

Effect of Fungicides on Rhizoctonia Control in Potato
Sponsored by Miller Research, Syngenta Crop Protection, Arysta LifeScience, and BASF

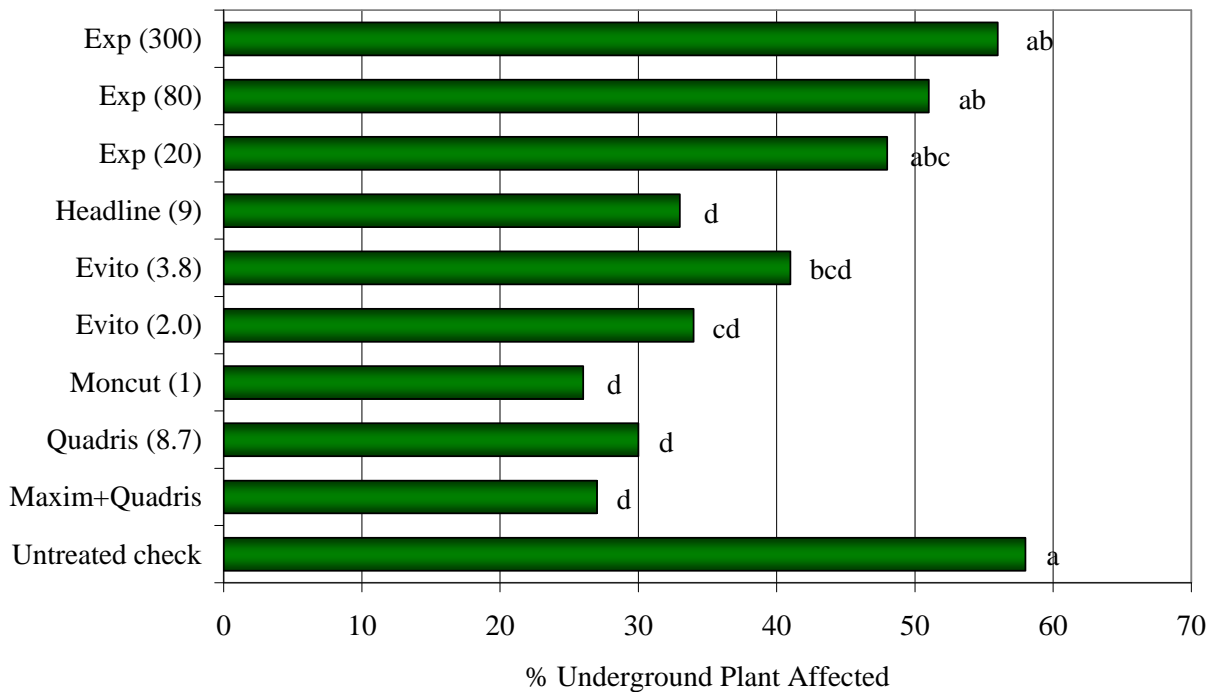
Summary:

Treatments effective in reducing Rhizoctonia stem and stolon canker in June and July included:

1. Maxim seed treatment at 0.04 fl oz/cwt + Quadris in-furrow at 8.7 fl oz/acre
2. Quadris in-furrow at 8.7 fl oz/acre
3. Moncut in-furrow at 1 lb/acre
4. Evito in-furrow at 2.0 fl oz/acre
5. Headline in-furrow at 9 fl oz/acre.

Moncut in-furrow significantly increased yield compared to the check. The Quadris/Maxim and Quadris treatments were statistically similar.

Effect of Fungicides on Rhizoctonia Stem and Stolon Canker
 July 17 (66 days after planting)



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MATERIALS AND METHODS

Trial Establishment

Certified seed (cv. Russet Burbank) for this trial was purchased from a commercial potato grower. Seed was cut on an automatic seed cutter and treated on May 1. For treatment 2, 50 pounds of cut seed were collected and loaded into a modified cement mixer (baffles removed). As the seed tumbled in the mixer, 60 ml of spray mixture (Maxim 4 FS + water) was misted onto seed pieces using a hand-pump sprayer. The mixer turned for 90 seconds using an automatic timer. This process was repeated twice for each treatment so that 100 lb of seed were cut and treated per treatment. Seed was cut and boxed without any treatment for the remaining treatments.

