

**POTATO (*Solanum tuberosum* 'Russet Burbank')
Seedpiece/Furrow/Foliar Fungicide Evaluation**

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EVALUATION OF THE EFFECT OF FUNGICIDES, APPLIED AT PLANTING, HILLING AND TO THE FOLIAGE, ON CONTROL OF POTATO DISEASES - HANCOCK, 2000: A field trial to evaluate the effect of selected fungicides applied at planting (seedpiece treatment or in-furrow application), hilling and to the foliage, was established April 27, 2000 at the Hancock Agricultural Research Station in central WI. The experiment was designed to evaluate the effects of treatment on seedpiece decay, emergence, stand, Rhizoctonia development, early and late blight control and yield. US#1 Russet Burbank tubers were mechanically cut into approximately 2 oz. seedpieces April 27 and treated according to experiment protocol. To apply chemical seedpiece treatments, seedpieces were placed in plastic bags with the chemical and rolled until seedpieces were uniformly coated with chemical (two 42-lb-lots were prepared for each treatment receiving seedpiece treatment). Seedpieces were planted with an assist-feed planter with the covering disks removed. In-furrow treatments were applied in an 8-inch-wide band over the seedpieces at a rate equivalent to 29 gal water/A at 40 psi, using a hand-held boom with a single HC-2 70° hollow disc cone nozzle. After treatment, all seedpieces were mechanically covered using hilling disks. The at-hilling treatment was applied in an 8-inch-wide band over the hill at a rate equivalent to 13 gal water/A at 40 psi, using a hand-held sprayer just prior to hilling. Conditions at planting were air temperature 72°F, soil temperature 78°F at the depth of seedpiece placement, seedpiece temperature 55°F and relative humidity 26%. It was partly cloudy and the soil was moderately moist. A randomized complete block design with four replications was used for the experiment, with each plot consisting of four 28-foot-long rows spaced 36 inches apart with tubers 15 inches apart in the row. To avoid soil compaction in treatment rows, drive rows for pesticide application equipment, adjacent to treated plots, were included in the design. The soil type was Plainfield loamy sand, pH 6.0. Fertilizer applied was: 0-0-60, 300 lb/A, broadcast April 10, before planting, 5-10-30, 500 lb/A, banded in the row at planting, sidedress applications on May 17 (21-0-0, 350 lb/A) and June 2 (34-0-0, 375 lb/A) and broadcast application June 2 of Cal-Sul, 500 lb/A. Insects were controlled with Admire (16 oz./A) incorporated in the fertilizer at planting and foliar application of Asana XL (5.8 fl oz./A) on June 27. Linex 4 L (1.0 pt/A) was applied May 9 for weed control.

Emergence was counted for the two center rows of each plot ten times between May 15 and June 19. Height measurements were taken for all plants in the trial on June 1, June 9 and June 19. To evaluate seedpiece decay, disease development and general plant vigor, eight hills per plot were evaluated on June 21. The eight hills from each plot (four hills from each of the two center rows) were dug by hand and the number of stems per plant, Rhizoctonia severity, incidence of black leg symptoms and extent of seedpiece decay were recorded. Seedpieces from plants which were dug and evaluated were removed and discarded. Total fresh weight of all leaves and stems, and weight of daughter tubers was recorded for the sample of plants dug from each plot. These values were expressed as grams (fresh weight) per hill. Plant height was expressed in two different ways: height per plant is the sum of all plant heights, divided by the actual number of plants which emerged; height per hill is the sum of heights measured, divided by 40, the number of hills planted. Height per hill thus represents a measure of general vigor of all plants in a plot, since this value would be very low if few plants emerged. Fungicide treatments were applied to all four rows of each plot at weekly intervals from June 28 to August 22, according to treatment protocol, for a total of nine weeks. Treatments were applied with a plot sprayer consisting of a tractor-mounted boom pressurized with an air compressor. Treatments were applied at a rate equivalent to 35 gal water/A at 40 psi, using Tee Jet Hollow Disc Cone D3-23 nozzles (15 nozzles at 8-inch spacing). Plots were not inoculated, but relied on natural dispersal of both *Phytophthora infestans* and *Alternaria solani* for disease establishment (the *P. infestans* isolate was identified as US-8 in Dr. J. P. Helgeson's lab at the UW). Disease severity was rated weekly from June 27 through August 21 using the Horsfall-Barratt rating scale. Vines were killed with application of Diquat (1.0 pt/A) plus Peptoil (1.0 qt/A) on August 25. The two center rows of each plot (a total of 48 feet of row) were machine harvested and graded September 14-15. Tubers were graded into US#1, undersize, and cull categories and all potatoes in the US#1 category from each treatment plot were sorted using an optical size grader into six categories: < 4 oz., 4-6 oz., 6-10 oz., 10-13 oz., 13-16 oz. and >16 oz. Specific gravity was determined for a tuber sample from each plot and 25-40 pound samples from selected treatments were placed in storage. These will be evaluated for tuber decay, silver scurf and black scurf after several months in storage. Rainfall measured during the growing season (inches) was 0.20 (April 27-30); 5.08 -

May; 6.93 - June; 2.3 - July; 4.55 - August and 2.76 - September (through the 14th). An additional 15.3 inches of water was applied as overhead sprinkler irrigation in 29 applications (May 3 - August 30).

