Sugar End Evaluation (1900 Series)

Location: Inkster, 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 27, 2009
Row width: 36 inches
Seed spacing: 14 inches

Cultivar: Russet Burbank

50% Emergence: June 17

Herbicide: Prowl (2.0 pt/a) + Matrix (1.0 oz/a) + Sencor (0.5 lb/a); June 12

Sencor (0.5 lb/a) + Matrix (1.0 oz/a); June 20

Fertilizer: 57#N, 200#K, 20#S; Broadcast May 14

29#N, 100#P, 1#Zn; at planting

70#N; Sidedress June 10 20#N; Fertigation July 14 20#N; Fertigation July 19 20#N; Fertigation July 24

Insecticide: Belay (12.0 oz/a); in furrow at planting

Baythroid (1.0 oz/a) + Coragen (5.0 oz/a); August 18

Objective: Determine effect of foliar applications of QoI on sugar end

development as a result of water stress.

Fungicide application dates: July 2, 8, 13, 22, 29, August 6, 10, 18, 25,

September 2

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: Regione (2.0 pt/a) + Ad-Wet 90 Plus (1.0 pt/a/100gal);

September 10 and 17

Harvest: October 5

NDSU Fry evaluation: October 30; 25 days after harvest

December 17; 73 days after harvest

January 21, 2010; 108 days after harvest February 20, 2010; 138 days after harvest

Lamb Weston Fry evaluation: November 10; 36 days after harvest

December 3; 59 days after harvest January 19, 2010; 106 days after harvest

February 25, 2010; 106 days after harvest

Sugar evaluation: November 4; 30 days after harvest

January 15; 102 days after harvest

NDSU 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 000 to 4.0, with lower numbers indicating lighter color. A rating of 2.0 or lower is considered acceptable by the industry. In some analyses, 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 addition to analyzing the data using the industry standard, 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 000 was scored as 0.1, 00 as 0.3, and a 0 as 0.5. Average fry color, percent sugar ends, and average sugar end fry color were calculated.

Lamb Weston Fry Protocol: Two groups of ratings were performed by Lamb Weston on each date. For the first group, raw product was fried at 375°F for 3 min., for the second group, raw product was first blanched for 10 min. at 175°F and subsequently fried for 3 min. at 375°F. Sugar ends were rated as a #3 or greater color in at least the stem end 1/3 of the fry.

Sugar End Evaluation 2009 - Inkster Series 1900

Treatr	ment	Rate	Schedule	Notes		F	oliar [Diseas	e (% S	Severi	ty)	
Heati	nent	Nate	Scriedule	Notes	7/7	7/13	7/20	7/27	8/3	8/10	8/17	9/4
1901	Dithane	2.0 lb / a	1,3,5		0.0	0.00	0.00	0.01	0.05	0.04	0.11	1.09
	Manzate	2.0 lb / a	7	60 gpa using a								
	Bravo Zn	2.13 pt / a	2,4,6,8	converted ATV.								
	Gavel	2.0 lb / a	9,10									
1902	Headline	9.0 fl oz / a	1,4			0.00	0.00	0.04	0.04	0.06	0.06	0.99
	Dithane	2.0 lb / a	2	Headline application at tuber initiation and								
	Manzate	2.0 lb / a	6,8	early tuber bulking at								
	Bravo Zn	2.13 pt / a	3,5,7	60 gpa using a converted ATV.								
	Gavel	2.0 lb / a	9,10									
1903	Headline	9.0 fl oz / a	1,4			0.00	0.01	0.02	0.07	0.08	0.09	1.95
	Dithane	2.0 lb / a	2	Headline application at tuber initiation and								
	Manzate	2.0 lb / a	6,8	early tuber bulking at								
	Bravo Zn	2.13 pt / a	3,5,7	60 gpa using a handsprayer.								
	Gavel	2.0 lb / a	9,10	a.rasp.ays								
1904	Headline	9.0 fl oz / a	1,4			0.00	0.00	0.03	0.09	0.15	0.11	1.09
	Dithane	2.0 lb / a	2	Headline application at tuber initiation and								
	Manzate	2.0 lb / a	6,8	early tuber bulking at 5								
	Bravo Zn	2.13 pt / a	3,5,7	gpa using a handsprayer.								
	Gavel	2.0 lb / a	9,10	, i.a.i.aspirayeii								
1905	Headline	6.0 fl oz / a	1,4			0.00	0.00	0.00	0.03	0.06	0.04	0.23
	Dithane	2.0 lb / a	2	Headline application at tuber initiation and								
	Manzate	2.0 lb / a	6,8	early tuber bulking at								
	Bravo Zn	2.13 pt / a	3,5,7	60 gpa using a converted ATV.								
	Gavel	2.0 lb / a	9,10									
1906	Evito	3.8 fl oz / a	1,4		0.0	0.00	0.00	0.01	0.01	0.07	0.09	0.48
	Dithane	2.0 lb / a	2	Evito application at tuber initiation and								
	Manzate	2.0 lb / a	6,8	early tuber bulking at 5								
	Bravo Zn	2.13 pt / a	3,5,7	gpa using a handsprayer.								
	Gavel	2.0 lb / a	9,10									
1907	Evito	3.8 fl oz / a	1,4		0.0	0.01	0.03	0.06	0.03	0.03	0.04	0.56
	Dithane	2.0 lb / a	2	Evito application at tuber initiation and								
	Manzate	2.0 lb / a	6,8	early tuber bulking at								
	Bravo Zn	2.13 pt / a	3,5,7	60 gpa using a converted ATV.								
	Gavel	2.0 lb / a	9,10									

