with rhizoctonia; 2 plants/treatment/replication. Readings taken on July 7th and August 5th.

Black scurf: 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.

Yield: % 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 27th, 2015.

Grade: 3-10 foot rows per treatment per replication, total yield expressed in cwt/A.

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

Table 1. Seed Piece Trial #1 - Effect of applied products for control of *Rhizoctonia solani*, on tuber yield and quality in the cultivar Colorado Rose, Colorado State University, San Luis Valley Research Center, Colorado, 2015.

			Percent[b]					
Trt. #	**Products/Timing**	**% Stand[a] (July 7th)**	**<4 oz.**	**4-10 oz.**	**>10 oz.**	**US #2's & culls**	**Total CWT[c]**	**CWT w/o US #2's & culls[d]**
1	Untreated Control	90.6	22.3	52.2	17.8	7.8	475.7	439.5
2	Fir Bark @ 1 lb/cwt	81.1	21.2	49.8	18.7	10.3	436.9	392.8
3	Emesto Silver @ 0.31 floz/cwt	88.9	22.9	54.3	14.5	8.3	530.0	485.5
4	Cruiser Maxx Potato Extreme @ 0.31 floz/cwt	85.5	21.0	42.5	27.7	8.8	478.5	436.9
LSD (P=.05)		NS	NS	NS	NS	NS	NS	NS
CV		9.57	5.02	8.06	8.99	2.12	53.31	48.4
F value		0.5459	0.9393	0.2513	0.2597	0.4028	0.177	0.1301

[a]Percentage of plants emerged on July 7th, 2015; mean of 4 replications.

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

[c]Total yield expressed as hundred weight per acre, 2-10 foot rows per treatment per replication, mean of four replications.

[d]Hundred weight per acre minus the US #2s and culls, 3-10 foot rows per treatment per replication, mean of four replications.
Means followed by same letter do not significantly differ (P=0.05)

Table 2. Seed Piece Trial #1 - Effects of seed treatments on in-season plant development and incidence of disease in the cultivar Colorado Rose, Colorado State University, San Luis Valley Research Center, Colorado, 2015.

		Stems & Seed Pieces evaluated in season						Tubers evaluated for rhizoctonia post harvest		
		7/7/2015			8/5/2015					
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	45.0	163.5	89.6	61.5	137.5 ab	100.0	51.3	20.0	25.0
2	Fir Bark @ 1 lb/cwt	45.8	88.9	83.3	58.3	150.0 a	93.8	33.8	13.8	20.0
3	Emesto Silver @ 0.31 floz/cwt	7.6	18.1	75.0	19.6	51.7 c	100.0	17.5	10.0	7.5
4	Cruiser Maxx Potato Extreme @ 0.31 floz/cwt	19.7	53.1	66.7	51.4	55.6 bc	91.8	22.5	13.8	5.0
LSD (P=0.05)		NS	NS	NS	NS	82.4	NS	NS	NS	NS
CV		78.0	98.7	34.9	43.7	52.2	11.3	86.9	89.3	102.9
F value		0.1071	0.1324	0.6738	0.0675	0.0426	0.6232	0.3593	0.7447	0.2351

[a]Mean % of stems with rhizoctonia stem canker per plant; 2 plants/treatment/rep. Readings taken on July 7th & August 5th; 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 7th & August 5th; mean of 4 replications.

[c]Mean % of seed piece decay per seed piece, Readings taken on July 7th & August 5th; mean of 4 replications.