Warm conditions during the emergence period favored rapid emergence for all treatments. There were no significant differences in emergence between treatments. Likewise seedpiece, furrow, or at-hilling treatment did not affect plant height in mid-June or seedpiece decay. Fungicide treatment significantly reduced *Rhizoctonia* stem infection, compared with plots where a seed treatment was not applied. As long as a fungicide was applied to the seed, similar *Rhizoctonia* control was achieved regardless of the fungicide used. Persistent warm and wet weather conditions during most of the growing season were highly favorable for the development of early blight and late blight. Early blight first appeared on June 27 and late blight appeared on July 10. Both diseases continued to spread, especially in the untreated control plots, after their initial appearances. By August 14, it was no longer possible to rate early and late blight separately. All foliar fungicide programs controlled late blight. Control of early blight was satisfactory only where the foliage was treated with a Quadris (weeks 1, 3, 5)/Bravo Zn (weeks 2, 4, 6, 7, 8, 9) program. Control of both early and late blight with foliar fungicide treatment was reflected in low values for the area under the disease progress curve (AUDPC) for early blight, late blight and combined ratings. Applying Quadris in the furrow did not improve control of early blight later in the growing season. Yields were adversely affected by the appearance of early dying symptoms throughout the plot in early August. Yields were lowest in untreated control plots and highest yields were generally observed in plots where foliage was sprayed weekly with the Quadris/Bravo Zn program. The addition of Auxigro to Potato Seed Treater as a premix applied to the seedpieces at planting or to Bravo Zn foliar treatments did not improve disease control or yield when compared to plots treated with Potato Seed Treater or Bravo Zn alone. Treatment of foliage with fungicides for early and late blight control decreased the proportion of tubers in the < 4 oz size category and increased the proportion of tubers in the 10-13 oz size category. The specific gravity of tubers from all plots was unusually high compared with previous years. Plots treated with Quadris with 0.58 fl oz/1000 row feet, in-furrow at planting, tended to have the highest specific gravity readings.

Table 1. Effect of potato seedpiece treatment on field emergence, stand and height of Russet Burbank potatoes.

