

**POTATO** (*Solanum tuberosum*)

**Early Blight;** *Alternaria solani*

**Late Blight;** *Phytophthora infestans*

**Black Scurf;** *Rhizoctonia solani*

**Silver Scurf;** *Helminthosporium solani*

**Leak;** *Pythium spp.*

**Pink Rot;** *Phytophthora erythroseptica*

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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. The two center rows of each plot (a total of 48 feet of row) were machine harvested and graded September 14-15 and 25-40 pound samples from selected treatments were placed in a storage facility at the Hancock Agricultural Research Station, maintained at approximately 50° F and 90% RH until evaluation on 21 Mar 2001. All tubers were rated for presence or absence of symptoms of late blight, soft rot, pink rot, silver scurf, black scurf and early blight.

**Table 1. Hancock Seedpiece/Furrow Treatment Trial, 2000 - Effect of treatment on relative AUDPC, yield and quality after storage.**

Treatment, rate/acre formulated ;product (and active ingredient in [ ]) and schedule summary <sup>1</sup>				Relative AUDPC <sup>2</sup>			Yield (cwt/A)		% of tubers with:					Silver scurf index <sup>3</sup>	Rhizoc-tonia index <sup>4</sup>		
				Early blight	Late blight	Com-bined	Total	US#1	No symp-toms	Late blight	Soft rot	Pink rot	Silver scurf ONLY			Rhizoc-tonia ONLY	Early blight
1	Untreated			0.043	0.0264	0.076	265.6	189.6	23.9	0.0	0.0	0.0	76.1	35.6	0.0	29.3	15.2
2	Untreated seed																
	Quadris SC	0.77 pt/A	0.2 lb/A														
	Bravo Zn 6F	1.5 pt/A	1.13 lb/A				358.5	254.8	43.3	0.4	0.4	0.0	55.9	13.1	0.0	22.3	5.8
	Maxim	0.5 lb/cwt seed	0.0004 oz/lb														
3	Quadris SC	0.38 fl oz/1000 rft	0.1 oz/1000rft														
	Bravo Zn 6F	1.5 pt/A	1.13 lb/A				298.9	233.8	31.1	0.0	0.0	0.0	68.9	21.8	0.3	22.8	5.6
	Maxim	0.5 lb/cwt seed	0.0004 oz/lb														
4	Quadris SC	0.58 fl oz/1000 rft	0.15 oz/1000rft														
	Bravo Zn 6F	1.5 pt/A	1.13 lb/A				291.3	213.6	54.8	0.0	0.4	0.0	44.0	2.4	0.4	14.2	0.6
	Maxim	0.5 lb/cwt seed	0.0004 oz/lb														
5	Quadris SC	0.96 fl oz/1000 rft	0.25 oz/1000rft														
	Bravo Zn 6F	1.5 pt/A	1.13 lb/A				316.7	244.4	47.6	0.0	0.0	0.0	52.4	3.4	0.0	17.0	0.8
	Maxim	0.5 lb/cwt seed	0.0004 oz/lb														
6	Quadris SC	0.38 fl oz/1000 rft	0.1 oz/1000rft														
	Quadris SC	0.77 pt/A	0.2 lb/A														
	Bravo Zn 6F	1.5 pt/A	1.13 lb/A				359.0	256.5	52.3	0.0	0.0	0.0	47.3	0.4	0.4	16.5	0.4
	Maxim	0.5 lb/cwt seed	0.0004 oz/lb														
7	Quadris SC	0.58 fl oz/1000 rft	0.15 oz/1000rft														
	Quadris SC	0.77 pt/A	0.2 lb/A														
	Bravo Zn 6F	1.5 pt/A	1.13 lb/A				330.6	262.8	42.5	0.0	0.0	0.0	57.5	5.4	0.0	17.5	1.9
	Maxim	0.5 lb/cwt seed	0.0004 oz/lb														
8	Quadris SC	0.96 fl oz/1000 rft	0.25 oz/1000rft														
	Quadris SC	0.77 pt/A	0.2 lb/A														
	Bravo Zn 6F	1.5 pt/A	1.13 lb/A				286.6	214.7	38.6	0.0	0.0	0.0	61.4	15.4	0.0	29.3	2.3
	TOPS MZ	0.5 lb/cwt seed	0.0068 oz/lb														
9	Quadris SC	0.38 fl oz/1000 rft	0.1 oz/1000rft														
	Quadris SC	0.77 pt/A	0.2 lb/A														
	Bravo Zn 6F	1.5 pt/A	1.13 lb/A				340.5	267.2	44.3	0.4	0.0	0.0	55.3	14.9	0.0	23.0	7.5
	TOPS MZ	0.5 lb/cwt seed	0.0068 oz/lb														
10	Quadris SC	0.58 fl oz/1000 rft	0.15 oz/1000rft														
	Quadris SC	0.77 pt/A	0.2 lb/A														
	Bravo Zn 6F	1.5 pt/A	1.13 lb/A				367.3	292.0	23.4	0.4	0.4	0.0	75.4	16.2	0.0	28.0	5.6
	TOPS MZ	0.5 lb/cwt seed	0.0068 oz/lb														
11	Quadris SC	0.96 fl oz/1000 rft	0.25 oz/1000rft														
	Quadris SC	0.77 pt/A	0.2 lb/A														
	Bravo Zn 6F	1.5 pt/A	1.13 lb/A				341.5	254.8	23.0	0.0	0.0	0.0	77.0	14.7	0.0	33.3	5.2
	TOPS MZ	0.5 lb/cwt seed	0.0068 oz/lb														
12	Bravo Zn 6F	1.5 pt/A	1.1266 lb/A														
	Maxim	0.5 lb/cwt seed	0.0004 oz/lb				288.1	230.3	49.4	0.0	0.0	0.0	50.6	6.8	0.0	13.8	1.3
	Quadris SC	1.15 pt/A	0.3 lb/A														
	Bravo Zn 6F	1.5 pt/A	1.13 lb/A				334.1	264.2	58.8	0.0	0.4	0.0	40.0	0.4	0.4	15.8	0.0
	Maxim	0.5 lb/cwt seed	0.0004 oz/lb														
14	Bravo Zn 6F	1.5 pt/A	1.1266 lb/A														
	Maxim	0.5 lb/cwt seed	0.0004 oz/lb				343.7	252.1	37.6	0.0	0.5	0.0	61.9	6.7	0.0	23.3	2.3
	Potato Seed Trt	0.75 lb/ cwt seed	0.0072 oz/lb														
15	Bravo Zn 6F	1.5 pt/A	1.13 lb/A														
	Maxim	0.5 lb/cwt seed	0.0004 oz/lb				303.1	227.1	24.5	0.0	0.0	0.0	75.5	17.5	0.0	26.3	6.7

