

**POTATO (*Solanum tuberosum* ‘Snowden’)  
Seedpiece Treatment Evaluation**

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**EVALUATION OF THE EFFECT OF POTATO SEEDPIECE SIZE, TREATMENT AND WITHIN ROW SPACING ON EMERGENCE, DISEASE CONTROL AND YIELD - HANCOCK, 2000:** Cut seedpieces of Snowden potatoes were planted April 27, 2000 at the Hancock Agricultural Research Station to evaluate the effect of seedpiece size, chemical treatment and within row spacing on seedpiece decay, Rhizoctonia development, emergence, stand, and yield. All seedpieces were mechanically cut the day of planting. Cut seed was sorted into two size classes: 2-3 oz. and 3-4 oz. To apply chemical seedpiece treatments, samples of seedpieces were placed in plastic bags (32.5 lb – smaller size seedpieces; 53 lb – larger size seedpieces) with the chemical and shaken until seedpieces were uniformly coated with chemical. Seedpieces were placed in the furrow with an assist-feed planter with the covering shoes removed. Seedpieces were moved by hand to result in 14-inch or 12-inch spacing within the row and then all seedpieces were mechanically covered using hilling disks. 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 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 14<sup>th</sup>). 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 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 early in the growing season favored rapid emergence and by April 30, there was over 90% emergence in every plot. Treatment of seedpieces with Maxim had little effect on overall emergence. Early emergence was favored by planting larger seedpieces, although by May 23, similar emergence was observed in all plots regardless of seed size. Plant spacing had only a small effect on plant emergence. Small, but significant differences in plant height were observed between treatments. In pooled data, the tallest plants were observed in plots where seedpieces were treated with Maxim, where larger seedpieces were planted and where seedpieces were spaced 12” apart. Treatment of seedpieces significantly reduced the incidence of Rhizoctonia canker. Stem numbers per hill were considered higher than desirable and the treatment of seedpieces with Maxim fungicide slightly increased stem numbers. While total yield and yield of US#1 tubers was unaffected by fungicide treatment of seedpieces, the yield of undersize tubers was highest, the yield of culls was lowest, and the yield of tubers <4 oz was highest in Maxim treated plots. In contrast, the yield of 6-10 oz, 10-13 oz, and 6-13 oz tubers was highest in plots where seedpieces were not treated with fungicide. Planting larger seedpieces significantly increased the total yield, yield of US#1 tubers, and yield of undersize tubers, but had little affect on size grade of harvested tubers. Highest total yields and yield of US#1 tubers were observed in plots where tubers were spaced 12” apart. The gross value of the harvested Snowden tubers, calculated on the basis of chipstock values, was highest in plots where seedpieces were not treated with fungicide, and were planted 12 inches apart in the row regardless of seedpiece size.

**Table 1. Effect of potato seed size, plant spacing and seedpiece treatment on field emergence, stand and height of Snowden potatoes.**

Chemical treatment	Seed size	Spacing	Percentage of plants emerged on: <sup>1</sup>										Avg. days to emergence <sup>2</sup>
			5/15	5/19	5/23	5/30	6/1	6/6	6/9	6/13	6/16	6/19	
1. None	2.5 oz	12"	8.0	57.0	90.5	94.0	94.5	96.5	95.0	95.5	93.5	95.5	26.1
2. None	2.5 oz	14"	2.9	41.3	89.5	96.5	96.5	97.1	95.3	95.9	95.9	94.8	27.6
3. None	3 oz	12"	24.5	61.5	95.0	97.0	96.0	97.5	97.5	98.5	95.0	93.0	27.6
4. None	3 oz	14"	18.0	63.4	91.9	95.9	96.5	97.7	97.7	96.5	99.4	97.7	25.7
5. Maxim 0.5 DS, 8 oz/cwt	2.5 oz	12"	16.5	72.5	96.0	97.5	96.5	96.0	96.0	97.5	96.5	92.5	25.5
6. Maxim 0.5 DS, 8 oz/cwt	2.5 oz	14"	1.7	48.3	95.9	98.3	97.1	98.8	98.3	98.8	98.8	97.7	26.5
7. Maxim 0.5 DS, 8 oz/cwt	3 oz	12"	13.0	72.0	95.0	95.5	93.5	95.5	96.5	95.5	93.5	92.5	25.9
8. Maxim 0.5 DS, 8 oz/cwt	3 oz	14"	14.0	68.0	97.7	99.4	99.4	98.8	100.0	99.4	100.0	94.8	26.0
Pr > F <sup>3</sup>			0.05	< 0.01	0.25	0.47	0.60	0.77	0.11	0.43	0.10	0.40	0.48
LSD			14.5	16.6	NS	NS	NS	NS	NS	NS	5.3*	NS	NS