The seed was planted with a modified ACME commercial cup type potato planter on May 12 with 14 inch spacing between plants within rows, 36 inches between rows, to a depth of 7 inches. Each plot was four rows wide and 34 feet long. Drive rows were established within the plot so that foliar applications could be made to the trial without driving through the treated plot area.

Fertilizer was spread just prior to hilling on May 18. Maintenance treatments for weed and disease (pink rot) control were applied using a Melroe 115 spray-coupe. Details of these operations are provided in the Experimental Plot Data section at the end of this report.

Irrigation was done using a solid set irrigation system. Irrigation was scheduled with the goal to keep soil moisture above 60% field capacity.

Treatments

1. Untreated check
2. Maxim 4 FS seed treatment (0.04 fl oz/cwt) + Quadris in-furrow (8.7 fl oz/acre)
3. Quadris in-furrow (8.7 fl oz/acre)
4. Moncut in-furrow (1 lb/acre)
5. Evito in-furrow (2.0 fl oz/acre)
6. Evito in-furrow (3.8 fl oz/acre)
7. Headline in-furrow (9 fl oz/acre)
8. Experimental in-furrow (20% active ingredient/volume)
9. Experimental in-furrow (80% active ingredient/volume)
10. Experimental in-furrow (300% active ingredient/volume)

In-Furrow Applications

Treatments were applied in-furrow at planting with TeeJet flat fan SS8001E nozzles mounted on the potato planter on May 12. Nozzles (one per row) were positioned to spray the soil in an 8 inch band as it was being turned into the furrow. Treatments were mixed in three-gallon stainless steel tanks. A Teflon-coated laboratory magnet was placed inside each tank. A second magnet located under the tank was turned with a hydraulic motor which caused the magnet inside the tank to turn creating constant agitation of the spray mixture. The spray tanks were pressurized with compressed air. Products were applied using 9.5 gallons of spray mix per acre. Red Ball flow indicators were used to monitor the output for each nozzle and help ensure accurate spray delivery for each plot.

Emergence and Row Closure

Plant emergence was measured in the center two rows of the four row plots. A plant was counted as emerged when any visible green portion of a potato plant was visible. Three ratings

were taken from June 3 to June 12 during the period of emergence. The number of emerged plants was converted to a percentage based on the number of seed pieces planted per plot.

Row closure was visually estimated just prior to row closure on July 3. A value of 100% represents complete row closure (no visible soil when looking between rows).

Rhizoctonia Disease Severity



Evaluations for Rhizoctonia stem canker (caused by *Rhizoctonia solani*) were taken on June 24 (43 days after planting) and July 17 (66 days after planting). The percentage of the underground stems and stolons with disease symptoms was estimated from 10 plants and then averaged. Any plant with a girdled stolon automatically received a minimum 10% rating regardless of the stem infection level.

The first evaluation (about 45 days after planting) is critical since young tubers are forming and early

Rhizoctonia infections (which can girdle stolons causing a reduced tuber number) are visible at this time.

Seed Piece Decay

As plants were pulled from the soil for the first Rhizoctonia evaluation (June 24), the seed pieces from each plant were also lifted and evaluated for seed piece decay. The cut surface of each tuber was removed with a knife and the seed piece was cut into four quarters. Each seed piece was evaluated for the percentage of the seed piece affected by Fusarium seed piece decay (caused by *Fusarium sambucinum* and *F. coeruleum*). Most of the decay appeared to be caused by *F. coeruleum*. The presence of watery decay (cause unknown) and bacterial seed piece decay (caused by *Pectobacterium* sp.) was also scored.



