

## 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 12, 2010  
**Row width:** 36 inches  
**Seed spacing:** 14 inches  
**Cultivar:** Russet Burbank  
**50% Emergence:** June 6
- Herbicide:** Prowl (2.0 pt/a) + Matrix (1.0 oz/a) + Sencor (0.5 lb/a); June 2
- Fertilizer:** Broadcast: 61#N, 200#K, 30#S; April 27  
Starter: 29#N, 100#P; May 12  
Sidedress: 70#N; June 2  
Fertigation: 20#N; July 7, 16, 29
- Insecticide:** Admire Pro (8.7 oz/a) + Ultra Flourish (12.2 oz/a); in furrow at plant  
Kaiso (2.0 oz/a); August 6
- Objective:** Determine effect of foliar applications of QoI on sugar end development as a result of water stress.
- Fungicide application dates:** June 23, 29, July 7, 16, 20, 28, August 3, 11, 18, 25, September 1
- Fungicide application method:** Fungicide applications 1 and 3 were performed using a hand held CO<sub>2</sub> sprayer as indicated by the protocol. All other fungicides were applied using a converted ATV (55 psi; 61 gpa; 11005XR nozzles).
- Fungicide overspray dates:**
- |             |  |
|-------------|--|
| July 16     | Revus (8.0 oz/a)                         |
| July 21     | Revus (8.0 oz/a)                         |
| July 28     | Presidio (4.0 oz/a)                      |
| August 3    | Presidio (4.0 oz/a)                      |
| August 11   | Revus (8.0 oz/a) + Curzate (3.2 oz/a)    |
| August 18   | Presidio (4.0 oz/a) + Curzate (3.2 oz/a) |
| August 25   | Revus (8.0 oz/a) + Curzate (3.2 oz/a)    |
| September 1 | Presidio (4.0 oz/a)                      |
| September 8 | Gavel (2.0 lb/a)                         |
- Vinekill:** Reglone (2.0 pt/a) + Ad-Wet 90 Plus (1.0 pt/100 gal); September 14  
Rotobeat; September 29

**Harvest:** October 12

**NDSU fry evaluation:** November 15; 34 days after harvest  
December 9; 58 days after harvest  
January 18; 98 days after harvest  
February 24; 135 days after harvest

**Lamb Weston fry evaluation:** November 17; 36 days after harvest  
December 14; 63 days after harvest  
January 18; 119 days after harvest

**Sugar evaluation:** December 3; 52 days after harvest  
January 20; 100 days after harvest

**NDSU Fry Protocol:** Three tubers (170-227 g each) were cut into fries (1 cm<sup>2</sup>, 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 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. Mottling and vascular discoloration also were noted if present.

Sugar end analyses were performed in two ways. Common industry practice is to grade any stem end with a color score 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. Therefore, this definition of sugar end is more stringent, and will result in higher levels of sugar ends, than that used in the processing industry.

**Lamb Weston Fry Protocol:** Two sets of ratings were performed by Lamb Weston on each date. For the first set, raw product was fried at 375°F for 3 min., for the second set, raw product first was blanched for 10 min. at 175°F and subsequently fried for 3 min. at 375°F. In both sets, sugar ends were scored if a color of #3 or greater was observed in at least 1/3 of the stem end of the final fry product.