Treatment, rate/acre formulated ;product (and active ingredient in [ ]) and schedule summary <sup>1</sup>				Relative AUDPC <sup>2</sup>			Yield (cwt/A)		% of tubers with:						Silver scurf index <sup>3</sup>	Rhizoc-tonia index <sup>4</sup>		
				Early blight	Late blight	Com-bined	Total	US#1	No symp-toms	Late blight	Soft rot	Pink rot	Silver scurf ONLY	Rhizoc-tonia ONLY			Early blight	
20	L1036	0.75 lb/ cwt seed	Seedpiece trt															
	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	0.017	0.0000	0.017	315.3	238.0	26.0	0.0	0.3	0.0	73.7	8.7	0.0	26.8	4.2
	Pr > F <sup>4</sup>				< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.34	0.58	0.80	---	0.32	0.35	0.68	0.21	0.21
	LSD				0.009	0.009	0.010	55.6	51.0	NS	NS	NS	---	NS	NS	NS	NS	NS

- 1 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.
- 2 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.
- 3 Silver scurf index: Tubers were spread out and the % of the top surface area with silver scurf symptoms was rated on a 5 point scale with 0 = none; 1 = 1-10% of the surface area of the tuber affected; 2 = 10-25% affected; 3 = 25-50% affected; 4 = 50-75% affected; 5 = > 75% affected. The lesion area index was calculated by summing the number in each class times the class number / 5 times the total number of tubers rated. The index represents a percentage of the worst possible case (if all tubers were rated 5, the index would = 100).
- 4 Rhizoctonia index: Tubers were spread out and the severity of Rhizoctonia symptoms on the top surface was rated on a 5 point scale with 0 = none; 1 = 1-5 sclerotia; 2 = 5-10 sclerotia; 3 = 10-20 sclerotia; 4 = > 20 sclerotia. The Rhizoctonia index was calculated by summing the number in each class times the class number / 4 times the total number of tubers rated. The index represents a percentage of the worst possible case (if all tubers were rated 4, the index would = 100).
- 5 Analysis of variance was performed on data, and Fisher's protected least significant difference (LSD) was calculated. NS = not significant at P = 0.10.