Treatr	mont	Poto	Schedule	Notes	Foliar Disease (% Severity)							
rreau	nent	Rate	Scriedule	Notes	7/7	7/13	7/20	7/27	8/3	8/10	8/17	9/4
1908	Picoxystrobin +	16.0 fl oz / a +	1,4		0.0	0.00	0.00	0.00	0.01	0.01	0.06	0.39
	Induce	0.25% v/v		Picoxystrobin								
	Dithane	2.0 lb / a	2	application at tuber initiation and early								
	Manzate	2.0 lb / a	6,8	tuber bulking at 5 gpa								
	Bravo Zn	2.13 pt / a	3,5,7	using a handsprayer.								
	Gavel	2.0 lb / a	9,10									
1909	Picoxystrobin +	16.0 fl oz / a +	1,4		0.0	0.00	0.00	0.01	0.02	0.03	0.04	1.30
	Induce	0.25% v/v		Picoxystrobin								
	Dithane	2.0 lb / a	2	application at tuber initiation and early								
	Manzate	2.0 lb / a	6,8	tuber bulking at 60								
	Bravo Zn	2.13 pt / a	3,5,7	gpa using a converted ATV.								
	Gavel	2.0 lb / a	9,10									
1910	Quadris	9.0 fl oz / a	1,4		0.0	0.01	0.00	0.06	0.03	0.04	0.10	0.30
	Dithane	2.0 lb / a	2	Quadris application at tuber initiation and								
	Manzate	2.0 lb / a	6,8	early tuber bulking at 5								
	Bravo Zn	2.13 pt / a	3,5,7	gpa using a handsprayer.								
	Gavel	2.0 lb / a	9,10	nanaoprayon								
1911	Quadris	9.0 fl oz / a	1,4		0.0	0.00	0.01	0.02	0.03	0.05	0.03	0.45
	Dithane	2.0 lb / a	2	Quadris application at tuber initiation and								
	Manzate	2.0 lb / a	6,8	early tuber bulking at								
	Bravo Zn	2.13 pt / a	3,5,7	60 gpa using a converted ATV.								
	Gavel	2.0 lb / a	9,10									
1912	Gem	3.8 fl oz / a	1,4		0.0	0.01	0.03	0.06	0.09	0.11	0.09	0.18
	Dithane	2.0 lb / a	2	Gem application at tuber initiation and								
	Manzate	2.0 lb / a	6,8	early tuber bulking at								
	Bravo Zn	2.13 pt / a	3,5,7	60 gpa using a converted ATV.								
	Gavel	2.0 lb / a	9,10									
LSD _P	= 0.05					NS	NS	0.05	NS	NS	NS	0.86