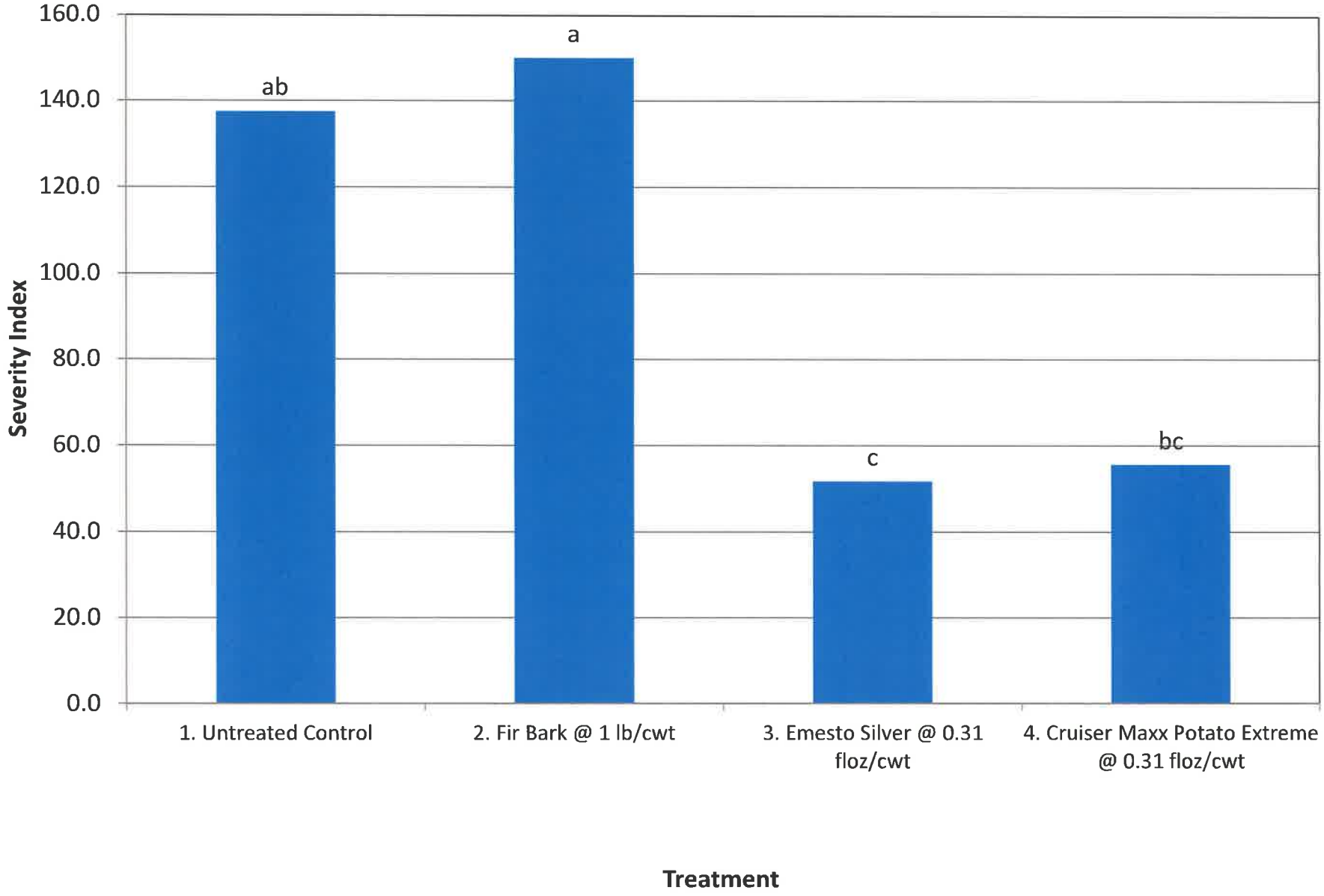
[d]Mean % of tubers with black scurf, collected at harvest. Harvested on Sept. 23 and readings taken on October 27, 2015; mean of 4 reps.

[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)

2015 Seed Piece Fungicide Trial #1
Number Stems with Rhizoctonia Stem Canker Multiplied by Disease Severity, August 5, 2015, SLVRC, CO



2015 Powdery Scab Fungicide Trial

The fungicide Omega, Forum and Ridez resulted in a reduction in powdery scab levels also. Omega has been evaluted for the managment of powdery scab in the San Luis Valley for several years with similar results. The fungicide Ridez is a biological product. There are not many chemistries that have been found to be effective at managing powdery scab. These products are tools that can be utilized in a wholeistic management system to combat powdery scab. Forum is currently only labeled for late blight control in potatoes.