Treatment Chemicals	Rate		Application schedule	Percentage of plants emerged on: ¹										Avg. days to emergence ²
	Formulated product	Active ingredient		5/15	5/19	5/23	5/30	6/1	6/6	6/9	6/13	6/16	6/19	
1. Untreated				27.5	71.9	87.5	89.4	86.9	88.1	87.5	88.1	87.5	89.4	24.8
2. Untreated seed														
Quadris SC	0.77 pt/A	0.2 lb/A	Foliar Appl 1, 3, 5											
Bravo Zn 6F	1.5 pt/A	1.13 lb/A	Foliar Appl 2, 4, 6-9	20.6	70.6	84.4	86.9	85.0	86.9	84.4	85.6	85.6	88.1	25.0
3. Maxim	0.5 lb/cwt seed	0.0004 oz/lb	Seedpiece trt											
Quadris SC	0.38 fl oz/1000 rft	0.1 oz/1000rft	Appl. In-furrow											
Bravo Zn 6F	1.5 pt/A	1.13 lb/A	Foliar Appl 1-9	19.4	63.8	85.0	86.3	84.4	85.6	83.8	84.4	84.4	86.3	25.0
4. Maxim	0.5 lb/cwt seed	0.0004 oz/lb	Seedpiece trt											
Quadris SC	0.58 fl oz/1000 rft	0.15 oz/1000rft	Appl. In-furrow											
Bravo Zn 6F	1.5 pt/A	1.13 lb/A	Foliar Appl 1-9	17.5	68.1	89.4	89.4	86.9	90.6	90.0	91.9	91.3	92.5	25.0
5. Maxim	0.5 lb/cwt seed	0.0004 oz/lb	Seedpiece trt											
Quadris SC	0.96 fl oz/1000 rft	0.25 oz/1000rft	Appl. In-furrow											
Bravo Zn 6F	1.5 pt/A	1.13 lb/A	Foliar Appl 1-9	9.4	63.1	81.3	81.9	83.1	84.4	84.4	85.0	84.4	86.3	24.5
6. Maxim	0.5 lb/cwt seed	0.0004 oz/lb	Seedpiece trt											
Quadris SC	0.38 fl oz/1000 rft	0.1 oz/1000rft	Appl. In-furrow											
Quadris SC	0.77 pt/A	0.2 lb/A	Foliar Appl 1, 3, 5											
Bravo Zn 6F	1.5 pt/A	1.13 lb/A	Foliar Appl 2, 4, 6-9	16.3	62.5	83.8	85.6	84.4	86.3	85.0	86.3	86.3	85.6	24.8
7. Maxim	0.5 lb/cwt seed	0.0004 oz/lb	Seedpiece trt											
Quadris SC	0.58 fl oz/1000 rft	0.15 oz/1000rft	Appl. In-furrow											
Quadris SC	0.77 pt/A	0.2 lb/A	Foliar Appl 1, 3, 5											
Bravo Zn 6F	1.5 pt/A	1.13 lb/A	Foliar Appl 2, 4, 6-9	11.3	61.3	86.3	85.6	85.6	87.5	86.3	86.9	87.5	89.4	25.8
8. Maxim	0.5 lb/cwt seed	0.0004 oz/lb	Seedpiece trt											
Quadris SC	0.96 fl oz/1000 rft	0.25 oz/1000rft	Appl. In-furrow											
Quadris SC	0.77 pt/A	0.2 lb/A	Foliar Appl 1, 3, 5											
Bravo Zn 6F	1.5 pt/A	1.13 lb/A	Foliar Appl 2, 4, 6-9	14.4	68.1	86.9	87.5	86.9	89.4	88.1	86.9	88.1	86.9	25.0
9. TOPS MZ	0.5 lb/cwt seed	0.0068 oz/lb	Seedpiece trt											
Quadris SC	0.38 fl oz/1000 rft	0.1 oz/1000rft	Appl. In-furrow											
Quadris SC	0.77 pt/A	0.2 lb/A	Foliar Appl 1, 3, 5											
Bravo Zn 6F	1.5 pt/A	1.13 lb/A	Foliar Appl 2, 4, 6-9	16.9	61.3	86.3	86.9	86.3	86.9	83.8	85.6	86.3	86.9	25.4
10. TOPS MZ	0.5 lb/cwt seed	0.0068 oz/lb	Seedpiece trt											
Quadris SC	0.58 fl oz/1000 rft	0.15 oz/1000rft	Appl. In-furrow											
Quadris SC	0.77 pt/A	0.2 lb/A	Foliar Appl 1, 3, 5											
Bravo Zn 6F	1.5 pt/A	1.13 lb/A	Foliar Appl 2, 4, 6-9	8.8	58.1	82.5	81.9	80.0	80.6	80.0	80.6	80.6	79.4	26.1
11. TOPS MZ	0.5 lb/cwt seed	0.0068 oz/lb	Seedpiece trt											
Quadris SC	0.96 fl oz/1000 rft	0.25 oz/1000rft	Appl. In-furrow											
Quadris SC	0.77 pt/A	0.2 lb/A	Foliar Appl 1, 3, 5											
Bravo Zn 6F	1.5 pt/A	1.13 lb/A	Foliar Appl 2, 4, 6-9	11.9	51.9	78.8	80.6	80.6	80.6	78.8	80.6	80.6	79.4	26.5

