

Sugar End Evaluation (1900 Series)

- Location:** Tappen, ND
Plot design: 4 rows X 30 feet X 4 reps; RCBD
All 4 rows were sprayed; foliar disease data was taken from the center 2 rows.
- Planting date:** May 14, 2008
Row width: 36 inches
Seed spacing: 14 inches
- Cultivar:** Russet Burbank
- 50% Emergence:** June 14
- Fertilizer:** Broadcast: 209#N, 52#P, 200#K, 1#B; May 7
Starter: 25#N, 40#P, 28#S, 1#Zn; May 14
- Herbicide:** Prowl (2.0 pt/a) + Matrix (1.0 oz/a); Pre-June 10
- Insecticide:** Belay in-furrow (12.0 oz/a); May 14
- Objective:** Determine effect of foliar applications of pyraclostrobin on sugar end development as a result of water stress.
- Fungicide application dates:** July 3, 10, 15, 24, 30, August 5, 14, 19, 26
September 3, 12
- Fungicide application method:** Fungicide applications 1 and 4, were performed using a hand held CO₂ sprayer as indicated by the protocol. All other fungicides were applied using a converted ATV (55 psi; 61 gpa; 11005XR nozzles).
- Vinekill:** Rotobeat; September 25
Harvest: September 30 and October 1
Grade: Performed by AgWorld - Jamestown, ND; October 7
- Fry color evaluation:** Performed by AgWorld - Jamestown, ND; October 7
NDSU Fry evaluation: October 23; 23-24 days after harvest
Sugar evaluation: November 1; 31-32 days after harvest
- NDSU Sugar End Fry Protocol:** Three tubers (170-227 g each) were cut into fries (1 cm², the full length of the tuber) using a manual cutter (Ductile, Bloomfield, Indiana, or Cabela's model AUFA International Corp). Nine central fries from each tuber were rinsed in cool water and fried in vegetable oil (Flavorite) at 375°F for 3.5 minutes. Fries were visually graded using the USDA Fry Color chart for fry color and sugar end (stem

end fry color) color if different from the main body of the fry. The USDA scale defines a range of color from 0.0 to 4.0, with lower numbers indicating lighter color. A rating of 2.0 or lower is considered acceptable by the industry. The definition of sugar end in this study was more stringent than that used in the processing industry. Common industry practice is to grade any end of 3.0 or higher on the USDA scale, as a sugar end. In the present study, a sugar end was defined as any stem end which varied by one or more scale unit darker from the main body of the fry. Mottling and vascular discoloration were also noted if present. In order to conduct statistical analysis of the data, a 0.0 was scored as 0.1, 0.0 a 0.3, and a 0 as 0.5. Average fry color, percent sugar ends, and average sugar end fry color were calculated.

NOTE: The first fry evaluation (10/7) was performed during grading by Ag World and did not follow the previously described protocol.

Sugar End Evaluation - Tappen Series 1900

Treatment	Rate	Schedule	Notes	Early Blight (% Severity)											AUDPC	RAUDPC		
				7/10	7/16	7/23	7/30	8/6	8/13	8/19	8/27	9/3	9/10	9/17				
1901 Dithane	2.0 lb / a	1,3,5,7,9,11	Application 1 and 4 at 20 gpa using a handsprayer.	0.01	0.29	0.49	0.63	1.2	6.5	5.0	4.4	5.4	11.6	22.6	327.6	0.047		
Bravo Zn	2.13 pt / a	2,4,6,8,10																
1902 Headline	9.0 fl oz / a	1,4	Headline application at tuber initiation and early tuber bulking at 60 gpa using a handsprayer.	0.01	0.23	0.26	0.87	1.2	5.6	5.4	5.7	7.8	16.3	31.6	415.8	0.059		
Bravo Zn	2.13 pt / a	2,6,8,10																
Dithane	2.0 lb / a	3,5,7,9,11																
1903 Headline	9.0 fl oz / a	1,4	Headline application at tuber initiation and early tuber bulking at 20 gpa using a handsprayer.	0.00	0.14	0.36	0.51	1.0	2.6	2.5	2.8	3.3	10.9	19.0	235.7	0.034		
Bravo Zn	2.13 pt / a	2,6,8,10																
Dithane	2.0 lb / a	3,5,7,9,11																
1904 Headline	9.0 fl oz / a	1,4	Headline application at tuber initiation and early tuber bulking at 5 gpa using a handsprayer.	0.01	0.19	0.38	0.48	0.6	1.8	2.3	1.9	2.8	13.7	26.9	263.2	0.038		
Bravo Zn	2.13 pt / a	2,6,8,10																
Dithane	2.0 lb / a	3,5,7,9,11																
1905 Headline +	9.0 fl oz / a +	1,4	Headline / Silwet application at tuber initiation and early tuber bulking at 5 gpa using a handsprayer.	0.00	0.13	0.19	0.55	0.4	2.1	2.9	3.2	4.0	11.4	26.9	268.6	0.038		
Silwet	0.125% v/v																	
Bravo Zn	2.13 pt / a	2,6,8,10																
Dithane	2.0 lb / a	3,5,7,9,11																
1906 Headline	9.0 fl oz / a	1,4	Headline application at tuber initiation and early tuber bulking at 60 gpa using a converted ATV.	0.01	0.09	0.26	0.79	0.7	3.1	3.6	3.9	5.0	14.3	25.6	311.6	0.045		
Bravo Zn	2.13 pt / a	2,6,8,10																
Dithane	2.0 lb / a	3,5,7,9,11																
LSD _{P=0.05}				NS	0.09	0.20	NS	0.6	2.5	NS	NS	2.3	NS	NS	NS	NS		