## 2010 Sugar End Evaluation - Inkster Series 1900

Treatment	Rate	Schedule	Notes	Foliar Disease (% Severity)												AUDPC	RAUDPC	Total Yield (cwt/a)
				6/23	6/30	7/7	7/13	7/20	7/28	8/2	8/9	8/16	8/23	9/1	9/7			
1901 Manzate	2.0 lb / a	1,3,5,7,9,11	60 GPA ATV	0.0	0.04	0.18	0.33	0.45	0.39	0.54	0.61	1.21	2.2	4.3	17.4	127.2	0.018	574.4
Bravo Zn	2.125 pt / a	2,4,6,8,10		0.0	0.01	0.24	0.19	0.23	0.18	0.17	0.12	0.14	0.1	0.4	1.2			
1902 Luna Tranquility	11.0 fl oz / a	1,3	60 GPA ATV	0.0	0.01	0.24	0.19	0.23	0.18	0.17	0.12	0.14	0.1	0.4	1.2	15.8	0.002	592.6
Echo Zn	2.125 pt / a	2,5-8,10,11																
Scala +	7.0 fl oz / a +	4,9																
Dithane	1.5 lb / a																	
1903 Scala	7.0 fl oz / a	1,3	60 GPA ATV	0.0	0.02	0.23	0.26	0.26	0.15	0.12	0.24	0.10	0.2	0.2	1.0	15.5	0.002	573.9
Echo Zn	2.125 pt / a	2,5-8,10,11																
Luna Tranquility +	11.0 fl oz / a +	4,9																
Dithane	1.5 lb / a																	
1904 GEM	2.9 fl oz / a	1,3	60 GPA ATV	0.0	0.02	0.18	0.21	0.23	0.16	0.39	0.45	0.77	0.8	1.2	9.3	59.0	0.009	567.2
Echo Zn	2.125 pt / a	2,5-8,10,11																
Scala +	7.0 fl oz / a +	4,9																
Dithane	1.5 lb / a																	
1905 GEM	3.8 fl oz / a	1,3	60 GPA ATV	0.0	0.04	0.24	0.26	0.31	0.21	0.43	0.51	0.61	1.2	3.3	8.9	77.9	0.011	582.8
Echo Zn	2.125 pt / a	2,5-8,10,11																
Scala +	7.0 fl oz / a +	4,9																
Dithane	1.5 lb / a																	
1906 GEM	3.8 fl oz / a	1,3	5 GPA Hand	0.0	0.03	0.18	0.18	0.47	0.38	0.37	0.30	0.46	1.2	4.3	14.9	102.3	0.015	578.0
Echo Zn	2.125 pt / a	2,5-8,10,11																
Scala +	7.0 fl oz / a +	4,9																
Dithane	1.5 lb / a																	
1907 Picoxystrobin +	16.0 fl oz / a +	1,3	60 GPA ATV	0.0	0.01	0.19	0.23	0.47	0.39	1.10	1.02	1.98	4.8	5.6	18.6	172.8	0.025	583.1
Induce	0.25% v/v																	
Manzate	2.0 lb / a	5,7,9,11																
Bravo Zn	2.125 pt / a	2,4,6,8,10																

Treatment	Rate	Schedule	Notes	Foliar Disease (% Severity)												AUDPC	RAUDPC	Total Yield (cwt/a)
				6/23	6/30	7/7	7/13	7/20	7/28	8/2	8/9	8/16	8/23	9/1	9/7			
1908 Picoxystrobin + Induce Manzate Bravo Zn	16.0 fl oz / a + 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3  5,7,9,11 2,4,6,8,10	5 GPA Hand	0.0	0.00	0.14	0.24	0.28	0.31	0.51	0.43	0.46	1.8	2.2	17.1	98.0	0.014	584.6
1909 Headline + Activator 90 Manzate Bravo Zn	9.0 fl oz / a 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3  5,7,9,11 2,4,6,8,10	60 GPA ATV	0.0	0.03	0.10	0.28	0.43	0.28	0.25	0.34	1.45	2.9	4.5	15.1	123.8	0.018	579.7
1910 Headline + Activator 90 Manzate Bravo Zn	9.0 fl oz / a 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3  5,7,9,11 2,4,6,8,10	5 GPA Hand	0.0	0.01	0.10	0.26	0.80	0.69	1.23	1.36	1.97	4.4	9.4	21.8	214.7	0.031	588.2
1911 Quadris Manzate Bravo Zn	9.0 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.0	0.03	0.16	0.23	0.24	0.18	0.16	0.26	1.72	2.2	2.6	18.2	112.1	0.016	573.9
1912 Quadris Manzate Bravo Zn	9.0 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.0	0.01	0.28	0.12	0.41	0.49	0.76	0.75	1.78	2.1	4.0	14.1	119.9	0.017	592.1
1913 Evito Manzate Bravo Zn	3.8 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.0	0.03	0.19	0.26	0.33	0.25	0.29	0.91	1.31	2.0	6.9	27.2	173.4	0.025	561.5
1914 Evito Manzate Bravo Zn	3.8 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.0	0.01	0.12	0.34	0.44	0.33	0.64	0.49	2.23	3.6	5.6	19.8	161.9	0.023	579.4
LSD <sub>P = 0.05</sub>				.	NS	NS	NS	0.27	0.21	0.51	0.66	NS	2.0	3.4	8.9	113.8	0.017	NS