Sugar End Evaluation - Inkster Series 1900 Lamb Fry Analysis

Treatr	mont	Rate	Schedule	Notes	% Sugar Ends				Blanch % Sugar Ends				
i reatr	nent	Rate	Scriedule	notes	11/10	12/3	1/19	2/25	11/10	12/3	1/19	2/25	
1901	Dithane	2.0 lb / a	1,3,5		4.0	2.0	2.0	1.0	0.0	0.0	0.0	0.0	
	Manzate	2.0 lb / a	7	60 gpa using a									
	Bravo Zn	2.13 pt / a	2,4,6,8	converted ATV.									
	Gavel	2.0 lb / a	9,10										
1902	Headline	9.0 fl oz / a	1,4	Headline	1.0	6.0	1.0	3.0	0.0	0.0	1.0	0.0	
	Dithane	2.0 lb / a	2	application at tuber initiation									
	Manzate	2.0 lb / a	6,8	and early tuber									
	Bravo Zn	2.13 pt / a	3,5,7	bulking at 60 gpa using a									
	Gavel	2.0 lb / a	9,10	converted ATV.									
1903	Headline	9.0 fl oz / a	1,4	Headline	0.0	1.0	1.0	3.0	0.0	0.0	1.0	1.0	
	Dithane	2.0 lb / a	2	application at tuber initiation									
	Manzate	2.0 lb / a	6,8	and early tuber									
	Bravo Zn	2.13 pt / a	3,5,7	bulking at 60 gpa using a									
	Gavel	2.0 lb / a	9,10	handsprayer.									
1904	Headline	9.0 fl oz / a	1,4	Headline	4.0	3.0	0.0	3.0	1.0	0.0	0.0	1.0	
	Dithane	2.0 lb / a	2	application at tuber initiation									
	Manzate	2.0 lb / a	6,8	and early tuber									
	Bravo Zn	2.13 pt / a	3,5,7	bulking at 5 gpa using a									
	Gavel	2.0 lb / a	9,10	handsprayer.									
1905	Headline	6.0 fl oz / a	1,4	Headline	4.0	2.0	2.0	2.0	0.0	0.0	0.0	0.0	
	Dithane	2.0 lb / a	2	application at tuber initiation									
	Manzate	2.0 lb / a	6,8	and early tuber									
	Bravo Zn	2.13 pt / a	3,5,7	bulking at 60 gpa using a									
	Gavel	2.0 lb / a	9,10	converted ATV.									
1906	Evito	3.8 fl oz / a	1,4	Evito application	2.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	
	Dithane	2.0 lb / a	2	at tuber initiation									
	Manzate	2.0 lb / a	6,8	and early tuber bulking at 5 gpa									
	Bravo Zn	2.13 pt / a	3,5,7	using a handsprayer.									
	Gavel	2.0 lb / a	9,10	папаэргауст.									

Troots	mant	Data	Cabadula	Notes	%	Suga	r Ends	5	Blanc	h % S	ugar E	nds
Treatr	nent	Rate	Schedule	Notes	11/10	12/3	1/19	2/25	11/10	12/3	1/19	2/25
1907	Evito	3.8 fl oz / a	1,4	Evito application	3.0	5.0	2.0	0.0	0.0	3.0	0.0	0.0
	Dithane	2.0 lb / a	2	at tuber initiation								
	Manzate	2.0 lb / a	6,8	and early tuber bulking at 60								
	Bravo Zn	2.13 pt / a	3,5,7	gpa using a converted ATV.								
	Gavel	2.0 lb / a	9,10	convened / (1 v.								
1908	Picoxystrobin +	16.0 fl oz / a +	1,4		3.0	5.0	1.0	1.0	0.0	1.0	1.0	1.0
	Induce	0.25% v/v		Picoxystrobin application at								
	Dithane	2.0 lb / a	2	tuber initiation and early tuber								
	Manzate	2.0 lb / a	6,8	bulking at 5 gpa								
	Bravo Zn	2.13 pt / a	3,5,7	using a handsprayer.								
	Gavel	2.0 lb / a	9,10									
1909	Picoxystrobin +	16.0 fl oz / a +	1,4		0.0	1.0	1.0	1.0	0.0	1.0	1.0	0.0
	Induce	0.25% v/v		Picoxystrobin application at								
	Dithane	2.0 lb / a	2	tuber initiation and early tuber								
	Manzate	2.0 lb / a	6,8	bulking at 60								
	Bravo Zn	2.13 pt / a	3,5,7	gpa using a converted ATV.								
	Gavel	2.0 lb / a	9,10									
1912	Gem	3.8 fl oz / a	1,4	Gem application	1.0	2.0	0.0	1.0	1.0	0.0	0.0	0.0
	Dithane	2.0 lb / a	2	at tuber initiation								
	Manzate	2.0 lb / a	6,8	and early tuber bulking at 60								
	Bravo Zn	2.13 pt / a	3,5,7	gpa using a converted ATV.								
	Gavel	2.0 lb / a	9,10									
LSD _P	=0.05		NS	NS	NS	NS	NS	NS	NS	NS		