Tuber Yield

Tubers were harvested using a specially modified two-row Champion harvester on September 21. Tubers from the center two rows of each four-row plot were lifted and cleaned by the harvester and crew riding on the machine. The tubers were dropped into a basket hanging from the end of the delivery boom. The basket was suspended by an electronic load cell scale, which weighed all tubers harvested from the plot. The weight in pounds was converted to cwt/acre. A fresh-pack cardboard box (50 lb capacity) was placed in the hanging basket in order to obtain a sample (40-50 lb) for determining tuber quality (grade).

Tuber Quality (Grade)

USDA standards were used in grading the tuber samples collected at harvest. Samples were graded on September 25. The samples were separated into US#1, US#2, cull, and undersize tubers. Each tuber was individually weighed. Tuber weights were then used to determine the percentage of yield in the following size categories: < 4 oz, 4-6 oz, US#1, 6-10 oz. US#1, 10-14 oz. US#1, >14 oz.

US#1, culls, 4-10 oz. US#2, and >10 oz. US#2. The percentage of tubers in various fresh-pack carton sizes was also determined as described below in “Economic Return.”

Economic Return

The gross economic value of each plot was estimated using mock processing and fresh pack contracts. These values were estimated using values obtained from the University of Idaho and some processing and fresh pack operations. The contract parameters of an individual grower can vary extensively from the numbers cited here. These numbers are used as an estimation of what the harvested crop could be worth and can be used as a tool to determine if the cost of an experimental treatment is justified.

For processing, the marketable yield (all US#1 tubers greater than 4 oz and all US#2 tubers) and process cull yield (<4 oz tubers) was determined. Incentives were determined based on the percentage of US#1 tubers and all tubers >10 oz. For US#1 tubers, an incentive of \$0.015/% was awarded for each percentage over 60% and disincentives of -\$0.015/% and -\$0.03 were applied for percentages between 40-60% and below 40%, respectively. For tubers over 10 oz., an incentive of \$0.015/% was awarded for each percentage over 21% with a cap set at 45% A disincentive of -\$0.015/% was applied if the percentage of over 10 oz fell below 21%. Incentives were added to a base contract price of \$5.00/cwt of marketable tubers (all US#1 tubers > 4 oz and all US#2 tubers). Processing culls were estimated as the tubers in the undersize class (> 4 oz) and were given a value of \$4.00/cwt.

For fresh pack, the price for each sample was determined from the following table:

Item	Tuber Category	Price/cwt
10# Mesh	4.0-6.4 oz., US1	\$9.00
40	18-22 oz., US1	\$12.00
50	14.7-18 oz., US1	\$12.00
60	12.4-14.7 oz., US1	\$12.00
70	10.7-12.4 oz., US1	\$12.00
80	9.5-10.7 oz., US1	\$12.00
90	8.5-9.5 oz. , US1	\$12.00
100	7.7-8.5 oz. , US1	\$12.00
110	7.0-7.7 oz. , US1	\$12.00
120	6.4-7.0 oz. , US1	\$12.00
US#2	All US2 tubers	\$11.00
Washed processor grade	Undersize and culls	\$8.00

The percentage of tubers (by number) in each category (column 2) was multiplied by the price (column 3) and the resulting values were added, and then multiplied by the yield in hundredweight per acre. The fresh pack contract does NOT take into account the packer margin which can be highly variable.

All economic return values are listed in dollars/acre.

Statistical Analysis

All data were analyzed by analysis of variance (ANOVA) using Agricultural Research Manager (ARM) version 8. When the treatment effect was significant ($P<0.10$), mean separation was performed using Fisher’s protected LSD. If the treatment variances were not homogeneous as determined by Bartlett’s test for homogeneity, means were transformed using either the log (x+1) or the arcsine (x/100) transformation. Back-transformed data are listed in the results.

RESULTS AND DISCUSSION

Emergence and Row Closure

Differences among treatments for emergence were not observed on the first two evaluation dates (Table 1). On June 12 one treatment (an experimental compound) showed a reduction in emergence compared to the untreated check. All other treatments were similar to the check.

Row closure is another way to estimate the health of the crop early in the season. Row closure was similar for all treatments.