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Treatment	Rate	Schedule	Notes	Total Yield (cwt/a)	Market Yield (cwt/a)	US No. 2 Processing (%)			Unusables (%)				Specific Gravity
						4-6 oz	6-9 oz	>10 oz	Total	Undersize	Serious Hollow	Other	
1901 Dithane	2.0 lb / a	1,3,5,7,9,11	Application 1 and 4 at 20 gpa using a handsprayer.	478.0	421.6	14.4	29.5	44.5	11.8	5.5	4.7	1.6	1.0574
Bravo Zn	2.13 pt / a	2,4,6,8,10											
1902 Headline	9.0 fl oz / a	1,4	Headline application at tuber initiation and early tuber bulking at 60 gpa using a handsprayer.	452.8	387.1	18.2	31.7	35.6	14.5	7.2	5.7	1.6	1.0855
Bravo Zn	2.13 pt / a	2,6,8,10											
Dithane	2.0 lb / a	3,5,7,9,11											
1903 Headline	9.0 fl oz / a	1,4	Headline application at tuber initiation and early tuber bulking at 20 gpa using a handsprayer.	464.1	422.8	17.8	33.6	39.7	8.9	5.9	2.4	0.6	1.0873
Bravo Zn	2.13 pt / a	2,6,8,10											
Dithane	2.0 lb / a	3,5,7,9,11											
1904 Headline	9.0 fl oz / a	1,4	Headline application at tuber initiation and early tuber bulking at 5 gpa using a handsprayer.	480.9	428.9	14.5	32.8	41.6	10.8	6.4	1.8	2.6	1.0844
Bravo Zn	2.13 pt / a	2,6,8,10											
Dithane	2.0 lb / a	3,5,7,9,11											
1905 Headline +	9.0 fl oz / a +	1,4	Headline / Silwet application at tuber initiation and early tuber bulking at 5 gpa using a handsprayer.	438.1	387.7	15.0	37.2	35.1	11.5	6.0	2.4	3.1	1.0813
Silwet	0.125% v/v												
Bravo Zn	2.13 pt / a	2,6,8,10											
Dithane	2.0 lb / a	3,5,7,9,11											
1906 Headline	9.0 fl oz / a	1,4	Headline application at tuber initiation and early tuber bulking at 60 gpa using a converted ATV.	459.7	413.2	18.7	33.5	37.6	10.1	6.7	1.9	1.5	1.0910
Bravo Zn	2.13 pt / a	2,6,8,10											
Dithane	2.0 lb / a	3,5,7,9,11											
LSD _{P=0.05}				NS									

Sugar End Evaluation - Tappen Series 1900
Fry Analysis (10/7/08)