Sugar End Evaluation - Tappen Series 1900 Sugar Evaluation

		_			11/4/	% %	1/15	/2010
Treat	ment	Rate	Schedule	Notes	%			%
1901	Dithane	2.0 lb / a	1,3,5		Glucose 9.5			Sucrose 17.7
1001	Manzate	2.0 lb / a	7	CO and wains	0.0		10.1	.,,,
	Bravo Zn	2.13 pt / a	2,4,6,8	60 gpa using a converted ATV.				
	Gavel	2.10 pt / a	9,10					
1902	Headline	9.0 fl oz / a	1,4	Headline	8.9	18.6	20.6	19.9
1002	Dithane	2.0 lb / a	2	application at	0.0	10.0	20.0	10.0
	Manzate	2.0 lb / a	6,8	tuber initiation and early tuber				
	Bravo Zn	2.0 lb / a 2.13 pt / a	3,5,7	bulking at 60 gpa				
	Gavel	2.13 pt / a 2.0 lb / a	9,10	using a converted ATV.				
1003	Headline	9.0 fl oz / a	1,4	Headline	9.5	10.1	16.1	18.8
1303	Dithane	2.0 lb / a	2	application at	9.0	10.1	10.1	10.0
	Manzate	2.0 lb / a	6,8	tuber initiation and early tuber				
	Bravo Zn	2.0 lb / a 2.13 pt / a	3,5,7	bulking at 60 gpa				
	Gavel	2.13 pt / a 2.0 lb / a	9,10	using a handsprayer.				
1004	Headline	9.0 fl oz / a	1,4	Headline	7.8	18.0	10.4	15.1
1304	Dithane	2.0 lb / a	2	application at	7.0	10.9	10.4	13.1
	Manzate	2.0 lb / a	6,8	tuber initiation and early tuber				
	Bravo Zn	2.0 lb / a 2.13 pt / a	3,5,7	bulking at 5 gpa				
	Gavel	2.13 pt / a 2.0 lb / a	9,10	using a handsprayer.				
1905	Headline	6.0 fl oz / a	1,4	Headline	16.3	18.8	20.4	22.6
1505	Dithane	2.0 lb / a	2	application at	10.5	10.0	20.4	22.0
	Manzate	2.0 lb / a	6,8	tuber initiation and early tuber				
	Bravo Zn	2.0 lb / a 2.13 pt / a	3,5,7	bulking at 60 gpa				
	Gavel	2.10 pt / a	9,10	using a converted ATV.				
1906	Evito	3.8 fl oz / a	1,4		9.4	14.2	12.4	18.3
1000	Dithane	2.0 lb / a	2	Evito application at tuber initiation	0.4	11.2	12.7	10.0
	Manzate	2.0 lb / a	6,8	and early tuber				
	Bravo Zn	2.13 pt / a	3,5,7	bulking at 5 gpa using a				
				handsprayer.				
	Gavel	2.0 lb / a	9,10	папаэргаует:				

			_		11/4/	2009	1/15/2010		
Treat	ment	Rate	Schedule	Notes	%	%	%	%	
1907	Evito	3.8 fl oz / a	1,4		Glucose 8.5	Sucrose 18.4	Glucose 16.3	Sucrose 18.8	
1307	Dithane	2.0 lb / a	2	Evito application at tuber initiation	0.0	10.4	10.5	10.0	
				and early tuber					
	Manzate	2.0 lb / a	6,8	bulking at 60 gpa					
	Bravo Zn	2.13 pt / a	3,5,7	using a converted ATV.					
	Gavel	2.0 lb / a	9,10	AIV.					
1908	Picoxystrobin +	16.0 fl oz / a +	1,4	Picoxystrobin	9.8	16.9	13.6	19.0	
	Induce	0.25% v/v		application at					
	Dithane	2.0 lb / a	2	tuber initiation and early tuber					
	Manzate	2.0 lb / a	6,8	bulking at 5 gpa using a					
	Bravo Zn	2.13 pt / a	3,5,7						
	Gavel	2.0 lb / a	9,10	handsprayer.					
1909	Picoxystrobin +	16.0 fl oz / a +	1,4	Picoxystrobin	9.4	14.5	14.8	19.1	
	Induce	0.25% v/v		application at					
	Dithane	2.0 lb / a	2	tuber initiation					
	Manzate	2.0 lb / a	6,8	and early tuber bulking at 60 gpa					
	Bravo Zn	2.13 pt / a	3,5,7	using a converted					
	Gavel	2.0 lb / a	9,10	ATV.					
1912	Gem	3.8 fl oz / a	1,4	Gem application	7.5	13.8	15.3	20.1	
	Dithane	2.0 lb / a	2	at tuber initiation					
	Manzate	2.0 lb / a	6,8	and early tuber bulking at 60 gpa					
	Bravo Zn	2.13 pt / a	3,5,7	using a converted					
	Gavel 2.0 lb / a 9,10		9,10	ATV.					
LSD _P	=0.05				NS	0.04	NS	NS	