Rhizoctonia stem and stolon canker

Incidence of Rhizoctonia (percentage of plants with any symptoms) was significantly less with the Maxim/Quadris combination and with Quadris in-furrow alone on June 24 (Table 2). This was not expected because differences are rarely observed among treatments for incidence. By the second evaluation all treatments had similar incidence values averaging around 98%.

Significant differences were observed among treatments for the severity of Rhizoctonia on both evaluation dates (Table 2). All treatments except Evito at 3.8 fl oz and the experimental product reduced Rhizoctonia compared to the untreated check. The Maxim/Quadris combination provided the greatest reduction and was significantly lower than all other treatments on June 24. On July 17 all treatments except those with the experimental product showed a significant reduction. Maxim/Quadris, Quadris, Moncut, Evito (both rates), and Headline were all similar in the reduction of Rhizoctonia canker.

Seed Piece Decay

Almost no Fusarium decay was observed in the seed pieces on June 24 (data not shown). “Watery seed decay” is a condition we have seen over the years and is shown on the top of the seed piece in the photo in the **Seed Piece Decay** section of the **Materials and Methods**. The cause and importance of this condition is not known, but it is common in potato producing areas. We don’t think it has an adverse effect on the plant, but we have always recorded the incidence of the condition in seed piece trials. Maxim/Quadris, Quadris, Moncut, and Evito at 2.0 fl oz all reduced the incidence of this decay compared to the untreated check (Table 3).

Yield and Quality

Total yield was significantly increased with Moncut in-furrow (Table 3). Maxim/Quadris and Quadris alone were similar to Moncut, but were also similar to the untreated check. The high rate of the experimental compound resulted in a yield reduction compared to the check.

The percentage of US#1 tubers was similar for all treatments and averaged 70% (Table 4). The percentage of tubers over 10 oz was significantly affected by treatment with Maxim/Quadris, Moncut, Headline, and the experimental product (20% ai/v) yielding less than the untreated check. We have observed a decrease in larger tubers at times associated with the control of Rhizoctonia canker. Because stolons are not clipped off, plants have more tubers per stem. Carbohydrates produced in the leaves now have more places to be stored and the average tuber size can decrease. This is somewhat supported by the fact that the Maxim/Quadris, Moncut, Headline, and the experimental product (20% ai/v) produced significantly more 4-6 US#1 tubers than the untreated check (Table 5). One problem with this generalization is that the experimental product did not reduce Rhizoctonia severity (Table 2).

Significant differences were not observed for gross dollar return per acre (Table 4), or for 6-10 and 10-14 oz US#1 tubers (Table 5). Significant differences were observed for tubers over 14 oz with the untreated check producing more than any other treatment (Table 5). The Maxim/Quadris treatment produced the fewest.

All treatments were similar for the percentage of undersize (< 4 oz) and US#2 treatments (Table 6). The experimental product produced more culls than other treatments, particularly at 80% ai/v.

Conclusions

Treatments effective in reducing *Rhizoctonia* stem and stolon canker in June and July included:

- Maxim seed treatment at 0.04 fl oz/cwt + Quadris in-furrow at 8.7 fl oz/acre
- Quadris in-furrow at 8.7 fl oz/acre
- Moncut in-furrow at 1 lb/acre
- Evito in-furrow at 2.0 fl oz/acre
- Headline in-furrow at 9 fl oz/acre.

Moncut in-furrow significantly increased yield compared to the check. The Quadris/Maxim and Quadris treatments were statistically similar.

Table 1. Effect of Rhizoctonia treatment on plant emergence and row closure (cv. Russet Burbank; Minidoka, ID; 2009).