Treatment Chemicals	Rate		Application schedule	Percentage of plants emerged on: ¹										Avg. days to emergence ²
	Formulated product	Active ingredient		5/15	5/19	5/23	5/30	6/1	6/6	6/9	6/13	6/16	6/19	
12. TOPS MZ Bravo Zn 6F	0.5 lb/cwt seed 1.5 pt/A	0.0068 oz/lb 1.1266 lb/A	Seedpiece trt Foliar Appl 1-9	11.3	57.5	84.4	85.6	85.6	86.3	85.6	85.0	85.6	85.0	24.7
13. Maxim Quadris SC Bravo Zn 6F	0.5 lb/cwt seed 1.15 pt/A 1.5 pt/A	0.0004 oz/lb 0.3 lb/A 1.13 lb/A	Seedpiece trt Appl at hilling Foliar Appl 1-9	21.9	68.8	81.9	81.3	81.3	81.9	79.4	81.3	80.6	82.5	24.6
14. Maxim Bravo Zn 6F	0.5 lb/cwt seed 1.5 pt/A	0.0004 oz/lb 1.1266 lb/A	Seedpiece trt Foliar Appl 1-9	21.3	71.3	86.9	88.1	87.5	86.9	87.5	86.9	86.9	88.8	23.5
15. Potato Seed Treater Bravo Zn 6F	0.75 lb/ cwt seed 1.5 pt/A	0.0072 oz/lb 1.13 lb/A	Seedpiece trt Foliar Appl 1-9	10.0	61.9	80.6	83.1	82.5	83.8	81.3	83.1	83.8	80.6	26.0
16. Potato Seed Treater + Auxigro (premix) Bravo Zn 6F	0.75 lb/ cwt seed 1.5 pt/A	0.0072 oz/lb 0.10 oz 1.13 lb/A	Seedpiece trt Foliar Appl 1-9	11.9	56.3	81.9	84.4	83.1	85.6	85.6	85.6	86.3	86.3	24.0
17. Potato Seed Treater + Auxigro (premix) Bravo Zn 6F + Auxigro WP	0.75 lb/ cwt seed 1.5 pt/A 4 oz/A	0.0072 oz/lb 0.10 oz 1.13 lb/A	Seedpiece trt Foliar Appl 1-9 Foliar Appl 1	7.5	55.0	77.5	83.1	82.5	84.4	84.4	84.4	85.6	83.8	26.0
18. Potato Seed Treater + Auxigro (premix) Bravo Zn 6F + Auxigro WP	0.75 lb/ cwt seed 1.5 pt/A 4 oz/A	0.0072 oz/lb 0.10 oz 1.13 lb/A	Seedpiece trt Foliar Appl 1-9 Foliar Appl 5	10.0	59.4	81.3	86.3	85.6	86.3	85.6	85.6	84.4	84.4	24.8
19. Potato Seed Treater + Auxigro (premix) Bravo Zn 6F + Auxigro WP	0.75 lb/ cwt seed 1.5 pt/A 4 oz/A	0.0072 oz/lb 0.10 oz 1.13 lb/A	Seedpiece trt Foliar Appl 1-9 Foliar Appl 1, 5	11.9	56.3	83.1	85.0	83.8	84.4	84.4	84.4	85.0	83.8	24.3
20. L1036 Quadris SC Bravo Zn 6F	0.75 lb/ cwt seed 0.77 pt/A 1.5 pt/A	0.2 lb/A 1.13 lb/A	Seedpiece trt Foliar Appl 1, 3, 5 Foliar Appl 2, 4, 6-9	13.1	57.5	79.4	81.9	83.1	84.4	83.1	84.4	85.0	84.4	24.9
Pr > F ³				< 0.01	0.05	0.21	0.18	0.63	0.29	0.19	0.37	0.33	0.19	0.83
LSD				7.9	12.5	NS	NS	NS	NS	NS	NS	NS	NS	NS

1. Based on 40 seedpieces planted/56 feet of row.
2. The average number of days to emergence was calculated for all plants which emerged.
3. Analysis of variance was performed on data, and Fisher's protected least significant difference (LSD) was calculated. NS = not significant at $P = 0.10$. * indicates differences between treatments were significant at $P = 0.10$, but not at $P = 0.05$.

Table 2. Effect of potato seedpiece treatment on decay, black leg and Rhizoctonia symptoms and plant development on Russet Burbank potatoes (Treatment numbers correspond to those listed in Table 1).