Treatment	Rate	Schedule	Notes	% Fries Scored Zero	% Sugar Ends
1901 Dithane	2.0 lb / a	1,3,5,7,9,11	Application 1 and 4 at 20 gpa using a handsprayer.	84.0	32.0
Bravo Zn	2.13 pt / a	2,4,6,8,10			
1902 Headline	9.0 fl oz / a	1,4	Headline application at tuber initiation and early tuber bulking at 60 gpa using a handsprayer.	80.0	24.0
Bravo Zn	2.13 pt / a	2,6,8,10			
Dithane	2.0 lb / a	3,5,7,9,11			
1903 Headline	9.0 fl oz / a	1,4	Headline application at tuber initiation and early tuber bulking at 20 gpa using a handsprayer.	84.0	16.0
Bravo Zn	2.13 pt / a	2,6,8,10			
Dithane	2.0 lb / a	3,5,7,9,11			
1904 Headline	9.0 fl oz / a	1,4	Headline application at tuber initiation and early tuber bulking at 5 gpa using a handsprayer.	73.0	15.0
Bravo Zn	2.13 pt / a	2,6,8,10			
Dithane	2.0 lb / a	3,5,7,9,11			
1905 Headline +	9.0 fl oz / a +	1,4	Headline / Silwet application at tuber initiation and early tuber bulking at 5 gpa using a handsprayer.	72.0	20.0
Silwet	0.125% v/v				
Bravo Zn	2.13 pt / a	2,6,8,10			
Dithane	2.0 lb / a	3,5,7,9,11			
1906 Headline	9.0 fl oz / a	1,4	Headline application at tuber initiation and early tuber bulking at 60 gpa using a converted ATV.	68.0	16.0
Bravo Zn	2.13 pt / a	2,6,8,10			
Dithane	2.0 lb / a	3,5,7,9,11			

Sugar End Evaluation - Tappen Series 1900

Fry Analysis (10-23-08)

Treatment	Rate	Schedule		Fry Color ^a	Sugar End Color ^b	% Sugar Ends	% Mottled Fries	% Fries with Dark Vascular Discoloration
1901 Dithane	2.0 lb / a	1,3,5,7,9,11	Application 1 and 4 at 20 gpa using a handsprayer.	0.7	1.3	50.0	0.0	0.0
Bravo Zn	2.13 pt / a	2,4,6,8,10						
1902 Headline	9.0 fl oz / a	1,4	Headline application at tuber initiation and early tuber bulking at 60 gpa using a handsprayer.	0.5	0.6	8.3	0.0	8.3
Bravo Zn	2.13 pt / a	2,6,8,10						
Dithane	2.0 lb / a	3,5,7,9,11						
1903 Headline	9.0 fl oz / a	1,4	Headline application at tuber initiation and early tuber bulking at 20 gpa using a handsprayer.	0.5	0.5	0.0	0.0	8.3
Bravo Zn	2.13 pt / a	2,6,8,10						
Dithane	2.0 lb / a	3,5,7,9,11						
1904 Headline	9.0 fl oz / a	1,4	Headline application at tuber initiation and early tuber bulking at 5 gpa using a handsprayer.	0.3	0.4	8.3	8.3	0.0
Bravo Zn	2.13 pt / a	2,6,8,10						
Dithane	2.0 lb / a	3,5,7,9,11						
1905 Headline +	9.0 fl oz / a +	1,4	Headline / Silwet application at tuber initiation and early tuber bulking at 5 gpa using a handsprayer.	0.1	0.1	0.0	8.3	0.0
Silwet	0.125% v/v							
Bravo Zn	2.13 pt / a	2,6,8,10						
Dithane	2.0 lb / a	3,5,7,9,11						
1906 Headline	9.0 fl oz / a	1,4	Headline application at tuber initiation and early tuber bulking at 60 gpa using a converted ATV.	0.2	0.5	16.8	0.0	0.0
Bravo Zn	2.13 pt / a	2,6,8,10						
Dithane	2.0 lb / a	3,5,7,9,11						
LSD _{P=0.05}				NS	0.5	28.1	NS	NS

^afry color scored as 000 = 0.1, 00 = 0.3, 0 = 0.5 so that statistical analysis can be conducted

^bstem end throughout; rated as any variation of color from the main fry extending 1/4" or more into the fry

Sugar End Evaluation - Tappen Series 1900 Fry Analysis (1-28-09)