## 2010 Sugar End Evaluation - Inkster Series 1900 NDSU Fry Analysis (11-15-10)

Treatment	Rate	Schedule	Notes	Fry Color <sup>a</sup>	Sugar End Color <sup>b</sup>	% Sugar Ends <sup>c</sup>	% Sugar Ends (#3) <sup>d</sup>	% Mottled Fries	% Fries with Dark Vascular Discoloration
1901 Manzate Bravo Zn	2.0 lb / a 2.125 pt / a	1,3,5,7,9,11 2,4,6,8,10	60 GPA ATV	0.5	0.6	25.0	0.0	25.0	0.0
1902 Luna Tranquility Echo Zn Scala + Dithane	11.0 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.1	0.1	0.0	0.0	0.0	0.0
1903 Scala Echo Zn Luna Tranquility + Dithane	7.0 fl oz / a 2.125 pt / a 11.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.2	0.2	0.0	0.0	0.0	0.0
1904 GEM Echo Zn Scala + Dithane	2.9 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.1	0.1	0.0	0.0	0.0	0.0
1905 GEM Echo Zn Scala + Dithane	3.8 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.4	0.4	0.0	0.0	16.5	0.0
1906 GEM Echo Zn Scala + Dithane	3.8 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	5 GPA Hand	0.3	0.4	17.5	0.0	8.3	0.0
1907 Picoxystrobin + Induce Manzate Bravo Zn	16.0 fl oz / a + 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.2	0.3	8.3	0.0	0.0	0.0

Treatment	Rate	Schedule	Notes	Fry Color <sup>a</sup>	Sugar End Color <sup>b</sup>	% Sugar Ends <sup>c</sup>	% Sugar Ends (#3) <sup>d</sup>	% Mottled Fries	% Fries with Dark Vascular Discoloration
1908 Picoxystrobin + Induce Manzate Bravo Zn	16.0 fl oz / a + 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.3	0.4	16.8	0.0	0.0	0.0
1909 Headline + Activator 90 Manzate Bravo Zn	9.0 fl oz / a 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.2	0.2	0.0	0.0	0.0	0.0
1910 Headline + Activator 90 Manzate Bravo Zn	9.0 fl oz / a 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.3	0.4	24.8	0.0	0.0	0.0
1911 Quadris Manzate Bravo Zn	9.0 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.1	0.1	0.0	0.0	0.0	0.0
1912 Quadris Manzate Bravo Zn	9.0 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.2	0.2	8.3	0.0	0.0	0.0
1913 Evito Manzate Bravo Zn	3.8 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.3	0.5	41.8	0.0	0.0	0.0
1914 Evito Manzate Bravo Zn	3.8 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.2	0.4	24.8	0.0	0.0	0.0
LSD <sub>P = 0.05</sub>				0.2	0.3	NS	.	NS	.

<sup>a</sup>Fry color scores: 0.1 corresponds to 000, 0.3 corresponds to 00, 0.5 corresponds to 0, 1.0 equals 1.0 and subsequent numbers follow rating scale for scale of 000 to 4.0.

<sup>b</sup>Fry color score for the stem end of the tuber. Any stem end darker than the main fry is considered a sugar end, the worst case scenario.

<sup>c</sup>Percent sugar end was defined as any stem end which varied by one or more scale unit darker from the main body of the fry.

<sup>d</sup>Percent sugar end based on fry color greater than or equal to a score of 3 in less than or equal to 1/3 of the length of the stem end of the fry, as per French fry industry protocol.