Treatment number	Avg. height (cm) ¹						June 21 Evaluation of eight hills per replication						
	Per plant			Per hill			% decay ²	% of Plants with black leg	% of Total stems with black leg	% Rhizoctonia infection ³	No. of stems per plant	Ave. fresh weight (g)	
	6/1	6/9	6/19	6/1	6/9	6/19						Leaves + stems per hill	Daughter tubers per hill
1.	11.5	22.4	39.2	10.1	19.6	35.4	65.9	21.9	12.4	20.2	2.8	474.9	104.6
2.	11.3	24.1	39.3	9.6	20.4	34.7	66.3	37.5	14.3	13.1	3.2	542.9	121.8
3.	11.0	23.5	36.8	9.3	19.7	32.0	58.9	6.3	2.4	0.6	3.3	537.9	126.3
4.	11.3	24.0	37.9	9.9	21.7	35.2	60.5	18.8	9.2	8.4	2.9	466.4	126.4
5.	11.0	23.4	36.4	9.1	19.7	31.4	58.5	12.5	5.0	1.7	3.0	606.7	130.5
6.	10.6	21.8	36.1	9.0	18.6	30.9	53.3	28.1	15.3	2.4	3.1	507.5	117.5
7.	11.0	24.8	37.3	9.4	21.4	33.4	58.7	15.6	10.1	6.3	3.2	563.5	126.8
8.	11.0	24.1	36.3	9.5	21.2	31.5	67.6	28.1	20.0	6.2	2.2	394.1	96.8
9.	10.4	23.7	36.9	8.9	19.9	32.1	48.1	12.5	3.8	2.4	3.2	518.8	136.2
10.	11.2	23.9	36.8	8.9	19.2	29.2	58.4	12.5	9.6	0.2	2.5	539.4	122.7
11.	10.3	21.7	34.8	8.4	17.1	27.6	59.5	21.9	9.4	1.6	2.7	489.0	90.1
12.	11.5	24.5	38.0	9.8	21.0	32.2	61.1	6.3	3.6	3.7	3.0	507.5	118.6
13.	11.7	24.1	36.3	9.5	19.2	29.9	53.6	18.8	9.0	5.2	2.9	502.5	135.6
14.	11.0	24.2	38.1	9.6	21.2	33.8	60.9	15.6	4.4	2.9	3.7	557.8	156.2
15.	10.5	20.6	34.2	8.7	16.7	27.7	57.9	21.9	7.8	4.2	3.0	623.7	142.6
16.	11.7	24.1	37.1	9.7	20.6	32.0	62.1	28.1	13.9	3.9	3.5	518.8	125.5
17.	10.9	19.8	34.1	9.0	16.7	28.6	59.6	9.4	5.5	3.1	3.1	525.9	110.0
18.	11.0	23.5	35.8	9.4	20.1	30.2	59.4	12.5	3.2	4.7	3.4	608.8	136.5
19.	10.3	22.2	34.7	8.7	18.8	29.1	67.7	12.5	4.8	1.9	2.4	468.5	94.5
20.	10.4	21.3	34.8	8.7	17.7	29.4	37.6	3.1	1.7	2.2	2.0	506.8	122.8
Pr > F ⁴	0.54	0.07	0.39	0.47	0.04	0.14	0.44	0.10	0.44	< 0.01	0.03	0.49	0.86
LSD	NS	3.1*	NS	NS	3.2	NS	NS	19.8*	NS	7.1	0.9	NS	NS

1 Avg. height per plant includes only those plants which grew. To calculate avg. height per hill, a height of 0 is included in the average for hills where no plant grew.

2 Severity of seedpiece decay rated on a Horsfall-Barratt scale of 0 (no decay) to 11 (100% decay). Ratings were converted to percentages.

3 Severity rated on a Horsfall-Barratt scale of 0 (no infection) to 11 (death of all stems due to Rhizoctonia infection). Ratings were converted to percentages.

4 Analysis of variance was performed on data, and Fisher's protected least significant difference (LSD) was calculated. NS = not significant at $P = 0.10$. * indicates differences between treatments were significant at $P = 0.10$, but not at $P = 0.05$.

Table 3. Effect of treatment on foliar disease severity (percent foliage infection, early blight and late blight combined). (Treatment numbers correspond to those listed in Table 1).

