

POTATO (*Solanum tuberosum* 'Red Norland')
Blackleg and seedpiece decay; *Erwinia carotovora* subsp.
atroseptica, *E. carotovora* subsp. *carotovora*
Rhizoctonia canker (black scurf); *Rhizoctonia solani*
Silver scurf; *Helminthosporium solani*

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Evaluation of the efficacy of seedpiece or in-furrow fungicide treatment for potato disease control – Endeavor, 2004

A field trial was established 9 Jul on a commercial muck farm near Endeavor, WI, to evaluate the effect of treatments applied to seedpieces or in the furrow at planting on Rhizoctonia stem canker, plant stand and vigor, silver scurf and black scurf tuber symptoms, and yield. US#1 Red Norland tubers were mechanically cut by the grower into approximately 2 oz seedpieces and treated as described. Seedpiece treatments were applied to samples of freshly cut potatoes in large plastic bags and the bags were rolled to distribute the chemicals uniformly on the seedpieces. The grower opened the furrows, placed the fertilizer, and then the seedpieces were planted by hand. In-furrow treatments were applied in an 8-in.-wide band over the seedpieces in the open furrow at a rate equivalent to 4.0 gal/1000 row ft at 40 psi, using a hand-held boom with a single HC-2 70° hollow disc cone nozzle. After planting and treatment, soil was raked by hand to cover the seedpieces and form hills over the rows. The experiment was designed as a randomized complete block with four replications, each plot consisting of two 25-ft-long rows spaced 36 in. apart with tubers spaced 12 in. apart in the row. Seedpieces were not inoculated. This study relied on natural inoculum present on seed tubers and/or in field soil. Fertilizer included: 0-30-50, 300 lb/A broadcast preplant, 10-34-0, applied in the row at planting at 15 gal/A and a sidedress application on 10 Aug of 20-20-20, 4 lb/A. Insects were controlled with foliar application of Asana XL, 5 fl oz/A, 21 Jul and Leverage 2.7E, 3.75 fl oz/A, 3 Aug. A combination of Matrix, 1.0 oz/A, + Sencor DF, 0.38 lb/A, was applied 21 Jul for weed control. All treatments received the same foliar fungicide program to control foliar blight: Penncozeb 75DF, 2.0 lb/A, 3, 10 and 17 Aug, Headline, 6 fl oz/A, 30 Aug and Penncozeb 75 DF, 1.0 lb/A + Bravo Ultrex 82.5 WDG, 1.0 lb/A 7 Sep. The number of emerged plants was counted for each plot 19 and 26 Jul, 4, 10 and 27 Aug. On 27 Aug the height of each plant in one row of each plot was recorded, and 5 ft from each row (10 ft/plot) was dug by hand. Plants were rated for Rhizoctonia canker, black leg, and seedpiece decay. The number of stems per plant, fresh weight of leaves and stems, and weight of daughter tubers were recorded. The remaining portion of the trial (a total of 40 ft of row/plot) was left to mature and provide yield data. Vines were killed applications of Reglone, 1 pt/A, 22 and 26 Sep. Plots were machine harvested 13 Oct and graded 14 Oct at the Hancock Agricultural Research Station into US#1, undersize, and cull categories. Tubers 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. Rainfall measured during the growing season (in.) was: Jul (2.6); Aug (2.88); and Sep (3.2).

In this trial all of the treatments except Moncut applied in the furrow decreased emergence and plant growth slightly, but this effect was not significant ($P = 0.05$). There was no significant effect of treatment on seedpiece decay, black leg or Rhizoctonia stem canker. At harvest, there were no significant differences between treatments were similar for total yield, yield of US#1 tubers, size grades or culls. Application of Moncut in the furrow resulted in a higher percentage of undersize tubers ($P = 0.05$), probably the result of the greater plant density and average number of stems for this treatment.

Table 1. Effect of treatment at planting (seedpiece or in-furrow) on emergence and height.

Trt no.	Treatment chemicals	Rate formulated product	Seed-piece	In-furrow	% of plants emerged on: ¹					Avg. days to emergence	Height 27 Aug (cm) ²	
					19 Jul	26 Jul	4 Aug	10 Aug	27 Aug		Per plant	Per hill
1	Untreated				45.5	77.5	81.0	79.0	79.0	15.8	56.3	44.8
2	Moncut 70 DF	0.79 oz 1000 rft		■	49.0	79.0	80.5	76.0	88.0	17.7	57.5	50.9
3	Potato Sd Trt 6%	0.75 lb/cwt	◆		33.0	68.5	68.5	67.5	67.0	15.5	50.9	34.9
4	Maxim 4 FS	0.04 fl oz/cwt	◆		25.5	55.5	55.5	48.0	47.0	22.6	51.8	26.6
5	Maxim 4 FS	0.04 fl oz/cwt	◆									
	Amistar 80 WG	0.134 oz/1000 rft		■	24.5	51.5	50.0	46.5	50.0	29.8	49.5	25.3
6	Moncoat MZ	0.75 lb/cwt	◆		32.5	59.5	60.5	57.5	64.0	18.2	54.4	35.0
7	Potato Sd Trt 6%	0.75 lb/cwt	◆									
	Amistar 80 WG	0.134 oz prod/1000 rft		■	33.0	61.5	61.0	56.5	55.0	16.6	50.8	28.8
8	Blocker 4F – high label	10.4 fl oz/1000 rft		■	27.0	59.5	54.5	58.5	65.0	19.9	55.3	35.8
<i>P</i> > <i>F</i> ⁶					0.03	0.18	0.08	0.09	0.13	0.25	0.28	0.06
LSD ⁶					16.0	NS	NS	NS	NS	NS	NS	NS