Sugar End Evaluation - Inkster Series 1900 NDSU Fry Analysis

Treatment	Data	Schedule	Notes		% Sugar	Ends	
Treatment	Rate	Schedule	Notes	10/30/09	12/17/09	1/21/10	2/20/10
1901 Dithane	2.0 lb / a	1,3,5		66.7	83.3	66.7	91.7
Manzate	2.0 lb / a	7	60 gpa using a				
Bravo Zn	2.13 pt / a	2,4,6,8	converted ATV.				
Gavel	2.0 lb / a	9,10					
1902 Headline	9.0 fl oz / a	1,4	Headline	16.7	50.0	0.0	100.0
Dithane	2.0 lb / a	2	application at tuber				
Manzate	2.0 lb / a	6,8	initiation and early tuber bulking at 60				
Bravo Zn	2.13 pt / a	3,5,7	gpa using a				
Gavel	2.0 lb / a	a 9,10 converted ATV.					
1903 Headline	903 Headline 9.0 fl oz / a		Headline	0.0	66.7	0.0	66.7
Dithane	2.0 lb / a	2	application at tuber				
Manzate	2.0 lb / a	6,8	initiation and early tuber bulking at 60				
Bravo Zn	2.13 pt / a	3,5,7	gpa using a				
Gavel	2.0 lb / a	9,10	handsprayer.				
1904 Headline	9.0 fl oz / a	1,4	Headline	16.7	16.7	0.0	41.7
Dithane	2.0 lb / a	2	application at tuber				
Manzate	2.0 lb / a	6,8	initiation and early tuber bulking at 5				
Bravo Zn	2.13 pt / a	3,5,7	gpa using a				
Gavel	2.0 lb / a	9,10	handsprayer.				
1905 Headline	6.0 fl oz / a	1,4	Headline	33.3	0.0	0.0	50.0
Dithane	2.0 lb / a	2	application at tuber				
Manzate	2.0 lb / a	6,8	initiation and early tuber bulking at 60				
Bravo Zn	2.13 pt / a	3,5,7	gpa using a				
Gavel	2.0 lb / a	9,10	converted ATV.				
1906 Evito	3.8 fl oz / a	1,4		75.0	0.0	16.7	91.7
Dithane	2.0 lb / a	2	Evito application at tuber initiation and				
Manzate	2.0 lb / a	6,8	early tuber bulking				
Bravo Zn	2.13 pt / a	3,5,7	at 5 gpa using a handsprayer.				
Gavel	2.0 lb / a	9,10					

Treatment	Rate	Schedule	Notes		% Sugar	Ends	
Treatment	Rate	Schedule	notes	10/30/09	12/17/09	1/21/10	2/20/10
1907 Evito	3.8 fl oz / a	1,4		8.3	0.0	0.0	25.0
Dithane	2.0 lb / a	2	Evito application at tuber initiation and				
Manzate	2.0 lb / a	6,8	early tuber bulking				
Bravo Zn	2.13 pt / a	3,5,7	at 60 gpa using a converted ATV.				
Gavel	2.0 lb / a	9,10					
1908 Picoxystrobin +	16.0 fl oz / a +	1,4		16.7	0.0	58.3	50.0
Induce	0.25% v/v		Picoxystrobin application at tuber				
Dithane	2.0 lb / a	2	initiation and early				
Manzate	2.0 lb / a	6,8	tuber bulking at 5 gpa using a				
Bravo Zn	2.13 pt / a	3,5,7	handsprayer.				
Gavel	2.0 lb / a	9,10					
1909 Picoxystrobin +	16.0 fl oz / a +	1,4		0.0	8.3	50.0	66.7
Induce	0.25% v/v		Picoxystrobin application at tuber				
Dithane	2.0 lb / a	2	initiation and early				
Manzate	2.0 lb / a	6,8	tuber bulking at 60 gpa using a				
Bravo Zn	2.13 pt / a	3,5,7	converted ATV.				
Gavel	2.0 lb / a	9,10					
1912 Gem	3.8 fl oz / a	1,4		25.0	0.0	50.0	33.3
Dithane	2.0 lb / a	2	Gem application at tuber initiation and				
Manzate	2.0 lb / a	6,8	early tuber bulking				
Bravo Zn	2.13 pt / a	3,5,7	at 60 gpa using a converted ATV.				
Gavel	2.0 lb / a	9,10					
LSD _{P=0.05}				47.0	30.9	47.3	NS

Percent sugar ends based on fry color great than or equal to 3 in 1/3 of the stem end of the fry or less, as per French fry industry protocal.