## 2010 Sugar End Evaluation - Inkster Series 1900 NDSU Fry Analysis (12-9-10)

Treatment	Rate	Schedule	Notes	Fry Color <sup>a</sup>	Sugar End Color <sup>b</sup>	% Sugar Ends <sup>c</sup>	% Sugar Ends (#3) <sup>d</sup>	% Mottled Fries	% Fries with Dark Vascular Discoloration
1901 Manzate Bravo Zn	2.0 lb / a 2.125 pt / a	1,3,5,7,9,11 2,4,6,8,10	60 GPA ATV	0.48	1.47	66.5	0.0	0.0	0.0
1902 Luna Tranquility Echo Zn Scala + Dithane	11.0 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.30	0.78	50.0	0.0	0.0	0.0
1903 Scala Echo Zn Luna Tranquility + Dithane	7.0 fl oz / a 2.125 pt / a 11.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.20	0.26	8.3	0.0	0.0	0.0
1904 GEM Echo Zn Scala + Dithane	2.9 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.15	0.15	0.0	0.0	0.0	0.0
1905 GEM Echo Zn Scala + Dithane	3.8 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.15	0.21	8.3	0.0	0.0	0.0
1906 GEM Echo Zn Scala + Dithane	3.8 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	5 GPA Hand	0.10	0.10	0.0	0.0	0.0	0.0
1907 Picoxystrobin + Induce Manzate Bravo Zn	16.0 fl oz / a + 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.15	0.15	0.0	0.0	0.0	0.0

Treatment	Rate	Schedule	Notes	Fry Color <sup>a</sup>	Sugar End Color <sup>b</sup>	% Sugar Ends <sup>c</sup>	% Sugar Ends (#3) <sup>d</sup>	% Mottled Fries	% Fries with Dark Vascular Discoloration
1908 Picoxystrobin + Induce Manzate Bravo Zn	16.0 fl oz / a + 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.10	0.10	0.0	0.0	0.0	0.0
1909 Headline + Activator 90 Manzate Bravo Zn	9.0 fl oz / a 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.10	0.10	0.0	0.0	0.0	0.0
1910 Headline + Activator 90 Manzate Bravo Zn	9.0 fl oz / a 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.10	0.10	0.0	0.0	0.0	0.0
1911 Quadris Manzate Bravo Zn	9.0 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.15	0.21	8.3	0.0	0.0	0.0
1912 Quadris Manzate Bravo Zn	9.0 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.15	0.28	16.5	0.0	0.0	0.0
1913 Evito Manzate Bravo Zn	3.8 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.10	0.10	0.0	0.0	0.0	0.0
1914 Evito Manzate Bravo Zn	3.8 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.25	0.42	24.8	0.0	0.0	0.0
LSD <sub>P = 0.05</sub>				0.17	0.56	30.9	.	.	.

<sup>a</sup>Fry color scores: 0.1 corresponds to 000, 0.3 corresponds to 00, 0.5 corresponds to 0, 1.0 equals 1.0 and subsequent numbers follow rating scale for scale of 000 to 4.0.

<sup>b</sup>Fry color score for the stem end of the tuber. Any stem end darker than the main fry is considered a sugar end, the worst case scenario.

<sup>c</sup>Percent sugar end was defined as any stem end which varied by one or more scale unit darker from the main body of the fry.

<sup>d</sup>Percent sugar end based on fry color greater than or equal to a score of 3 in less than or equal to 1/3 of the length of the stem end of the fry, as per French fry industry protocol.



## 2010 Sugar End Evaluation - Inkster Series 1900 NDSU Fry Analysis (1/18/11)

Treatment	Rate	Schedule	Notes	Fry Color <sup>a</sup>	Sugar End Color <sup>b</sup>	% Sugar Ends <sup>c</sup>	% Sugar Ends (#3) <sup>d</sup>	% Mottled Fries	% Fries with Dark Vascular Discoloration
1901 Manzate Bravo Zn	2.0 lb / a 2.125 pt / a	1,3,5,7,9,11 2,4,6,8,10	60 GPA ATV	0.40	1.63	100.0	0.0	0.0	0.0
1902 Luna Tranquility Echo Zn Scala + Dithane	11.0 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.30	0.30	0.0	0.0	0.0	0.0
1903 Scala Echo Zn Luna Tranquility + Dithane	7.0 fl oz / a 2.125 pt / a 11.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.30	0.30	0.0	0.0	0.0	0.0
1904 GEM Echo Zn Scala + Dithane	2.9 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.30	0.30	0.0	0.0	0.0	0.0
1905 GEM Echo Zn Scala + Dithane	3.8 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.10	0.10	0.0	0.0	0.0	0.0
1906 GEM Echo Zn Scala + Dithane	3.8 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	5 GPA Hand	0.10	0.10	0.0	0.0	0.0	0.0
1907 Picoxystrobin + Induce Manzate Bravo Zn	16.0 fl oz / a + 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.10	0.10	0.0	0.0	0.0	0.0