EVALUATION OF PRODUCTS APPLIED TO POTATO SEED IN-FURROW AND FOLIAR FOR THE MANAGEMENT OF POWDERY SCAB, 2015

Researcher: Andrew J. Houser, Colorado State University, SLVRC
Location: San Luis Valley Research Center, Center, CO
Cultivar: DT6063-1R (Cherry Red)
Objective: To evaluate the efficacy of various products on the management of powdery scab. Additional data was collected on powdery scab root galling, tuber incidence, severity and overall yield.

Application: In-furrow (IF) and At-Hilling (AH) applications were made using a CO2 charged backpack sprayer with two XR8002VS nozzles (one per row) at 35psi with 10 gal. of water/A. Foliar applications 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. Applications were made on May 15th (IF), June 18th (AH), and July 16th (Foliar).

Treatments:
1. Untreated Control #1
2. Omega 500F @ 24 floz/A
3. Omega 500F @ 36 floz/A
4. Omega 500F @ 48 floz/A
5. Omega 500F @ 24 floz/A + Forum @ 6.0 floz/A
6. Omega 500F @ 36 floz/A + Forum @ 6.0 floz/A
7. Omega 500F @ 48 floz/A + Forum @ 6.0 floz/A
8. Forum @ 6.0 floz/A
9. Ridez @ 0.2 floz/cwt (IF) & Ridez @ 1 qt/A (TI)
10. Proprietary
11. Proprietary
12. Untreated Control #2

Planted: May 15, 2015
Stand: Readings taken on July 9, 2015.
Plot Design: Randomized complete block
Plot Size: 2-17 foot rows per treatment per replication
Plant Spacing: 12 inches
Row Spacing: 34 inches
Replications: Four
Irrigation: Center pivot irrigation, rate based on ET
Fertilizer: NA
Herbicide: NA
Insecticide: NA
Fungicide: NA
Vine Killer: NA
Harvested: Septemeber 21 & 22, 2015

DATA:

Disease Readings: Root gall readings were taken from 2 plants per row per replicationon on Aug. 10, 11, 12, 2015. Powdery scab tuber readings were taken on 2-10 foot rows at harvest on September 21 & 22, 2015.

Yield & Grade: 2-10 foot rows per treatment per replication, total yield expressed in cwt/A. By hand, percent tubers by weight in kilograms < 4 oz., 4-10 oz., > 10 oz., US #2's & culls.

Table 1. Powdery Scab Fungicide Trial - Effect of applied products for control of powdery scab on root galling and tuber lesion development in the potato cultivar DT6063-1R (Cherry Red), Colorado State University, San Luis Valley, Colorado, 2015.

		Tuber symptoms			
Treatment (Products/Timing)	**Root Gall Rating[a]**	**Percent Incidence[b]**	**Percent Healthy[c]**	**Severity Index[d]**	**Percent Unmarketable[e]**
1. Untreated Control #1	2.4	46.7 a	41.1 c	93.5 a	12.1
2. Omega 500F @ 24 floz/A	2.3	33.9 b	59.1 a	67.8 c	7.0
3. Omega 500F @ 36 floz/A	1.9	30.0 b	60.3 a	60.0 c	9.7
4. Omega 500F @ 48 floz/A	1.8	33.4 b	60.0 a	66.8 c	6.7
5. Omega 500F @ 24 floz/A + Forum @ 6.0 floz/A	2.5	33.7 b	61.3 a	67.4 c	5.0
6. Omega 500F @ 36 floz/A + Forum @ 6.0 floz/A	1.8	37.5 ab	57.4 a	75.0 bc	5.1
7. Omega 500F @ 48 floz/A + Forum @ 6.0 floz/A	1.9	29.3 b	64.4 a	58.7 c	6.3
8. Forum @ 6.0 floz/A	1.9	33.2 b	57.1 a	66.3 c	9.8
9. Ridez @ 0.2 floz/cwt (IF) & Ridez @ 1 qt/A (TI)	2.4	33.8 b	57.0 a	67.6 c	9.2
10. Proprietary	2.5	33.8 b	52.8 ab	67.7 c	13.4
11. Proprietary	2.0	46.1 a	41.6 bc	92.1 ab	12.3
12. Untreated Control #2	2.3	34.0 b	55.3 a	67.9 c	10.8
LSD (P=.05)	NS	9.21	11.65	18.41	NS
CV	35.73	17.99	14.52	17.98	47.01
F value	0.8259	0.0073	0.0042	0.0073	0.0775

[a]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. Data collected on August 10-12, 2015.