Trt No.	Foliar Disease Severity ¹																						
	Early Blight Alone									Late Blight Alone							Combined						
	6/27	7/3	7/10	7/17	7/24	7/31	8/7	8/14	8/21	7/10	7/17	7/24	7/31	8/7	8/14	8/21	7/10	7/17	7/24	7/31	8/7	8/14 ²	8/21 ²
1	0.7	0.3	1.2	2.2	3.2	6.9	22.8	--	--	0.0	0.1	0.1	2.5	25.3	--	--	1.2	2.2	3.4	10.8	53.2	91.7	96.5
2	0.4	0.4	0.6	1.5	1.8	2.0	3.1	5.6	6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.6	1.5	1.8	2.0	3.1	30.5	49.6
3	0.6	0.1	1.2	0.7	1.8	3.4	3.9	15.5	--	0.0	0.0	0.0	0.0	0.3	2.0	--	1.2	0.7	1.8	3.4	3.9	65.2	83.6
4	0.1	0.3	0.7	1.2	1.9	3.7	5.3	10.5	--	0.0	0.0	0.0	0.0	0.0	0.0	--	0.7	1.2	1.9	3.7	5.3	66.1	85.8
5	0.0	0.0	1.0	1.0	2.0	3.5	3.9	8.3	14.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	2.0	3.5	3.9	58.2	72.7
6	0.1	0.1	1.0	0.7	1.8	2.5	3.2	6.3	7.6	0.0	0.0	0.0	0.0	0.3	0.1	0.1	1.0	0.7	1.8	2.5	3.2	38.5	54.3
7	0.4	0.1	0.6	1.3	1.9	3.5	3.9	6.1	9.1	0.0	0.0	0.0	0.0	0.0	0.6	0.9	0.6	1.3	1.9	3.5	3.9	47.7	73.3
8	0.3	0.0	1.0	1.0	1.3	3.9	5.6	10.5	--	0.0	0.0	0.0	0.0	0.0	0.0	--	1.0	1.0	1.3	3.9	5.6	73.7	87.8
9	0.3	0.7	0.4	1.2	1.6	3.7	5.7	9.4	18.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.2	1.6	3.7	5.7	54.1	71.9
10	0.0	0.1	1.0	0.9	1.2	2.8	2.8	4.1	8.9	0.0	0.0	0.0	0.0	0.0	0.9	2.2	1.0	0.9	1.2	2.8	2.8	35.7	58.6
11	0.0	0.1	0.9	0.6	1.5	2.5	2.8	4.2	7.6	0.0	0.0	0.0	0.0	0.3	0.7	1.2	0.9	0.6	1.5	2.5	2.8	25.6	53.1
12	0.1	0.4	1.0	1.8	2.0	5.4	9.1	41.4	--	0.0	0.0	0.0	0.0	0.1	0.1	--	1.0	1.8	2.0	5.4	9.1	81.3	96.6
13	0.1	1.0	1.0	1.0	1.5	2.3	3.7	5.7	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.5	2.3	3.7	50.8	68.1
14	1.2	0.3	1.5	1.3	1.8	2.8	4.1	20.8	45.6	0.0	0.0	0.0	0.1	0.1	1.3	3.1	1.5	1.3	1.8	2.8	4.1	50.8	72.2
15	0.3	0.6	0.9	1.0	1.8	3.7	5.1	28.7	63.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.9	1.0	1.8	3.7	5.1	65.0	88.7
16	0.4	0.4	1.2	0.7	1.8	3.5	6.3	27.0	62.8	0.1	0.1	0.0	0.1	0.0	0.0	0.2	1.2	0.7	1.8	3.5	6.3	70.9	85.1
17	0.3	0.9	1.3	1.9	2.3	3.1	5.0	19.9	--	0.0	0.0	0.1	0.3	0.1	2.0	--	1.3	1.9	2.3	3.1	5.0	76.2	91.7
18	0.6	0.7	1.3	2.0	2.3	3.8	6.9	17.2	--	0.0	0.0	0.0	0.0	0.3	1.2	--	1.3	2.0	2.3	3.8	6.9	70.8	88.3
19	0.6	0.4	1.0	1.9	1.9	2.9	4.8	26.0	52.1	0.0	0.0	0.0	0.0	0.0	1.0	1.4	1.0	1.9	1.9	2.9	4.8	57.4	80.7
20	0.6	0.3	0.7	1.6	1.2	3.1	5.4	5.9	9.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.7	1.9	1.2	3.1	5.4	59.0	77.0
Pr>F ³	0.07	0.03	0.55	<0.01	0.14	<0.01	<0.01	<0.01	<0.01	0.48	0.55	0.55	<0.01	<0.01	0.43	0.37	0.55	<0.01	0.08	<0.01	<0.01	<0.01	<0.01
LSD	0.6*	0.9	NS	0.9	NS	1.8	7.4	11.8	18.4	NS	NS	NS	0.8	9.2	NS ⁴	NS ⁴	NS	0.9	1.1*	1.9	9.2	25.3	24.4

- Severity rated on a Horsfall-Barratt scale of 0 (no infection) to 11 (all foliage and stems dead). Ratings were converted to percentages. Combined foliage infection was assessed first. Then amount of early and late blight were estimated separately (the separate estimates do not necessarily add up to the combined defoliation figure as they were done independently).
- Symptoms of early dying were apparent on these rating dates. Combined ratings for 8/14 and 8/21 represent total death of foliage (early blight, late blight and early dying)
- Analysis of variance was performed on data, and Fisher's protected least significant difference (LSD) was calculated. NS = not significant at $P = 0.10$. * indicates differences between pairs of treatments were significant at $P = 0.10$ (but not at $P = 0.05$).
- Defoliation was too severe on untreated plots to distinguish the amount due to early blight and late blight separately. Lack of significant differences in the analysis of variance for these data indicate that there were no significant differences in control between the fungicide treatments applied (the untreated control was not included in the comparison).

Table 4. Effect of seedpiece treatment on yield, proportion of US#1, undersize and culls and size grades of Russet Burbank potatoes.