**Analysis of the effect of seed treatment, seed size and plant spacing**

*Effect of seed treatment (data pooled for other factors)*

Untreated.....	13.4	55.8	91.7	95.9	95.9	97.2	96.4	96.6	96.0	95.2	26.8
Maxim 0.5 DS, 8 oz/cwt.....	11.3	65.2	96.2	97.7	96.6	97.3	97.7	97.8	97.2	94.4	26.0
<b>Pr &gt; F <sup>3</sup></b> .....	0.56	0.03	0.02	0.15	0.60	0.93	0.13	0.28	0.34	0.54	0.20
<b>LSD</b> .....	NS	8.3	3.6	NS	NS	NS	NS	NS	NS	NS	NS

*Effect of seed size (data pooled for other factors)*

2.5 oz.....	7.3	54.8	93.0	96.6	96.2	97.1	96.2	96.9	96.2	95.1	26.4
3 oz.....	17.4	66.2	94.9	97.0	96.4	97.4	97.9	97.5	97.0	94.5	26.3
<b>Pr &gt; F <sup>3</sup></b> .....	< 0.01	< 0.01	0.29	0.75	0.88	0.81	0.05	0.62	0.54	0.66	0.88
<b>LSD</b> .....	7.3	8.3	NS	NS	NS	NS	1.7	NS	NS	NS	NS

*Effect of plant spacing (data pooled for other factors)*

12".....	15.5	65.8	94.1	96.0	95.1	96.4	96.3	96.8	94.6	93.4	26.3
14".....	9.2	55.2	93.8	97.5	97.4	98.1	97.8	97.7	98.5	96.2	26.5
<b>Pr &gt; F <sup>3</sup></b> .....	0.08	0.02	0.83	0.22	0.12	0.14	0.08	0.40	< 0.01	0.06	0.79
<b>LSD</b> .....	7.3*	8.3	NS	NS	NS	NS	1.7*	NS	2.7	2.9*	NS

**Pr > F for interaction:**

Seed treatment x seed size.....	0.12	0.65	0.39	0.51	0.70	0.65	0.45	0.26	0.20	0.56	0.84
Seed treatment x plant spacing.....	0.87	0.38	0.35	0.51	0.48	0.25	0.13	0.13	0.70	0.54	0.54
Seed size x plant spacing.....	0.32	0.03	0.94	0.93	0.50	0.99	0.75	0.97	0.24	0.66	0.08
Seed trt x seed size x plant spacing.....	0.23	0.87	0.49	0.18	0.24	0.84	0.68	0.26	0.68	0.16	0.30

1. Based on 50 seedpieces planted/50 feet of row (12" spacing) or 43 seedpieces (14" spacing). A sample from each plot in the trial was dug and rated for disease on June 21.
2. The average number of days to emergence was calculated for all plants which grew.
3. Analysis of variance was performed on data, and Fisher's protected least significant difference (LSD) was calculated. NS = not significant at  $P = 0.10$ . \* = Difference between treatments were significant at  $P = 0.10$ , but not at  $P = 0.05$ .