Treatment	Rate	Schedule	Notes	Fry Color <sup>a</sup>	Sugar End Color <sup>b</sup>	% Sugar Ends <sup>c</sup>	% Sugar Ends (#3) <sup>d</sup>	% Mottled Fries	% Fries with Dark Vascular Discoloration
1908 Picoxystrobin + Induce Manzate Bravo Zn	16.0 fl oz / a + 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.10	0.10	0.0	0.0	0.0	0.0
1909 Headline + Activator 90 Manzate Bravo Zn	9.0 fl oz / a 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.10	0.10	0.0	0.0	0.0	0.0
1910 Headline + Activator 90 Manzate Bravo Zn	9.0 fl oz / a 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.10	0.10	0.0	0.0	0.0	0.0
1911 Quadris Manzate Bravo Zn	9.0 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.10	0.10	0.0	0.0	0.0	0.0
1912 Quadris Manzate Bravo Zn	9.0 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.10	0.10	0.0	0.0	0.0	0.0
1913 Evito Manzate Bravo Zn	3.8 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.10	0.10	0.0	0.0	0.0	0.0
1914 Evito Manzate Bravo Zn	3.8 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.10	0.10	0.0	0.0	0.0	0.0
LSD <sub>P = 0.05</sub>				0.04	0.18	0.0	.	.	.

<sup>a</sup>Fry color scores: 0.1 corresponds to 000, 0.3 corresponds to 00, 0.5 corresponds to 0, 1.0 equals 1.0 and subsequent numbers follow rating scale for scale of 000 to 4.0.

<sup>b</sup>Fry color score for the stem end of the tuber. Any stem end darker than the main fry is considered a sugar end, the worst case scenario.

<sup>c</sup>Percent sugar end was defined as any stem end which varied by one or more scale unit darker from the main body of the fry.

<sup>d</sup>Percent sugar end based on fry color greater than or equal to a score of 3 in less than or equal to 1/3 of the length of the stem end of the fry, as per French fry industry protocol.

## 2010 Sugar End Evaluation - Inkster Series 1900 NDSU Fry Analysis (2/24/11)

Treatment	Rate	Schedule	Notes	Fry Color <sup>a</sup>	Sugar End Color <sup>b</sup>	% Sugar Ends <sup>c</sup>	% Sugar Ends (#3) <sup>d</sup>	% Mottled Fries	% Fries with Dark Vascular Discoloration
1901 Manzate Bravo Zn	2.0 lb / a 2.125 pt / a	1,3,5,7,9,11 2,4,6,8,10	60 GPA ATV	1.00	3.63	100.0	0.0	0.0	0.0
1902 Luna Tranquility Echo Zn Scala + Dithane	11.0 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.40	2.13	100.0	0.0	0.0	0.0
1903 Scala Echo Zn Luna Tranquility + Dithane	7.0 fl oz / a 2.125 pt / a 11.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.30	0.42	16.5	0.0	0.0	0.0
1904 GEM Echo Zn Scala + Dithane	2.9 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.30	0.30	0.0	0.0	0.0	0.0
1905 GEM Echo Zn Scala + Dithane	3.8 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.30	0.30	0.0	0.0	0.0	0.0
1906 GEM Echo Zn Scala + Dithane	3.8 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	5 GPA Hand	0.30	0.30	0.0	0.0	0.0	0.0
1907 Picoxystrobin + Induce Manzate Bravo Zn	16.0 fl oz / a + 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.30	0.30	0.0	0.0	0.0	0.0