1 Based on 50 seedpieces planted/50 ft of row.

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

3 Analysis of variance was performed on data, and Fisher's protected least significant difference (LSD) was calculated (alpha=0.05). NS = not significant at P = 0.05.

Table 2. Effect of treatment at planting (seedpiece or in-furrow) on symptoms of decay, black leg and Rhizoctonia, and tuber production (Treatments as in Table 1).

Trt no.	27 Aug evaluation of 10 hills per replication								
	% decay ¹	% of plants with black leg	% of total stems with black leg	Rhizoctonia severity (%) ²	Avg. no. of stems/plant	Avg. fresh weight per hill (g) ³		Avg. no. daughter tubers/hill	
						Leaves + stems	Daughter tubers		
1	89.9	2.5	2.7	2.4	5.8	965.0	177.5	9.5	
2	99.0	2.5	0.4	4.8	6.0	920.2	191.6	9.5	
3	97.5	2.5	0.5	6.8	4.5	793.2	164.4	8.2	
4	97.7	0.0	0.0	3.2	3.4	559.1	91.3	6.0	
5	100.0	2.5	0.7	3.2	2.7	420.7	93.6	5.2	
6	97.6	0.0	0.0	3.6	4.9	853.3	136.6	7.2	
7	97.6	2.5	0.7	5.5	4.2	648.6	132.1	8.5	
8	98.0	0.0	0.0	4.7	3.3	531.8	110.0	5.9	
<i>P</i> > <i>F</i> ⁴		0.11	0.88	0.64	0.66	0.14	0.10	0.13	0.30
LSD ⁴		NS	NS	NS	NS	NS	NS	NS	NS

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

2 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.

3 All daughter tubers > 0.75-in.-diam were removed and weighed. Remains of seedpieces were also removed. Fresh weight was taken of all remaining plant tissue. Calculations are based on 10 hills per plot. If no plant emerged for a hill, a value of 0 for that plant was included in the calculation.

4 Analysis of variance was performed on data, and Fisher's protected least significant difference (LSD) was calculated (alpha=0.05). NS = not significant at P = 0.05.

Table 3. Effect of treatment at planting (seedpiece or in-furrow) on yield and size grades of US#1 tubers (Treatments as in Table 1).

Trt no.	Yield							Size grades of US#1 potatoes - %						
	Total cwt/A	US#1		Undersize ¹		Culls		< 4 oz	4-6 oz	6-10 oz	10-13 oz	6-13 oz	13-16 oz	>16 oz
		cwt/A	%	cwt/A	%	cwt/A	%							
1	257.5	228.3	88.6	20.4	7.9	8.8	3.5	44.8	33.8	17.6	3.4	21.0	0.3	0.0
2	273.1	236.2	86.6	30.3	11.0	6.6	2.4	43.1	34.2	21.5	0.9	22.4	0.3	0.0
3	249.2	219.6	88.3	17.4	6.8	12.2	4.9	39.2	36.0	23.2	1.4	24.6	0.2	0.0
4	189.4	166.4	82.9	16.2	14.2	6.8	2.9	34.4	32.1	22.2	10.9	33.2	0.3	0.0
5	204.5	182.7	89.7	15.1	7.3	6.8	3.0	42.8	33.0	22.5	1.7	24.2	0.0	0.0
6	236.3	215.5	91.1	14.6	6.3	6.2	2.6	35.9	35.5	26.5	1.4	27.9	0.7	0.0
7	215.7	190.2	87.6	17.1	8.2	8.4	4.2	40.2	32.0	27.1	0.6	27.7	0.0	0.0
8	228.1	202.5	88.8	16.2	7.1	9.4	4.1	42.5	33.1	23.0	1.1	24.1	0.4	0.0
<i>P</i> > <i>F</i> ²	0.32	0.42	0.45	< 0.01	0.41	0.08	0.15	0.11	0.93	0.13	0.37	0.58	0.74	---
LSD ²	NS	NS	NS	7.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	---

¹ Undersize is defined as potatoes less than 1.88 inches in diameter.

² Analysis of variance was performed on data, and Fisher's protected least significant difference (LSD) was calculated (alpha=0.05). NS = not significant at P = 0.05.