**Table 2. Effect of potato seed size, plant spacing and seedpiece treatment on decay, black leg and Rhizoctonia symptoms and plant development on Snowden potatoes.**

Chemical treatment	Seed size	Spacing	Avg. height (cm) <sup>1</sup>						June 21 evaluation						
			Per plant			Per hill			% decay <sup>2</sup>	% of plants with black leg	% of total stems with black leg	% Rhizoctonia infection <sup>3</sup>	No. of stems per plant	Ave. fresh weight (g)	
			6/1	6/9	6/19	6/1	6/9	6/19						Leaves + stems / hill	Daughter tubers / hill
1. None	2.5 oz	12"	11.0	25.0	44.8	10.4	23.8	42.8	78.7	7.5	5.1	20.7	4.3	580.0	116.4
2. None	2.5 oz	14"	10.9	23.4	42.7	10.5	22.3	40.4	81.7	2.5	0.6	34.5	3.7	549.7	126.3
3. None	3 oz	12"	11.9	27.4	46.0	11.4	26.7	42.8	62.9	10.0	3.9	19.2	4.8	666.5	144.3
4. None	3 oz	14"	11.3	27.1	45.9	10.9	26.7	44.9	58.9	7.5	4.7	23.4	5.7	677.3	142.0
5. Maxim 0.5 DS, 8 oz/cwt	2.5 oz	12"	11.3	26.7	43.5	10.9	25.6	40.2	62.1	12.5	4.5	1.3	4.5	526.3	126.1
6. Maxim 0.5 DS, 8 oz/cwt	2.5 oz	14"	11.4	25.0	41.1	11.1	24.7	40.8	61.4	7.5	4.7	4.5	4.0	526.3	125.4
7. Maxim 0.5 DS, 8 oz/cwt	3 oz	12"	12.6	29.4	47.2	11.8	28.4	43.7	54.7	17.5	9.6	1.1	5.6	662.9	179.2
8. Maxim 0.5 DS, 8 oz/cwt	3 oz	14"	12.4	29.0	47.2	12.3	29.0	44.7	53.6	7.5	4.4	3.0	6.1	696.1	161.0
Pr > F <sup>4</sup>			0.02	<0.01	<0.01	0.06	<0.01	<0.01	0.05	0.66	0.64	<0.01	<0.01	<0.01	0.16
LSD			1.0	2.2	2.3	1.2*	2.3	2.9	19.4	NS	NS	10.1	0.9	97.9	NS

**Analysis of the effect of seed treatment, seed size and plant spacing**

**Effect of seed treatment (data pooled for other factors)**

Untreated	11.3	25.7	44.7	10.8	24.9	42.4	70.6	6.9	3.6	24.4	4.6	618.4	132.3
Maxim 0.5 DS, 8 oz/cwt	11.9	27.5	44.9	11.5	26.9	42.7	58.0	11.3	5.8	2.5	5.0	602.9	147.9
Pr > F <sup>4</sup>	0.02	<0.01	0.83	0.02	<0.01	0.64	0.01	0.25	0.28	<0.01	0.06	0.52	0.18
LSD	0.5	1.1	NS	0.6	1.2	NS	9.7	NS	NS	5.0	0.4*	NS	NS

**Effect of seed size (data pooled for other factors)**

2.5 oz	11.1	25.0	43.0	10.7	24.1	41.1	71.0	7.5	3.7	15.3	4.1	545.6	123.6
3 oz	12.0	28.2	46.6	11.6	27.7	44.0	57.6	10.6	5.6	11.7	5.5	675.7	156.6
Pr > F <sup>4</sup>	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.41	0.35	0.15	<0.01	<0.01	<0.01
LSD	0.5	1.1	1.1	0.6	1.2	1.5	9.7	NS	NS	NS	0.4	48.9	23.7

**Effect of plant spacing (data pooled for other factors)**

12"	11.7	27.1	45.4	11.2	26.1	42.7	64.6	11.9	5.8	10.6	4.8	609.0	141.5
14"	11.5	26.1	44.2	11.1	25.7	42.4	63.9	6.3	3.6	16.4	4.9	612.3	138.7
Pr > F <sup>4</sup>	0.36	0.06	0.05	0.76	0.42	0.61	0.88	0.14	0.29	0.03	0.66	0.89	0.81
LSD	NS	1.1*	1.1	NS	NS	NS	NS	NS	NS	NS	5.0	NS	NS