[b]Percent incidence = mean percent of medium sized tubers (4-10oz) with one or more powdery scab lesion at harvest. Mean of four replications.

[c]Percent healthy = mean percent of medium sized tubers (4-10oz) with zero powdery scab lesions at harvest. Mean of four replications.

[d]Severity Index = mean percent incidence multiplied by the avg. severity of the lesions, where 1 = very little or no disease and 5 = heavily infested. Mean of four replications.

[e]Percent Unmarketable = mean percent of the total number of medium sized tubers (4-10oz) with a lesion severity rating of three or higher at harvest. Mean of four replications.

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

Table 2. Powdery Scab Fungicide Trial - Effect of applied products for control of powdery scab, on tuber yield and quality in the cultivar DT6063-1R (Cherry Red), Colorado State University, San Luis Valley, Colorado, 2015.

		Percent[b]					
Treatment (Products/Timing)	**% Stand[a] (July 9th)**	**<4 oz.**	**4-10 oz.**	**>10 oz.**	**US #2's & culls**	**Total CWT[c]**	**CWT w/o US #2's & culls[d]**
1. Untreated Control #1	89.7	18.2	45.1	22.6	14.1	462.6	399.1
2. Omega 500F @ 24 floz/A	93.4	16.2	52.4	25.8	5.7	472.8	445.7
3. Omega 500F @ 36 floz/A	98.5	24.0	44.3	19.9	11.9	483.8	426.2
4. Omega 500F @ 48 floz/A	97.1	17.4	47.4	27.9	7.4	493.1	457.5
5. Omega 500F @ 24 floz/A + Forum @ 6.0 floz/A	96.3	16.4	51.2	21.3	11.1	430.1	383.5
6. Omega 500F @ 36 floz/A + Forum @ 6.0 floz/A	91.9	13.9	47.8	25.7	12.6	452.5	395.8
7. Omega 500F @ 48 floz/A + Forum @ 6.0 floz/A	93.4	16.7	43.8	29.8	9.7	426.6	386.4
8. Forum @ 6.0 floz/A	90.4	18.4	47.7	21.0	12.9	457.1	398.3
9. Ridez @ 0.2 floz/cwt (IF) & Ridez @ 1 qt/A (TI)	97.8	13.1	47.9	26.4	12.6	486.3	427.1
10. Proprietary	93.4	24.0	42.5	21.5	12.0	452.0	397.9
11. Proprietary	93.4	18.3	55.7	18.0	8.1	465.1	427.5
12. Untreated Control #2	96.3	18.1	48.0	26.3	7.8	468.6	432.6
LSD (P=.05)	NS	NS	NS	NS	NS	NS	NS
CV	4.59	30.78	14.92	29.99	43.04	13.23	15.24
F value	0.1015	0.197	0.3682	0.4536	0.2154	0.9176	0.8223