Treatment	Rate	Schedule	Notes	Fry Color <sup>a</sup>	Sugar End Color <sup>b</sup>	% Sugar Ends <sup>c</sup>	% Sugar Ends (#3) <sup>d</sup>	% Mottled Fries	% Fries with Dark Vascular Discoloration
1908 Picoxystrobin + Induce Manzate Bravo Zn	16.0 fl oz / a + 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.30	0.30	0.0	0.0	0.0	0.0
1909 Headline + Activator 90 Manzate Bravo Zn	9.0 fl oz / a 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.30	0.30	0.0	0.0	0.0	0.0
1910 Headline + Activator 90 Manzate Bravo Zn	9.0 fl oz / a 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.30	0.30	0.0	0.0	0.0	0.0
1911 Quadris Manzate Bravo Zn	9.0 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.30	0.30	0.0	0.0	0.0	0.0
1912 Quadris Manzate Bravo Zn	9.0 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.30	0.30	0.0	0.0	0.0	0.0
1913 Evito Manzate Bravo Zn	3.8 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.30	0.30	0.0	0.0	0.0	0.0
1914 Evito Manzate Bravo Zn	3.8 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.30	0.36	8.3	0.0	0.0	0.0
LSD <sub>P = 0.05</sub>				0.04	0.51	9.4	.	.	.

<sup>a</sup>Fry color scores: 0.1 corresponds to 000, 0.3 corresponds to 00, 0.5 corresponds to 0, 1.0 equals 1.0 and subsequent numbers follow rating scale for scale of 000 to 4.0.

<sup>b</sup>Fry color score for the stem end of the tuber. Any stem end darker than the main fry is considered a sugar end, the worst case scenario.

<sup>c</sup>Percent sugar end was defined as any stem end which varied by one or more scale unit darker from the main body of the fry.

<sup>d</sup>Percent sugar end based on fry color greater than or equal to a score of 3 in less than or equal to 1/3 of the length of the stem end of the fry, as per French fry industry protocol.

2010 Sugar End Evaluation - Inkster Series 1900  
Lamb Weston Fry Analysis (11-17-10)

Treatment	Rate	Schedule	Notes	Raw Fry				Blanch Fry		
				Color Score	% 0 & 1	% Sugar Ends	Total Color	Color Score	% Sugar Ends	Total Color
1901 Manzate Bravo Zn	2.0 lb / a 2.125 pt / a	1,3,5,7,9,11 2,4,6,8,10	60 GPA ATV	0.11	100.0	3.0	0.16	0.00	3.0	0.03
1902 Luna Tranquility Echo Zn Scala + Dithane	11.0 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.09	100.0	5.0	0.14	0.00	6.0	0.07
1903 Scala Echo Zn Luna Tranquility + Dithane	7.0 fl oz / a 2.125 pt / a 11.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.04	100.0	3.0	0.08	0.00	3.0	0.04
1904 GEM Echo Zn Scala + Dithane	2.9 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.07	100.0	4.0	0.13	0.00	3.0	0.04
1905 GEM Echo Zn Scala + Dithane	3.8 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.10	100.0	3.0	0.13	0.02	2.0	0.04
1906 GEM Echo Zn Scala + Dithane	3.8 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	5 GPA Hand	0.06	100.0	2.0	0.08	0.00	1.0	0.01
1907 Picoxystrobin + Induce Manzate Bravo Zn	16.0 fl oz / a + 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.03	100.0	2.0	0.06	0.00	3.0	0.05

Treatment	Rate	Schedule	Notes	Raw Fry				Blanch Fry		
				Color Score	% 0 & 1	% Sugar Ends	Total Color	Color Score	% Sugar Ends	Total Color
1908 Picoxystrobin + Induce Manzate Bravo Zn	16.0 fl oz / a + 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.02	100.0	3.0	0.06	0.00	1.0	0.01
1909 Headline + Activator 90 Manzate Bravo Zn	9.0 fl oz / a 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.00	100.0	1.0	0.01	0.00	2.0	0.02
1910 Headline + Activator 90 Manzate Bravo Zn	9.0 fl oz / a 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.08	100.0	4.0	0.15	0.00	3.0	0.04
1911 Quadris Manzate Bravo Zn	9.0 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.02	100.0	1.0	0.04	0.00	2.0	0.02
1912 Quadris Manzate Bravo Zn	9.0 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.01	100.0	2.0	0.04	0.00	3.0	0.04
1913 Evito Manzate Bravo Zn	3.8 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.01	100.0	2.0	0.03	0.00	2.0	0.02
1914 Evito Manzate Bravo Zn	3.8 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.04	100.0	4.0	0.08	0.00	5.0	0.05
LSD <sub>P = 0.05</sub>				NS	.	NS	NS	NS	NS	NS