**Pr > F for interaction:**

Seed treatment x seed size	0.28	0.73	0.02	0.50	0.97	0.31	0.23	0.87	0.82	0.27	0.56	0.34	0.33
Seed treatment x plant spacing	0.58	0.95	0.91	0.38	0.57	0.52	0.96	0.62	0.86	0.20	0.71	0.58	0.57
Seed size x plant spacing	0.46	0.22	0.05	0.77	0.21	0.10	0.70	0.87	0.99	0.28	<0.01	0.44	0.52
Seed trt x seed size x plant spacing	0.96	0.96	0.88	0.47	0.97	0.18	0.73	0.62	0.19	0.41	0.59	0.93	0.91

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 potato seed size, plant spacing and seedpiece treatment on yield, proportion of US#1, undersize and culls and size grades of Snowden potatoes.**

Chemical treatment	Seed size	Spa- cing	Total yield cwt/A	US#1		Undersize <sup>1</sup>		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.
None	2.5 oz	12"	332.1	302.3	90.9	19.1	5.8	10.8	3.3	1.106	32.3	35.8	27.6	4.3	31.9	0.0	0.0
	2.5 oz	14"	306.1	271.9	88.8	19.4	6.4	14.8	4.8	1.130	36.6	33.0	26.5	3.9	30.4	0.0	0.0
	3 oz	12"	344.6	301.1	87.4	27.3	8.0	16.2	4.7	1.109	41.7	36.5	19.3	2.2	21.5	0.3	0.0
	3 oz	14"	327.2	292.7	89.5	22.3	6.8	12.2	3.7	1.112	39.9	33.9	22.5	2.6	25.0	0.5	0.6
Maxim 0.5 DS, 8 oz/cwt	2.5 oz	12"	334.8	297.8	88.9	28.0	8.4	9.0	2.7	1.102	50.8	34.9	13.1	1.2	14.3	0.0	0.0
	2.5 oz	14"	299.7	265.8	88.3	28.8	9.9	5.1	1.7	1.147	55.7	34.2	9.9	0.2	10.1	0.0	0.0
	3 oz	12"	352.1	315.4	89.6	31.6	9.0	5.0	1.4	1.121	48.6	34.6	15.8	1.0	16.7	0.0	0.0
	3 oz	14"	322.7	290.2	89.9	29.1	9.1	3.4	1.0	1.110	55.8	31.7	11.9	0.6	12.5	0.0	0.0
Pr > F <sup>2</sup>			0.01	0.04	0.37	0.02	0.03	<0.01	<0.01	0.05	<0.01	0.78	<0.01	0.01	<0.01	0.17	0.46
LSD			28.0	29.3	NS	7.9	2.6	6.5	1.9	0.028	6.8	NS	4.8	2.4	5.6	NS	NS

**Analysis of the effect of seed treatment, seed size and plant spacing**

Effect of seed treatment (data pooled for other factors)																	
Untreated	327.5	292.0	89.1	22.0	6.8	13.5	4.1	1.114	37.6	34.8	24.0	3.2	27.2	0.2	0.2		
Maxim 0.5 DS, 8 oz/cwt	327.3	292.3	89.2	29.4	9.1	5.6	1.7	1.119	52.7	33.9	12.7	0.7	13.4	0.0	0.0		
Pr > F <sup>2</sup>	0.98	0.96	0.94	<0.01	<0.01	<0.01	<0.01	0.40	<0.01	0.50	<0.01	<0.01	<0.01	0.08	0.33		
LSD	NS	NS	NS	3.9	1.3	3.2	0.9	NS	3.4	NS	2.4	1.2	2.8	0.2*	NS		
Effect of seed size (data pooled for other factors)																	
2.5 oz	318.2	284.4	89.2	23.8	7.6	9.9	3.1	1.121	43.8	34.5	19.3	2.4	21.7	0.0	0.0		
3 oz	336.7	299.9	89.1	27.6	8.2	9.2	2.7	1.113	46.5	34.2	17.3	1.6	18.9	0.2	0.2		
Pr > F <sup>2</sup>	0.01	0.04	0.83	0.06	0.36	0.66	0.36	0.24	0.12	0.85	0.11	0.17	0.06	0.08	0.33		
LSD	14.0	14.6	NS	3.9	NS	NS	NS	NS	NS	NS	NS	NS	2.8*	0.2*	NS		
Effect of plant spacing (data pooled for other factors)																	
12"	340.9	304.2	89.2	26.5	7.8	10.2	3.0	1.109	43.4	35.5	19.0	2.2	21.4	0.1	0.0		
14"	313.9	280.2	89.1	24.9	8.1	8.9	2.8	1.125	47.0	33.2	17.7	1.8	19.5	0.1	0.2		
Pr > F <sup>2</sup>	<0.01	<0.01	0.91	0.40	0.66	0.39	0.67	0.04	0.04	0.13	0.29	0.55	0.25	0.54	0.33		
LSD	14.0	14.6	NS	NS	NS	NS	NS	0.014	3.4	NS	NS	NS	NS	NS	NS		
Pr > F for interaction:																	
Seed trt x seed size	0.81	0.44	0.09	0.36	0.26	0.18	0.26	0.91	0.04	0.46	<0.01	0.13	<0.01	0.08	0.33		
Seed trt x plant spacing	0.45	0.52	0.91	0.67	0.39	0.38	0.32	0.77	0.16	0.75	0.06	0.56	0.07	0.54	0.33		
Seed size x plant spacing	0.60	0.32	0.08	0.27	0.21	0.36	0.28	<0.01	0.57	0.73	0.45	0.57	0.37	0.54	0.33		
Seed trt x seed size x plant spacing	0.91	0.59	0.25	0.80	0.92	0.11	0.11	0.19	0.21	0.68	0.30	0.93	0.35	0.54	0.33		