Treatment	Rate	Schedule		Fry Color ^a	Sugar End Color ^b	% Sugar Ends	% Mottled Fries	% Fries with Dark Vascular Discoloration
1901 Dithane	2.0 lb / a	1,3,5,7,9,11	Application 1 and 4 at 20 gpa using a handsprayer.	0.4	1.1	50.0	16.5	0.0
Bravo Zn	2.13 pt / a	2,4,6,8,10						
1902 Headline	9.0 fl oz / a	1,4	Headline application at tuber initiation and early tuber bulking at 60 gpa using a handsprayer.	0.9	1.9	58.3	8.3	0.0
Bravo Zn	2.13 pt / a	2,6,8,10						
Dithane	2.0 lb / a	3,5,7,9,11						
1903 Headline	9.0 fl oz / a	1,4	Headline application at tuber initiation and early tuber bulking at 20 gpa using a handsprayer.	0.4	2.6	100.0	8.3	0.0
Bravo Zn	2.13 pt / a	2,6,8,10						
Dithane	2.0 lb / a	3,5,7,9,11						
1904 Headline	9.0 fl oz / a	1,4	Headline application at tuber initiation and early tuber bulking at 5 gpa using a handsprayer.	1.2	2.6	58.3	41.8	0.0
Bravo Zn	2.13 pt / a	2,6,8,10						
Dithane	2.0 lb / a	3,5,7,9,11						
1905 Headline +	9.0 fl oz / a +	1,4	Headline / Silwet application at tuber initiation and early tuber bulking at 5 gpa using a handsprayer.	0.7	1.8	49.8	25.0	0.0
Silwet	0.125% v/v							
Bravo Zn	2.13 pt / a	2,6,8,10						
Dithane	2.0 lb / a	3,5,7,9,11						
1906 Headline	9.0 fl oz / a	1,4	Headline application at tuber initiation and early tuber bulking at 60 gpa using a converted ATV.	0.6	2.1	91.8	8.3	0.0
Bravo Zn	2.13 pt / a	2,6,8,10						
Dithane	2.0 lb / a	3,5,7,9,11						
LSD _{P=0.05}				NS	NS	NS	NS	.

^afry color scored as 000 = 0.1, 00 = 0.3, 0 = 0.5 so that statistical analysis can be conducted

^bstem end throughout; rated as any variation of color from the main fry extending 1/4" or more into the fry

Sugar End Evaluation - Tappen Series 1900

Sugar Evaluation

Treatment	Rate	Schedule	Notes	11/1/2008		1/28/2009	
				% Glucose	% Sucrose	% Glucose	% Sucrose
1901 Dithane	2.0 lb / a	1,3,5,7,9,11	Application 1 and 4 at 20 gpa using a handsprayer.	0.083	0.103	0.015	0.070
Bravo Zn	2.13 pt / a	2,4,6,8,10					
1902 Headline	9.0 fl oz / a	1,4	Headline application at tuber initiation and early tuber bulking at 60 gpa using a handsprayer.	0.105	0.128	0.090	0.085
Bravo Zn	2.13 pt / a	2,6,8,10					
Dithane	2.0 lb / a	3,5,7,9,11					
1903 Headline	9.0 fl oz / a	1,4	Headline application at tuber initiation and early tuber bulking at 20 gpa using a handsprayer.	0.088	0.128	0.055	0.073
Bravo Zn	2.13 pt / a	2,6,8,10					
Dithane	2.0 lb / a	3,5,7,9,11					
1904 Headline	9.0 fl oz / a	1,4	Headline application at tuber initiation and early tuber bulking at 5 gpa using a handsprayer.	0.120	0.110	0.105	0.060
Bravo Zn	2.13 pt / a	2,6,8,10					
Dithane	2.0 lb / a	3,5,7,9,11					
1905 Headline +	9.0 fl oz / a +	1,4	Headline / Silwet application at tuber initiation and early tuber bulking at 5 gpa using a handsprayer.	0.085	0.110	0.068	0.080
Silwet	0.125% v/v						
Bravo Zn	2.13 pt / a	2,6,8,10					
Dithane	2.0 lb / a	3,5,7,9,11					
1906 Headline	9.0 fl oz / a	1,4	Headline application at tuber initiation and early tuber bulking at 60 gpa using a converted ATV.	0.070	0.125	0.058	0.093
Bravo Zn	2.13 pt / a	2,6,8,10					
Dithane	2.0 lb / a	3,5,7,9,11					
LSD _{P=0.05}				NS	NS	0.0	NS