**2010 Sugar End Evaluation - Inkster Series 1900  
Lamb Weston Fry Analysis (12-14-10)**

Treatment	Rate	Schedule	Notes	Raw Fry				Blanch Fry		
				Color Score	% 0 & 1	% Sugar Ends	Total Color	Color Score	% Sugar Ends	Total Color
1901 Manzate Bravo Zn	2.0 lb / a 2.125 pt / a	1,3,5,7,9,11 2,4,6,8,10	60 GPA ATV	0.14	99.0	2.0	0.20	0.00	5.0	0.07
1902 Luna Tranquility Echo Zn Scala + Dithane	11.0 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.11	100.0	1.0	0.14	0.00	1.0	0.01
1903 Scala Echo Zn Luna Tranquility + Dithane	7.0 fl oz / a 2.125 pt / a 11.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.20	98.0	0.0	0.20	0.03	2.0	0.06
1904 GEM Echo Zn Scala + Dithane	2.9 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.08	100.0	3.0	0.15	0.00	1.0	0.01
1905 GEM Echo Zn Scala + Dithane	3.8 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.14	100.0	1.0	0.15	0.00	1.0	0.01
1906 GEM Echo Zn Scala + Dithane	3.8 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	5 GPA Hand	0.12	100.0	2.0	0.16	0.00	0.0	0.00
1907 Picoxystrobin + Induce Manzate Bravo Zn	16.0 fl oz / a + 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.12	100.0	1.0	0.15	0.00	6.0	0.09

Treatment	Rate	Schedule	Notes	Raw Fry				Blanch Fry		
				Color Score	% 0 & 1	% Sugar Ends	Total Color	Color Score	% Sugar Ends	Total Color
1908 Picoxystrobin + Induce Manzate Bravo Zn	16.0 fl oz / a + 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.12	100.0	0.0	0.12	0.00	0.0	0.00
1909 Headline + Activator 90 Manzate Bravo Zn	9.0 fl oz / a 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.16	99.0	0.0	0.16	0.01	1.0	0.03
1910 Headline + Activator 90 Manzate Bravo Zn	9.0 fl oz / a 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.10	99.0	3.0	0.17	0.00	4.0	0.05
1911 Quadris Manzate Bravo Zn	9.0 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.18	99.0	0.0	0.18	0.00	4.0	0.04
1912 Quadris Manzate Bravo Zn	9.0 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.29	99.0	3.0	0.36	0.00	9.0	0.16
1913 Evito Manzate Bravo Zn	3.8 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.10	100.0	1.0	0.11	0.00	5.0	0.06
1914 Evito Manzate Bravo Zn	3.8 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.11	100.0	1.0	0.12	0.00	4.0	0.05
LSD <sub>P = 0.05</sub>				NS	NS	NS	NS	NS	NS	NS