Treatment No.	Relative AUDPC ¹			Total yield cwt/A	US#1		Undersize ²		Culls		Specific gravity	Size grades of US#1 potatoes						
	Early Blight	Late Blight	Com-bined		cwt/A	%	cwt/A	%	cwt/A	%		% < 4 oz.	% 4-6 oz.	% 6-10 oz.	% 10-13 oz.	% 6-13 oz.	% 13-16 oz.	% > 16 oz.
1	0.043	0.0264	0.076	265.6	189.6	71.1	41.0	15.6	35.1	13.3	1.121	22.4	46.4	29.2	1.7	30.9	0.3	0.0
2	0.014	0.0000	0.014	358.5	254.8	70.7	28.8	8.2	74.9	21.1	1.104	16.7	39.0	37.0	5.8	42.8	1.6	0.0
3	0.016	0.0003	0.016	298.9	233.8	78.0	29.6	10.1	35.5	11.9	1.100	14.4	38.8	38.3	7.5	45.8	1.0	0.0
4	0.018	0.0000	0.018	291.3	213.6	73.0	38.7	13.9	39.0	13.0	1.109	14.8	42.6	37.5	4.3	41.8	0.8	0.0
5	0.016	0.0000	0.016	316.7	244.4	77.1	27.3	8.7	45.0	14.2	1.094	12.6	38.9	40.0	7.5	47.5	0.3	0.7
6	0.013	0.0003	0.013	359.0	256.5	71.5	30.7	8.5	71.8	20.0	1.094	10.4	36.2	40.5	9.6	50.2	3.0	0.3
7	0.016	0.0000	0.016	330.6	262.8	79.4	34.6	10.8	33.2	9.8	1.155	13.4	45.4	36.7	3.9	40.6	0.7	0.0
8	0.017	0.0000	0.017	286.6	214.7	75.2	34.6	12.5	37.3	12.2	1.109	15.5	41.9	37.8	3.3	41.1	1.5	0.0
9	0.018	0.0000	0.018	340.5	267.2	79.0	31.2	9.1	42.2	11.9	1.120	10.7	39.4	41.1	7.1	48.2	0.8	0.9
10	0.013	0.0000	0.013	367.3	292.0	79.5	27.7	7.5	47.6	12.9	1.160	10.4	35.2	40.8	10.4	51.1	3.0	0.3
11	0.012	0.0003	0.012	341.5	254.8	74.8	27.7	8.1	58.9	17.2	1.117	9.8	35.7	45.0	7.0	52.0	2.2	0.3
12	0.026	0.0001	0.026	288.1	230.3	79.6	38.3	13.8	19.5	6.6	1.097	17.7	45.4	34.0	2.5	36.6	0.3	0.0
13	0.015	0.0000	0.015	334.1	264.2	79.0	27.4	8.2	42.5	12.8	1.102	10.2	37.7	44.4	5.3	49.8	2.0	0.3
14	0.017	0.0004	0.017	343.7	252.1	73.4	38.2	11.0	53.3	15.6	1.124	12.1	44.0	35.4	6.1	41.5	0.6	1.8
15	0.018	0.0000	0.018	303.1	227.1	74.9	30.1	10.0	45.9	15.1	1.140	10.8	38.5	40.3	8.6	48.9	1.4	0.3
16	0.019	0.0006	0.019	287.7	222.3	77.6	29.3	10.2	36.1	12.2	1.110	15.4	41.9	37.7	4.7	42.4	0.3	0.0
17	0.021	0.0009	0.021	273.7	192.8	69.4	33.7	12.4	47.2	18.2	1.117	15.9	42.2	38.3	3.1	41.4	0.5	0.0
18	0.024	0.0003	0.024	284.2	195.9	68.2	33.0	12.6	55.3	19.1	1.104	18.0	43.3	34.4	3.5	37.9	0.8	0.0
19	0.018	0.0000	0.018	311.4	233.4	74.8	31.7	10.2	46.3	15.0	1.127	16.5	41.2	37.3	4.8	42.1	0.3	0.0
20	0.017	0.0000	0.017	315.3	238.0	75.5	31.9	10.2	45.5	14.3	1.121	14.5	35.8	41.4	6.8	48.3	1.1	0.3
Pr > F ³	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.03	0.43	0.04	< 0.01	0.02	0.04	< 0.01	0.30	0.49	0.04	0.14	0.02	0.61
LSD ³	0.009	0.009	0.010	55.6	51.0	7.2	NS	4.7	23.3	7.0	0.039	6.2	NS	NS	4.9	NS	1.7	NS

1. Relative area under the disease progress curve. Data for each observation date were plotted on a graph and the area under the line was calculated for each treatment providing a measure of the relative severity of disease throughout the season. A disease rating of 100% foliage infection for the entire season would produce a value of 1.0. All relative AUDPC values are expressed as the proportion of this value. Either decreased disease severity or later disease development will contribute to lower relative areas under the disease progress curve. Early blight and late blight AUDPC values were calculated from Jun 27 - Aug 7 (values for late blight were all 0 for June 27 and July 3). Disease had progressed sufficiently that it was not possible to evaluate early blight and late blight separately for the untreated control beginning August 14. The combined AUDPC was calculated from early blight data for Jun 27 and Jul 3 and the combined foliar disease severity data through August 7. Severe early dying symptoms were evident by August 14 so data for August 14 and 21 were not included in the AUDPC calculation since control of early dying was not being tested in this trial.
2. Undersize is defined as potatoes less than 1 7/8 inches in diameter.
3. Analysis of variance was performed on data, and Fisher's protected least significant difference (LSD) calculated. NS = not significant at $P = 0.10$. * indicates differences between treatments were significant at $P = 0.10$, but not at $P = 0.05$.

