

**POTATO (*Solanum tuberosum* ‘Russet Burbank’)
Seedpiece Treatment Evaluation**

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EVALUATION OF POTATO SEEDPIECE TREATMENTS - HANCOCK, 2000: Cut seedpieces of Russet Burbank potatoes were planted April 27, 2000 at the Hancock Agricultural Research Station to evaluate the effect of chemical treatments on seedpiece decay, Rhizoctonia development, emergence, stand, and yield. All seedpieces were cut mechanically with one treatment cut and allowed to heal 7 days before planting and the remaining treatments cut the day of planting. To apply chemical seedpiece treatments, 45-lb samples of seedpieces were placed in plastic bags with the chemical and shaken until seedpieces were uniformly coated with chemical. All seedpieces were planted 3-4 inches deep with an assist-feed planter. Conditions at planting were air temperature 68°F, soil temperature 72°F at the depth of seedpiece placement, seedpiece temperature 65°F and relative humidity 26%. The sky was overcast and the soil was slightly moist. A randomized complete block design with four replications was used for the experiment, with each plot consisting of a single 50 foot row with seedpieces planted 12 inches apart in the row and treatment rows spaced three feet apart. 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. Fungicide was applied on a standard schedule for early and late blight control (Bravo Zn 1.5 pt/A - June 29; 2.13 pt/A - July 13 and 27, August 3, 10, 17 and 24; Quadris 2.08F, 6.2 fl oz./A - July 6; 15.4 fl oz./A - July 20). Vines were killed with an application of Diquat, 1.0 pt/A, plus Peptoil, 1.0 qt/A on August 24. 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).

Emergence was counted for 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, a 10-foot long section of row from each plot was evaluated on June 21. The hills from each plot 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 50, 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. A forty-foot section of row in each plot was mechanically harvested September 14-15 and graded into US#1, undersize, and cull categories. Specific gravity was measured on a sample of tubers from each plot. US#1 tubers from all plots 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.

Environmental conditions favored rapid emergence of vigorous plants in all plots. Although emergence was most rapid in plots planted with seedpieces cut and suberized before planting, similar emergence was observed in all plots by the May 23 rating. The least amount of seedpiece decay was observed in plots planted with suberized seed and in plots where freshcut seedpieces were treated with Tops-MZ dust. No blackleg was observed in plots where seedpieces were treated with Tops-MZ dust. While the incidence of Rhizoctonia stem canker was variable, symptoms were most common in plots where seedpieces were not treated with fungicide at planting. Yields were generally low in these plots and were adversely affected by the appearance of early dying symptoms in early August. Observed differences in yields and crop values were not significantly different from each other.

Figure 1. Soil Temperature and Rainfall/Irrigation - Hancock Agricultural Research Station, 2000