Description Rating Date	% Plants Emerged			Row Closure
	Jun 3	Jun 8	Jun 12	Jul 3
No. Name Rate Unit Code				
1 Untreated check	74 a	88 a	92 ab	89 a
2 Maxim 4 FS 0.04 fl oz/cwt A	78 a	94 a	94 a	94 a
Quadris 8.7 fl oz/a B				
3 Quadris 8.7 fl oz/a B	73 a	88 a	93 a	90 a
4 Moncut 1 lb/a B	75 a	91 a	94 a	95 a
5 Evito 2.0 fl oz/a B	73 a	88 a	88 bc	95 a
6 Evito 3.8 fl oz/a B	75 a	92 a	92 ab	92 a
7 Headline 9 fl oz/a B	79 a	89 a	92 a	91 a
8 Exp 1 20 % ai/v B	70 a	91 a	93 a	86 a
9 Exp 1 80 % ai/v B	71 a	89 a	87 c	88 a
10 Exp 1 300 % ai/v B	67 a	88 a	91 ab	83 a
LSD (P=.10)	8.3	4.3	4.2	8.9
Standard Deviation	6.9	3.6	3.5	7.4
CV	9.41	3.95	3.79	8.23
Grand Mean	73.43	89.81	91.48	90.13
Treatment Prob(F)	0.4170	0.1840	0.0559	0.3390

Code: A = seed treatment; B = In-furrow at planting.

Mean comparisons performed only when ANOVA Treatment Prob(F) is significant at the pre-determined mean comparison level (<0.10). Significant values are bolded. Means followed by same letter do not significantly differ (P=0.10, LSD).

Table 2. Effect of fungicides on the incidence and severity of Rhizoctonia stem and stolon canker (cv. Russet Burbank; Minidoka, ID; 2009).

Description Rating Date	Rhizoc Incidence		Rhizoc Severity	
	Jun 24	Jul 17	Jun 24	Jul 17
Days after planting	43	66	43	66
Trt Treatment	Rate	Code		
1 Untreated check				
2 Maxim 4 FS	0.04 fl oz/cwt	A		
Quadris	8.7 fl oz/a	B		
3 Quadris	8.7 fl oz/a	B		
4 Moncut	1 lb/a	B		
5 Evito	2.0 fl oz/a	B		
6 Evito	3.8 fl oz/a	B		
7 Headline	9 fl oz/a	B		
8 Exp 1	20 % ai/v	B		
9 Exp 1	80 % ai/v	B		
10 Exp 1	300 % ai/v	B		
LSD (P=.10)				
Standard Deviation				
CV				
Grand Mean				
Treatment Prob(F)				

Code: A = seed treatment; B = In-furrow at planting.

t=Mean descriptions are reported in transformed data units, and are not de-transformed. Data were transformed using the $\log(x+1)$ transformation. Back transformed means are given in the table.

Mean comparisons performed only when ANOVA Treatment Prob(F) is significant at the pre-determined mean comparison level (<0.10). Significant values are bolded. Means followed by same letter do not significantly differ ($P=0.10$, LSD).

Table 3. Effect of fungicides on the incidence of watery seed decay and total tuber yield (cv. Russet Burbank; Minidoka, ID 2009).

Description No. Name	Rate Unit	Code	Watery seed decay	Yield (cwt/acre)
1 Untreated check			13 a	498 bcd
2 Maxim 4 FS	0.04 fl oz/cwt	A	0 c	533 ab
Quadris	8.7 fl oz/a	B		
3 Quadris	8.7 fl oz/a	B	0 c	536 ab
4 Moncut	1 lb/a	B	3 bc	559 a
5 Evito	2.0 fl oz/a	B	0 c	465 de
6 Evito	3.8 fl oz/a	B	8 abc	517 bc
7 Headline	9 fl oz/a	B	8 abc	489 cde
8 Exp 1	20 % ai/v	B	10 ab	489 cde
9 Exp 1	80 % ai/v	B	10 ab	495 b-e
10 Exp 1	300 % ai/v	B	13 a	454 e
LSD (P=.10)			9.0	41.4
Standard Deviation			7.5	33.4
CV			119.55	6.63
Grand Mean			6.25	503.57
Treatment Prob(F)			0.0927	0.0105

Code: A = seed treatment; B = In-furrow at planting.

Mean comparisons performed only when ANOVA Treatment Prob(F) is significant at the pre-determined mean comparison level (<0.10). Significant values are bolded. Means followed by same letter do not significantly differ (P=0.10, LSD).