Table 4. Effect of experimental treatment on value per acre of Russet Burbank tubers.

Treatment number	Cost of chemicals/A ¹	Gross value of yield/A		Net value of yield/A ⁴		Effect of treatment on value/A ⁵	
		Fresh market ²	Processing ³	Fresh market	Processing	Fresh market	Processing
1	0.00	1161.90	884.65	1161.90	884.65	0.00	0.00
2	116.18	1699.69	1327.68	1583.51	1211.50	421.61	326.85
3	102.72	1570.66	1150.57	1467.94	1047.85	306.03	163.21
4	107.22	1446.37	1059.41	1339.15	952.19	177.24	67.55
5	117.68	1666.87	1191.57	1549.19	1073.89	387.28	189.24
6	148.16	1822.20	1344.07	1674.04	1195.91	512.14	311.26
7	152.66	1745.33	1274.17	1592.67	1121.51	430.77	236.87
8	163.13	1425.51	1056.13	1262.39	893.01	100.49	8.36
9	140.33	1847.63	1338.83	1707.30	1198.50	545.40	313.85
10	144.83	2034.48	1494.09	1889.65	1349.26	727.75	464.62
11	155.30	1805.87	1306.40	1650.57	1151.11	488.67	266.46
12	83.79	1466.22	1073.20	1382.43	989.41	220.53	104.76
13	126.12	1841.62	1326.77	1715.50	1200.65	553.60	316.01
14	91.62	1722.53	1275.69	1630.91	1184.07	469.01	299.43
15	---	1591.30	1145.36	---	---	---	---
16	---	1468.56	1093.38	---	---	---	---
17	---	1287.19	955.76	---	---	---	---
18	---	1313.11	931.83	---	---	---	---
19	---	1536.28	1156.82	---	---	---	---
20	---	1616.84	1197.68	---	---	---	---
Pr > F	---	< 0.01	< 0.01	< 0.01	0.01	< 0.01	0.01
LSD⁶	---	391.91	266.51	350.73	242.69	350.73	242.69

1 2000 Season-long cost of chemicals/Acre (rate, number of applications and retail cost are included in calculation). Retail prices used include:

- Bravo Zn 6F - \$ 41.94/gal
- Maxim - \$2.88/lb
- Quadris 2SC - \$ 240/gal
- TOPSMZ - \$1.80/lb

- If ANY component of the treatment was an experimental product with no retail price, the cost of chemicals was not calculated.
- Seedpiece treatment chemical cost were based on an estimated planting rate of 14.5cwt cut seed planted per acre.

2 Typical 2000 fresh market pricing: 4-6 oz. \$6.50/cwt, 6-10 oz. \$8/cwt, 10-13 oz. \$8, >13 oz. \$7, < 4 oz. and culls \$1/cwt.

3 Typical 2000 processing contract pricing: Base price is \$4.70/cwt for 69% US#1 (4 oz. minimum) with specific gravity of 1.078. A premium is paid for > 19% 10 oz. or greater. For each 1% > 19% (max = 32%) > 10 oz. the price increases \$0.03/cwt. The price decreases \$0.03/cwt for each 1% below 19% to 10%. A decrease of \$0.05 for each 1% of potatoes below 10% 10 oz. There is an increase or decrease in price per hundred weight depending on specific gravity: >1.085 + \$.17; 1.084 + \$.14; 1.083 + \$.11; 1.082 + \$.08; 1.081 + \$.06; 1.080 + \$.04; 1.079 + \$.02; 1.078 .00; 1.077 -\$0.02; 1.076 -\$0.04; 1.075 -\$0.06; 1.074 -.08; 1.073 -\$0.10; 1.072 -\$0.12; ≤ 1.071 -.50.

4 Gross value of the treatment minus cost of chemicals applied.

5 Net value of untreated control minus net value for the treatment.

6 Analysis of variance was performed, and Fisher's protected least significant difference (LSD) calculated. NS = not significant at $P = 0.10$. * indicates differences between treatments were significant at $P = 0.10$, but not at $P = 0.05$.