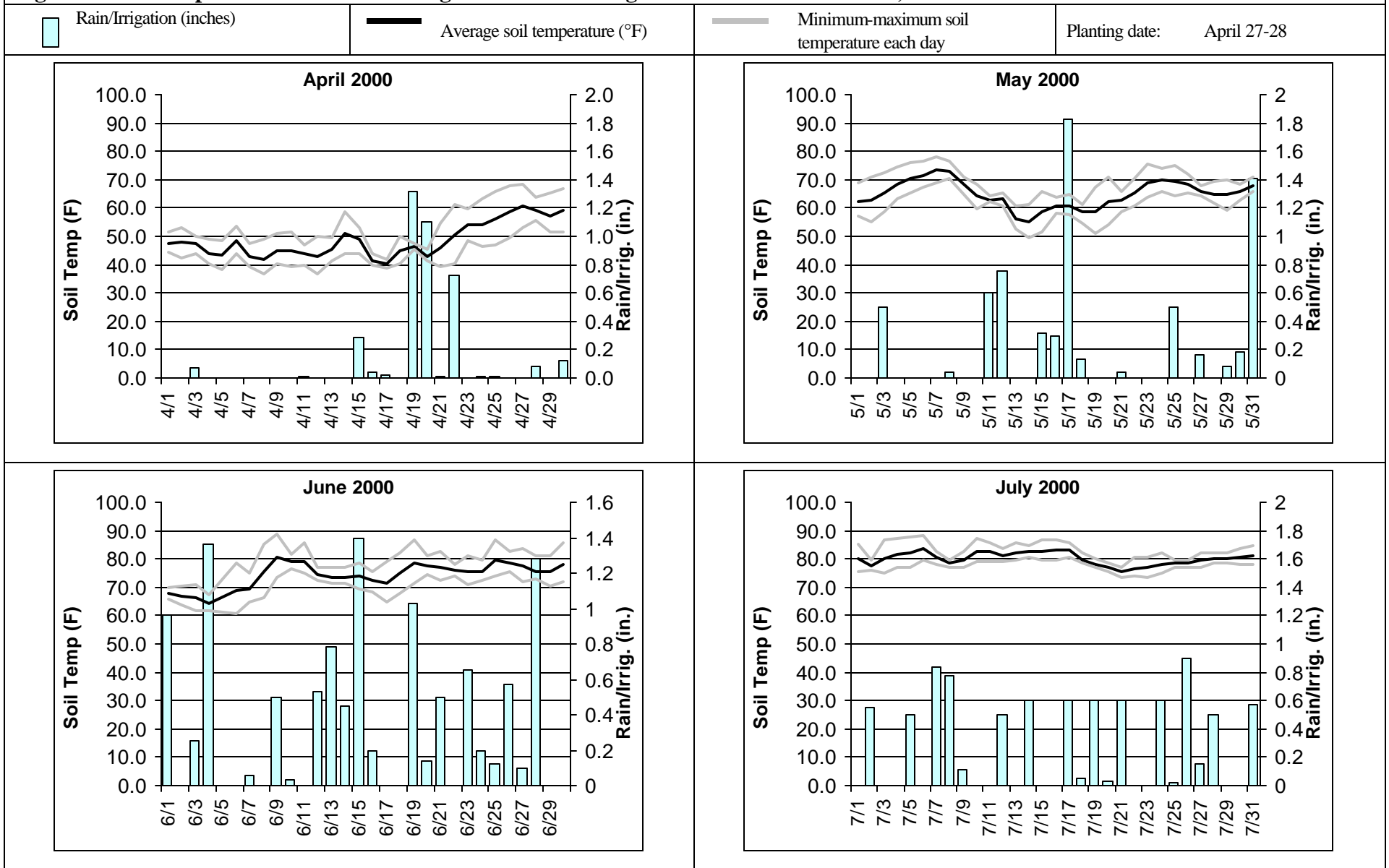


Table 1. Effect of potato seedpiece treatment on field emergence, stand and height of Russet Burbank potatoes.

Treatment	Percentage of plants emerged on: ¹											Avg. days to emergence ²	Avg. height (cm) ³					
	5/15	5/19	5/23	5/30	6/1	6/6	6/9	6/13	6/16	6/19	Per plant			Per hill				
											6/1		6/9	6/19	6/1	6/9	6/19	
Cut and healed 7 days before planting to permit suberization																		
1	No chemical treatment	20.5	68.0	82.5	85.0	84.0	85.0	85.0	84.0	83.5	90.0	26.5	12.8	26.3	41.6	10.7	22.3	37.4
Cut and treated day of planting																		
2	No chemical treatment	8.0	45.0	75.0	81.0	81.0	81.5	79.0	81.0	79.0	82.0	27.6	11.3	24.2	40.7	9.1	19.1	33.3
3	TOPS-MZ 8.5% dust, 0.75 lb/cwt	2.5	41.5	81.0	88.0	84.0	85.5	86.0	85.5	84.0	83.5	30.0	11.4	25.5	41.0	9.6	21.8	34.3
4	Evolve, 0.5 lb/cwt	3.0	50.5	81.5	83.5	84.5	85.0	84.5	84.0	82.5	87.0	26.5	12.6	26.0	42.6	10.6	22.0	37.1
5	Evolve, 0.75 lb/cwt	9.0	51.0	82.0	84.0	83.5	81.5	84.0	83.0	80.5	80.5	30.4	11.7	25.6	41.7	9.8	21.6	33.7
6	L1037-A1, 0.75 lb/cwt	4.5	40.0	77.0	79.5	81.0	82.0	80.5	81.5	81.0	86.5	27.6	11.4	24.4	39.8	9.3	19.7	34.4
7	L1036, 0.75 lb/cwt	5.5	53.0	81.0	82.0	80.0	81.0	81.5	81.0	84.0	82.5	27.8	12.4	26.4	44.0	10.0	21.5	36.3
8	Nubark Mancozeb, 1.0 lb/cwt	7.0	52.0	80.0	82.5	82.0	82.5	83.0	83.5	83.0	84.5	26.0	12.0	23.9	39.8	9.9	20.0	33.8
9	Nubark Plus Mancozeb, 1.0 lb/cwt	2.5	39.5	78.5	84.5	84.5	85.0	85.5	84.0	82.0	85.5	28.7	10.9	23.5	40.0	9.2	20.1	34.4
	Pr > F ⁴	< 0.01	< 0.01	0.22	0.12	0.71	0.32	0.07	0.60	0.80	0.12	0.07	<0.01	0.16	0.10	0.02	0.05	0.31
	LSD	8.8	11.6	NS	NS	NS	NS	4.8*	NS	NS	NS	3.0*	1.0	NS	2.9*	1.0	2.3	NS