**Table 2. Hancock Seedpiece/Furrow Treatment Trial, 2000 – Effect of treatment on internal quality of stored tubers (treatment numbers as listed in table 1).**

trt	% with no internal defects	% with any kind of internal defect	Com-bined Defect Rating <sup>1</sup>	Hollow Heart <sup>2</sup>				Internal Browning <sup>2</sup>				Black Spot/Bruising				
				% with ANY HH	% with SLIGHT HH	% MODER-ATE HH	% SEVERE HH	% with ANY IB	% with SLIGHT IB	% MODER-ATE IB	% SEVERE IB	% Bruise Free	% with 1 spot (< 1cm)	% with 1 spot (> 1cm)	% with 2-3 spots	% with > 3 spots
1	40.0	60.0	1.0	2.5	2.5	0.0	0.0	12.5	7.5	5.0	0.0	47.5	37.5	2.5	12.5	0.0
2	17.5	82.5	1.9	17.5	10.0	2.5	5.0	20.0	12.5	2.5	5.0	32.5	35.0	7.5	25.0	0.0
3	35.8	64.2	0.8	2.5	2.5	0.0	0.0	4.6	2.5	2.1	0.0	42.9	44.6	7.5	5.0	0.0
4	37.5	62.5	0.9	2.5	0.0	2.5	0.0	2.5	2.5	0.0	0.0	37.5	50.0	2.5	10.0	0.0
5	40.0	60.0	1.4	15.0	2.5	10.0	2.5	5.0	2.5	2.5	0.0	50.0	25.0	2.5	22.5	0.0
6	42.5	57.5	1.1	10.0	2.5	2.5	5.0	7.5	5.0	2.5	0.0	50.0	32.5	7.5	10.0	0.0
7	30.3	69.7	1.2	5.6	5.6	0.0	0.0	5.3	5.3	0.0	0.0	32.8	41.7	7.8	17.8	0.0
8	35.0	65.0	1.1	5.0	0.0	2.5	2.5	0.0	0.0	0.0	0.0	40.0	40.0	5.0	15.0	0.0
9	20.0	80.0	1.3	5.0	5.0	0.0	0.0	10.0	10.0	0.0	0.0	25.0	52.5	10.0	10.0	2.5
10	37.5	62.5	1.1	5.0	5.0	0.0	0.0	5.0	2.5	2.5	0.0	37.5	42.5	10.0	10.0	0.0
11	15.0	85.0	1.6	15.0	7.5	5.0	2.5	7.5	7.5	0.0	0.0	25.0	47.5	5.0	22.5	0.0
12	40.0	60.0	1.0	7.5	5.0	2.5	0.0	0.0	0.0	0.0	0.0	40.0	45.0	0.0	12.5	2.5
13	15.0	85.0	1.4	5.0	2.5	0.0	2.5	10.0	2.5	5.0	2.5	20.0	60.0	7.5	12.5	0.0
14	32.5	67.5	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.5	42.5	2.5	22.5	0.0
15	30.0	70.0	1.5	7.5	0.0	7.5	0.0	10.0	7.5	2.5	0.0	35.0	40.0	0.0	20.0	5.0
20	37.3	62.7	1.4	10.6	2.8	2.8	5.0	2.5	0.0	2.5	0.0	37.3	32.7	7.6	22.4	0.0
Pr > F <sup>3</sup>	0.31	0.31	0.09	0.17	0.51	0.10	0.49	0.06	0.02	0.56	0.04	0.56	0.67	0.83	0.26	0.12
LSD	NS	NS	0.6*	NS	NS	6.6*	NS	11.1*	7.5	NS	2.8	NS	NS	NS	NS	NS

1 The worst possible rating would be 10. Hollow heart and internal browning categories given values of 1 (slight), 2 (moderate), 3 (severe); bruising categories given values of 1 (1 spot<1cm) to 4 (> 3 spots). Combined defect rating = sum of Hollow heart, int. browning and bruising values//10 (the worst defect value a tuber could have if hh=3, ib=3 and bruise=4).

2 Hollow heart and internal browning evaluation: slight – longest dimension < 1 cm; moderate 1-2 cm; severe > 2cm.

3 Analysis of variance was performed on data, and Fisher's protected least significant difference (LSD) was calculated. NS = not significant at  $P = 0.10$ .