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 potato seed size, plant spacing and seedpiece treatment on value per acre of Snowden tubers.**

Chemical treatment	Seed size	Spacing	Gross value of yield <sup>1</sup>		Effect of treatment on value <sup>2</sup>	
			Fresh market <sup>3</sup>	Chipping <sup>4</sup>	Fresh market <sup>3</sup>	Chipping <sup>4</sup>
None	2.5 oz	12"	1600.74	1201.29	0.00	0.00
	2.5 oz	14"	1388.02	1045.03	-212.72	-156.26
	3 oz	12"	1410.21	1092.28	-190.53	-109.01
	3 oz	14"	1406.85	1066.75	-193.89	-134.54
Maxim 0.5 DS, 8 oz/cwt	2.5 oz	12"	1207.59	959.78	-393.15	-241.51
	2.5 oz	14"	1007.33	813.63	-593.42	-387.66
	3 oz	12"	1327.67	1043.84	-273.07	-157.45
	3 oz	14"	1091.90	874.43	-508.84	-326.86
Pr > F <sup>5</sup>			< 0.01	< 0.01	< 0.01	< 0.01
LSD			180.47	134.70	180.47	134.70
<b>Analysis of the effect of seed treatment, seed size and plant spacing</b>						
Effect of seed treatment (data pooled for other factors)						
Untreated			1451.46	1101.34	-149.28	-99.95
Maxim 0.5 DS, 8 oz/cwt			1158.62	922.92	-442.12	-278.37
Pr > F <sup>5</sup>			< 0.01	< 0.01	< 0.01	< 0.01
LSD			90.24	67.35	90.24	67.35
Effect of seed size (data pooled for other factors)						
2.5 oz			1300.92	1004.93	-299.82	-196.36
3 oz			1309.16	1019.33	-291.58	-181.96
Pr > F <sup>5</sup>			0.85	0.66	0.85	0.66
LSD			NS	NS	NS	NS
Effect of plant spacing (data pooled for other factors)						
12"			1386.55	1074.30	-214.19	-126.99
14"			1223.53	949.96	-377.21	-251.33
Pr > F <sup>5</sup>			< 0.01	< 0.01	< 0.01	< 0.01
LSD			90.24	67.35	90.24	67.35
Pr > F for interaction:						
Seed trt x seed size			0.04	0.09	0.04	0.09
Seed trt x plant spacing			0.22	0.31	0.22	0.31
Seed size x plant spacing			0.33	0.42	0.33	0.42
Seed trt x seed size x plant spacing			0.17	0.25	0.17	0.25

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 chipping price of \$5.25/cwt for a size range of 1 7/8 to 4" (estimated to be all US#1 potatoes from our size grading except those > 16 oz.) Process grade for chip stock (undersize + culls + >16 oz.) = \$1.00/cwt.

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