Table 4. Effect of fungicides on the percentage of US#1 tubers, tubers over 10 oz, and gross dollar return per acre based on processing and fresh market contracts (cv. Russet Burbank; Minidoka, ID 2009).

Description				% US #1	% > 10 oz	Gross \$ Return/Acre	
Trt	Treatment	Rate	Code	Tubers	Tubers	Processing	Fresh
1	Untreated check			76 a	30 a	2239 a	3787 a
2	Maxim 4 FS	0.04 fl oz/cwt	A	73 a	18 d	2269 a	3808 a
	Quadris	8.7 fl oz/a	B				
3	Quadris	8.7 fl oz/a	B	69 a	30 a	2299 a	4008 a
4	Moncut	1 lb/a	B	70 a	22 bcd	2333 a	4044 a
5	Evito	2.0 fl oz/a	B	70 a	26 abc	1937 a	3348 a
6	Evito	3.8 fl oz/a	B	70 a	23 a-d	2096 a	3681 a
7	Headline	9 fl oz/a	B	73 a	19 cd	2030 a	3403 a
8	Exp 1	20 % ai/v	B	65 a	18 d	1912 a	3367 a
9	Exp 1	80 % ai/v	B	67 a	26 a-d	2278 a	3768 a
10	Exp 1	300 % ai/v	B	68 a	28 ab	2052 a	3516 a
LSD (P=.10)				5.9	7.5	311.0	461.7
Standard Deviation				4.9	6.2	250.9	372.4
CV				6.95	25.83	11.7	10.14
Grand Mean				70.09	23.98	2144.3	3672.88
Treatment Prob(F)				0.1271	0.0455	0.2103	0.1342

Code: A = seed treatment; B = In-furrow at planting.

Mean comparisons performed only when ANOVA Treatment Prob(F) is significant at the pre-determined mean comparison level (<0.10). Significant values are bolded. Means followed by same letter do not significantly differ (P=0.10, LSD).

Table 5. Effect of fungicides on the percentage of US#1 tubers in common processing size categories (cv. Russet Burbank; Minidoka, ID 2009).

Description				% US#1 Tubers			
				4-6 oz	6-10 oz	10-14 oz	> 14 oz
Trt	Treatment	Rate	Code				
1	Untreated check			16 d	32 a	13 a	14.2 a
2	Maxim 4 FS	0.04 fl oz/cwt	A	24 a	32 a	15 a	1.7 d
	Quadris	8.7 fl oz/a	B				
3	Quadris	8.7 fl oz/a	B	16 d	29 a	17 a	7.4 bc
4	Moncut	1 lb/a	B	25 a	26 a	11 a	8.7 b
5	Evito	2.0 fl oz/a	B	16 d	32 a	15 a	7.1 bc
6	Evito	3.8 fl oz/a	B	18 bcd	30 a	18 a	3.7 cd
7	Headline	9 fl oz/a	B	23 ab	34 a	11 a	5.4 bcd
8	Exp 1	20 % ai/v	B	21 abc	30 a	10 a	3.4 cd
9	Exp 1	80 % ai/v	B	16 d	31 a	12 a	8.5 b
10	Exp 1	300 % ai/v	B	17 cd	27 a	16 a	7.1 bc
LSD (P=.10)				4.6	5.7	5.4	4.18
Standard Deviation				3.8	4.7	4.5	3.47
CV				19.92	15.68	32.33	51.73
Grand Mean				19.26	30.27	13.85	6.71
Treatment Prob(F)				0.0071	0.4532	0.2111	0.0021

Code: A = seed treatment; B = In-furrow at planting.

Mean comparisons performed only when ANOVA Treatment Prob(F) is significant at the pre-determined mean comparison level (<0.10). Significant values are bolded. Means followed by same letter do not significantly differ (P=0.10, LSD).

Table 6. Effect of fungicides on the percentage of undersize (< 4 oz), culls, and US#1 tubers (cv. Russet Burbank; Minidoka, ID 2009).