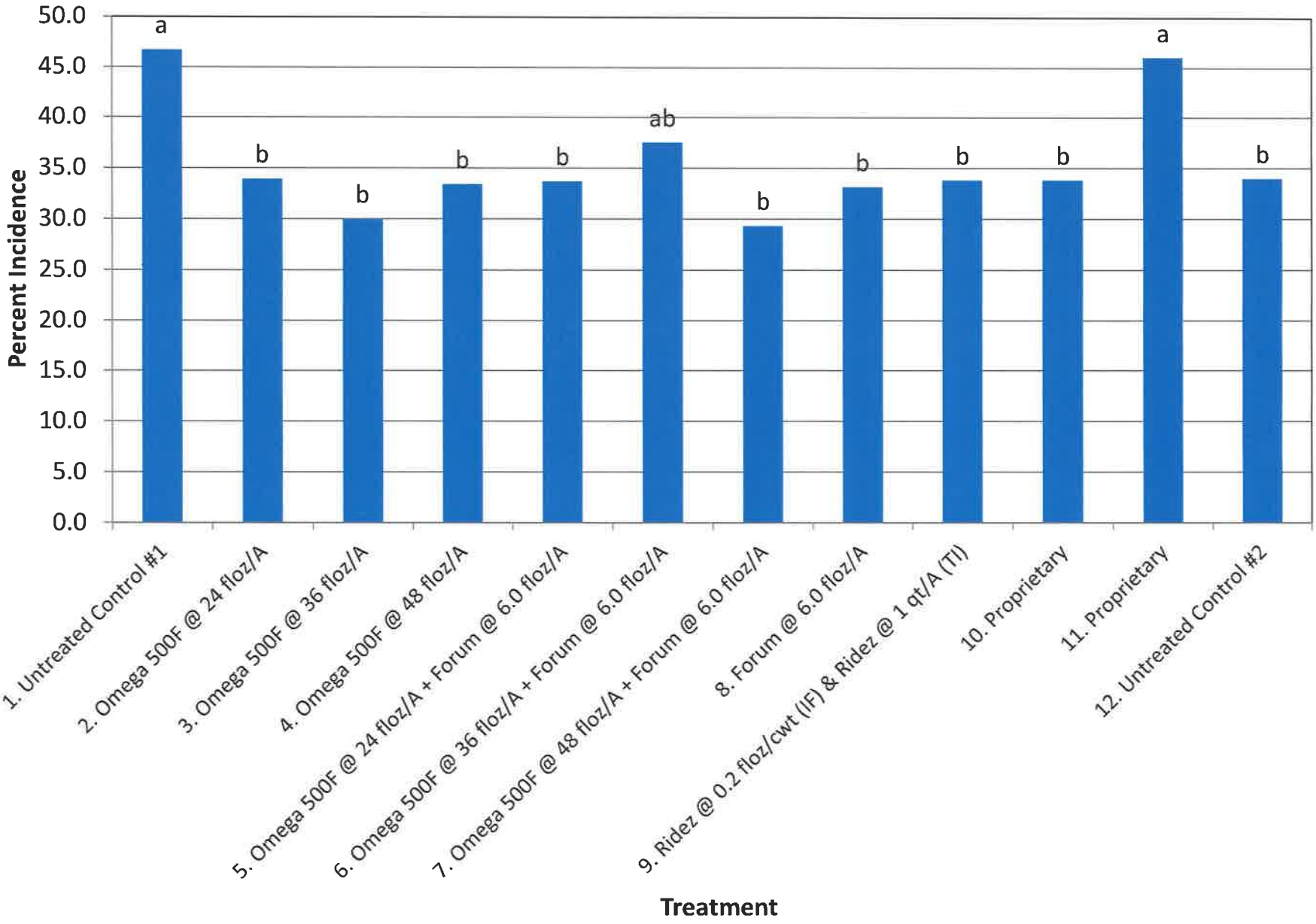
[a]Percentage of plants emerged on July 9th, 2015; mean of 4 replications.