- Based on 50 seedpieces planted/50 feet of row.
- The average number of days to emergence was calculated for all plants which grew.
- 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.
- 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	June 21 Evaluation of 10 hills per replication							
	% decay ¹	% of plants with black leg	% of total stems with black leg	% Rhizoctonia infection ²	No. of stems per plant	Ave. fresh weight per hill (g)		Avg. no. of tubers per hill
						Leaves + stems	Daughter tubers	
1	50.7	12.5	5.2	11.7	4.0	542.2	102.3	10.1
2	80.2	17.5	11.4	15.4	3.6	530.1	88.2	7.6
3	46.4	0.0	0.0	3.2	4.3	533.7	74.8	7.7
4	69.8	7.5	1.8	6.0	4.5	610.9	97.6	9.6
5	64.3	2.5	1.6	5.6	4.0	550.7	92.3	10.0
6	55.0	5.0	1.5	5.2	3.7	506.8	81.2	8.4
7	69.5	12.5	4.9	1.5	4.0	596.8	92.7	9.1
8	77.1	25.0	18.8	2.1	3.9	494.7	70.5	7.3
9	65.5	12.5	4.7	7.2	3.4	495.4	73.9	8.0
	Pr > F ³	0.03	0.14	0.04	0.23	0.23	0.29	0.18
	LSD	20.7	NS	11.1	NS	NS	NS	NS

- Severity of seedpiece decay rated on a Horsfall-Barratt scale of 0 (no decay) to 11 (100% decay). Ratings were converted to percentages.
- 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.
- Analysis of variance was performed on data, and Fisher's protected least significant difference (LSD) was calculated. NS = not significant $P = 0.10$. * indicates differences between treatments were significant at $P = 0.10$, but not at $P = 0.05$.

Table 3. Effect of seedpiece treatment on yield, proportion of US#1, undersize and culls and size grades of Russet Burbank potatoes. (Treatment numbers correspond to those listed in Table 1)

Treatment number	Total yield cwt/A	US#1		Undersize ¹		Culls		Specific gravity	Size grades of US#1 potatoes						
		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	272.9	202.9	72.8	47.0	18.6	23.1	8.6	1.146	20.6	52.8	25.7	0.9	26.6	0.0	0.0
2	258.0	190.6	72.3	44.6	19.2	22.8	8.5	1.134	22.2	47.0	28.0	1.9	29.9	1.0	0.0
3	233.8	168.3	71.2	50.5	22.0	15.1	6.8	1.123	26.0	55.5	18.2	0.3	18.5	0.0	0.0
4	280.3	213.9	76.1	48.7	17.5	17.7	6.4	1.123	22.8	51.8	24.8	0.6	25.3	0.0	0.0
5	276.9	207.3	74.6	46.3	17.6	23.3	7.8	1.139	18.2	49.3	28.3	2.8	31.1	1.1	0.3
6	251.2	184.4	72.2	51.8	21.8	14.9	6.0	1.134	24.8	48.4	25.9	0.7	26.5	0.3	0.0
7	278.9	204.6	71.4	58.4	22.5	15.9	6.1	1.136	21.5	48.7	27.6	1.9	29.4	0.3	0.0
8	258.1	193.5	73.3	43.4	18.0	21.2	8.7	1.129	23.0	47.6	29.2	0.2	29.4	0.0	0.0
9	268.8	200.7	74.4	53.3	20.0	14.7	5.6	1.133	20.5	52.3	25.3	1.9	27.2	0.0	0.0
Pr > F²	0.68	0.76	0.89	0.09	0.65	0.75	0.69	0.94	0.66	0.50	0.70	0.09	0.58	0.03	0.46
LSD	NS	NS	NS	9.7*	NS	NS	NS	NS	NS	NS	NS	1.9*	NS	0.8	NS

1. Undersize is defined as potatoes less than 1 7/8 inches in diameter.

2. 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 and rate per cwt		Gross value of yield ¹		Effect of treatment on value ²	
		Fresh market ³	Processing ⁴	Fresh market ³	Processing ⁴
Cut and healed 7 days before planting to permit suberization					
1	No chemical treatment	1264.81	925.27	76.03	30.84
Cut and treated day of planting					
2	No chemical treatment	1188.78	894.43	0.00	0.00
3	TOPS-MZ 8.5% dust, 0.75 lb/cwt	970.91	743.98	-217.87	-150.45
4	Evolve, 0.5 lb/cwt	1279.19	956.71	90.41	62.28
5	Evolve, 0.75 lb/cwt	1323.27	983.79	134.49	89.36
6	L1037-A1, 0.75 lb/cwt	1119.90	828.27	-68.88	-66.16
7	L1036, 0.75 lb/cwt	1287.36	936.13	98.58	41.70
8	Nubark Mancozeb, 1.0 lb/cwt	1191.39	873.34	2.61	-21.09
9	Nubark Plus Mancozeb, 1.0 lb/cwt	1237.08	904.48	48.30	10.05
Pr > F⁵		0.72	0.72	0.72	0.72
LSD		NS	NS	NS	NS

1 Cost of seedpiece treatment chemicals were not included in calculations for this trial.

2 Gross value of untreated control (fresh cut, no chemical applied) minus gross value for the treatment.

3 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.

4 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.

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