Description				% < 4 oz	% Culls	% US#2 Tubers	
Trt	Treatment	Rate	Code			4-10 oz	>10 oz
1	Untreated check			13 a	4.9 bc	3.5 a	2.6 a
2	Maxim 4 FS	0.04 fl oz/cwt	A	19 a	1.9 c	4.3 a	1.5 a
	Quadris	8.7 fl oz/a	B				
3	Quadris	8.7 fl oz/a	B	16 a	5.1 bc	3.7 a	6.0 a
4	Moncut	1 lb/a	B	18 a	5.8 bc	3.5 a	1.9 a
5	Evito	2.0 fl oz/a	B	17 a	5.3 bc	3.4 a	3.7 a
6	Evito	3.8 fl oz/a	B	21 a	3.0 c	4.8 a	1.7 a
7	Headline	9 fl oz/a	B	19 a	2.7 c	3.0 a	2.2 a
8	Exp 1	20 % ai/v	B	20 a	7.7 ab	3.0 a	4.8 a
9	Exp 1	80 % ai/v	B	13 a	10.2 a	4.6 a	5.3 a
10	Exp 1	300 % ai/v	B	14 a	7.8 ab	5.7 a	4.5 a
LSD (P=.10)				5.2	4.00	2.10	3.26
Standard Deviation				4.3	3.32	1.75	2.70
CV				25.19	61.21	44.46	79.39
Grand Mean				17.16	5.43	3.93	3.41
Treatment Prob(F)				0.1235	0.0374	0.4563	0.2050

Code: A = seed treatment; B = In-furrow at planting.

Mean comparisons performed only when ANOVA Treatment Prob(F) is significant at the pre-determined mean comparison level (<0.10). Significant values are bolded. Means followed by same letter do not significantly differ (P=0.10, LSD).

Miller Research
Experimental Plot Data

Trial: **09P-MR-1**Trial Location:

City: Rupert	Latitude of LL Corner °: 42.72406	N
State/Prov.: ID	Longitude of LL Corner °: 113.42191	W
Postal Code: 83350	Altitude of LL Corner, Unit: 4290	FT
Country: USA	Angle y-axis to North °: 0.00	

Crop Description:

Crop : Solanum tuberosum	Potato	Planting Date: 12 May 2009
Variety: Russet Burbank		Rate: 2050 LB/A
Planting Method: Hilled		Spacing Within Row: 14 IN
Depth: 7 IN		Soil Temperature: 55 F
Row Spacing: 36 IN		Emergence Date: 3 Jun 2009
Soil Moisture: Dry		Harvest Equipment: MR Potato Harvester
Harvest Date: 21 Sep 2009		Harvested Length: 34 FT
Harvested Width: 6 FT		

Site and Design:

Plot Width: 12 FT	Site Type: Field
Plot Length: 34 FT	Experimental Unit: Plot
Plot Area: 408 FT2	Tillage Type: Conventional-till
Replications: 4	Study Design: Randomized Complete Block (RCB)
	Untreated Arrangement: Single control randomized in each block

Field History:

2008	Potato
2007	Potato
2006	Potato
2005	Potato

Maintenance Chemicals:

No.	Date	Maintenance Treatment Name	Form Conc	Form Unit	Form Type	Rate	Rate Unit	Tank Mix
1.	26 May 2009	Sencor 75DF	75		DF	0.67	lb/a	yes
2.	26 May 2009	Outlook	6	lb/gal	EC	18	oz/a	yes
3.	26 May 2009	Prowl H2O	3.8	lb/gal	EC	1.5	pt/a	yes
4.	10 Jun 2009	Matrix	25	%	DF	1.5	pt/a	yes
5.	10 Jun 2009	Eptam 7E	7	lb/gal	EC	4.0	oz/a	yes
6.	14 Jul 2009	Metastar	2	lb/gal	EC	12.8	fl oz/a	yes
7.	14 Jul 2009	Endura	70	%	WG	5.5	oz/a	yes
8.	31 Jul 2009	Metastar	2	lb/gal	EC	12.8	fl oz/a	yes
9.	31 Jul 2009	Endura	70	%	WG	5.5	oz/a	yes
10.	31 Jul 2009	Echo ZN	4.17	lb/gal	SC	1.5	pt/a	yes

Field Preparation/Maintenance:

Beds formed November of 2008.