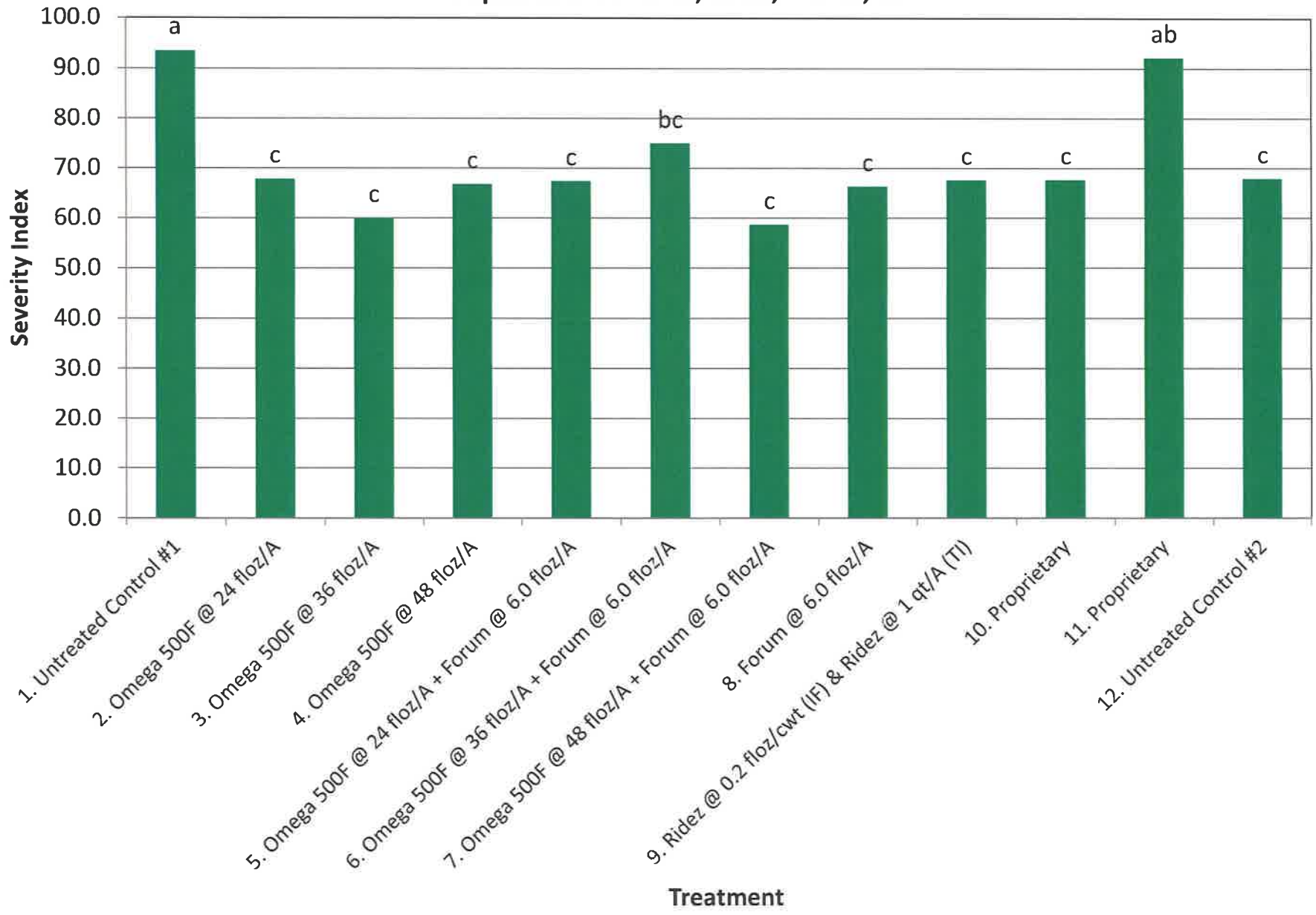
[b]Based on tuber weight in kilograms, mean of four replications.

[c]Total yield expressed as hundred weight per acre, 2-10 foot rows per treatment per replication, mean of four replications.

[d]Hundred weight per acre minus the US #2s and culls, 2-10 foot rows per treatment per replication, mean of four replications.
Means followed by same letter do not significantly differ (P=0.05)

2015 Powdery Scab Fungicide Trial
Percent Tubers (4-10 oz) at Harvest with Powdery Scab Lesions, September 21 & 22, 2015, SLVRC, CO




2015 Powdery Scab Fungicide Trial
Severity Index - mean percent incidence multiplied by the avg. severity of the lesions, where 1 = very little or no disease and 5 = heavily infested., September 21 & 22, 2015, SLVRC, CO
Severity Index
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
a
c
c
c
c
bc
c
c
c
c
ab
c
1. Untreated Control #1
2. Omega 500F @ 24 floz/A
3. Omega 500F @ 36 floz/A
4. Omega 500F @ 48 floz/A
5. Omega 500F @ 24 floz/A + Forum @ 6.0 floz/A
6. Omega 500F @ 36 floz/A + Forum @ 6.0 floz/A
7. Omega 500F @ 48 floz/A + Forum @ 6.0 floz/A
8. Forum @ 6.0 floz/A
9. Ridez @ 0.2 floz/cwt (IF) & Ridez @ 1 qt/A (TI)
10. Proprietary
11. Proprietary
12. Untreated Control #2
Treatment