Fertilizer was applied on May 18:

- Muriated potash (0-0-60) at 208 lb/acre
- Monoammonium phosphate (11-52-0) at 96 lb/acre
- Ammonium sulfate (20.5-0-0-24S) at 426 lb/acre
- ESN nitrogen (44-0-0) at 402 lb/acre

This translates to approximately 273 units of N, 50 units of P, 125 units of K, and 102 units of S per acre.

Potato beds were re-formed with a Lilliston bedder on May 20.

Supplemental fertilizer applied by fertigation: 50 units of N as URAN (32-0-0) on July 30.

Soil Description:

Description Name: Minidoka Poteet Field		
% Sand: 49	% OM: 1.8	Texture: Loam
% Silt: 36	pH: 8.1	Soil Name: Portneuf silt loam
% Clay: 15	CEC: 18.1	Fert. Level: Good
Soil Drainage: Good		

Analyzed By: Agvise Laboratories.

Moisture and Weather Conditions:

Overall Moisture Conditions:	Wet in June, normal otherwise		
Closest Weather Station:	MR Campbell Station	Distance:	500 FT

No.	Date	Amount (in)	Type Description
1.	31 May 2009	0.40	Rain
2.	1 Jun 2009	0.08	Rain
3.	2 Jun 2009	0.08	Rain
4.	5 Jun 2009	0.43	Rain
5.	6 Jun 2009	1.50	Sprinkler - solid set
6.	8 Jun 2009	0.12	Rain
7.	23 Jun 2009	2.6	Sprinkler - solid set
8.	30 Jun 2009	2.6	Sprinkler - solid set
9.	6 Jul 2009	2.6	Sprinkler - solid set
10.	14 Jul 2009	2.83	Sprinkler - solid set
11.	21 Jul 2009	2.20	Sprinkler - solid set
12.	25 Jul 2009	0.35	Rain
13.	29 Jul 2009	2.24	Sprinkler - solid set
14.	3 Aug 2009	3.19	Sprinkler - solid set
15.	12 Aug 2009	2.28	Sprinkler - solid set
16.	21 Aug 2009	1.73	Sprinkler - solid set
17.	23 Aug 2009	0.35	Rain
18.	29 Aug 2009	0.51	Sprinkler - solid set
19.	18 Sep 2009	0.91	Sprinkler - solid set

Application Conditions:

	A	B
Application Date:	5 May 2009	12 May 2009
Time of Day:	10:00 am	11:00 am
Application Method:	Slurry	Spray
Application Timing:	Seed treatment	At planting
Application Placement:	Seed	In-furrow
Applied By:	Miller, J.	Miller, J.
Air Temperature:	60 F	55 F
% Relative Humidity:	--*	39
Wind Velocity:	--	13 mph
Wind Direction:	--	E
Dew Presence:	--	No
Soil Temperature:	--	55 F
Soil Moisture:	--	Slightly dry
% Cloud Cover:	--	0
Next Rain Occurred On:	--	31 May 2009

*Seed treatment was performed in an enclosed shop area.

Application Equipment:

	A	B
Equipment Type:	Seed treater	Potato planter
Operating Pressure:	NA*	20 PSI
Nozzle Type:	NA*	Flat fan
Nozzle Size:	NA	SS8001E
Nozzle Spacing:	NA	36 IN
Nozzles/Row:	NA	1
Band Width:	NA	6 IN
Boom Length:	NA	12 FT
Boom Height:	NA	12 IN
Ground Speed:	NA	1.36 MPH
Incorporation Equip.:	NA	Planter
Hours to Incorp.:	NA	0
Incorp. Depth:	NA	8 IN
Carrier:	Water	Water
Spray Volume:	4.06 fl oz/cwt	9.5 gallons/acre
Propellant:	Hand pump	Compressed air

*NA = Not applicable