2010 Sugar End Evaluation - Inkster Series 1900  
Lamb Weston Fry Analysis (1-28-11)

Treatment	Rate	Schedule	Notes	Raw Fry				Blanch Fry		
				Color Score	% 0 & 1	% Sugar Ends	Total Color	Color Score	% Sugar Ends	Total Color
1901 Manzate Bravo Zn	2.0 lb / a 2.125 pt / a	1,3,5,7,9,11 2,4,6,8,10	60 GPA ATV	0.02	100.0	2.0	0.06	0.00	5.0	0.11
1902 Luna Tranquility Echo Zn Scala + Dithane	11.0 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.04	99.0	1.0	0.06	0.00	11.0	0.13
1903 Scala Echo Zn Luna Tranquility + Dithane	7.0 fl oz / a 2.125 pt / a 11.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.01	100.0	4.0	0.10	0.00	1.0	0.01
1904 GEM Echo Zn Scala + Dithane	2.9 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.04	100.0	2.0	0.08	0.00	5.0	0.07
1905 GEM Echo Zn Scala + Dithane	3.8 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.05	100.0	1.0	0.07	0.00	4.0	0.04
1906 GEM Echo Zn Scala + Dithane	3.8 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	5 GPA Hand	0.12	100.0	5.0	0.20	0.01	7.0	0.11
1907 Picoxystrobin + Induce Manzate Bravo Zn	16.0 fl oz / a + 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.05	100.0	2.0	0.08	0.00	9.0	0.11

Treatment	Rate	Schedule	Notes	Raw Fry				Blanch Fry		
				Color Score	% 0 & 1	% Sugar Ends	Total Color	Color Score	% Sugar Ends	Total Color
1908 Picoxystrobin + Induce Manzate Bravo Zn	16.0 fl oz / a + 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.00	100.0	2.0	0.02	0.00	6.0	0.06
1909 Headline + Activator 90 Manzate Bravo Zn	9.0 fl oz / a 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.03	100.0	1.0	0.04	0.00	8.0	0.11
1910 Headline + Activator 90 Manzate Bravo Zn	9.0 fl oz / a 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.11	99.0	2.0	0.15	0.00	6.0	0.11
1911 Quadris Manzate Bravo Zn	9.0 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.07	100.0	1.0	0.09	0.00	3.0	0.04
1912 Quadris Manzate Bravo Zn	9.0 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.07	100.0	4.0	0.11	0.00	7.0	0.12
1913 Evito Manzate Bravo Zn	3.8 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.07	100.0	1.0	0.09	0.00	6.0	0.07
1914 Evito Manzate Bravo Zn	3.8 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.03	100.0	1.0	0.04	0.00	2.0	0.02
LSD <sub>P = 0.05</sub>				NS	NS	NS	NS	NS	NS	NS

## 2010 Sugar End Evaluation - Inkster Series 1900 Sugar Evaluation

Treatment	Rate	Schedule	Notes	12/3/2010		1/20/2011	
				% Glucose	% Sucrose	% Glucose	% Sucrose
1901 Manzate Bravo Zn	2.0 lb / a 2.125 pt / a	1,3,5,7,9,11 2,4,6,8,10	60 GPA ATV	0.19	0.08	0.20	0.09
1902 Luna Tranquility Echo Zn Scala + Dithane	11.0 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.18	0.07	0.16	0.08
1903 Scala Echo Zn Luna Tranquility + Dithane	7.0 fl oz / a 2.125 pt / a 11.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.24	0.09	0.21	0.09
1904 GEM Echo Zn Scala + Dithane	2.9 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.15	0.07	0.22	0.09
1905 GEM Echo Zn Scala + Dithane	3.8 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	60 GPA ATV	0.16	0.04	0.18	0.09
1906 GEM Echo Zn Scala + Dithane	3.8 fl oz / a 2.125 pt / a 7.0 fl oz / a + 1.5 lb / a	1,3 2,5-8,10,11 4,9	5 GPA Hand	0.19	0.09	0.20	0.09
1907 Picoxystrobin + Induce Manzate Bravo Zn	16.0 fl oz / a + 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3  5,7,9,11 2,4,6,8,10	60 GPA ATV	0.17	0.10	0.23	0.09

Treatment	Rate	Schedule	Notes	12/3/2010		1/20/2011	
				% Glucose	% Sucrose	% Glucose	% Sucrose
1908 Picoxystrobin + Induce Manzate Bravo Zn	16.0 fl oz / a + 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.16	0.07	0.16	0.08
1909 Headline + Activator 90 Manzate Bravo Zn	9.0 fl oz / a 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.13	0.08	0.18	0.08
1910 Headline + Activator 90 Manzate Bravo Zn	9.0 fl oz / a 0.25% v/v 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.19	0.08	0.16	0.07
1911 Quadris Manzate Bravo Zn	9.0 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.18	0.09	0.21	0.08
1912 Quadris Manzate Bravo Zn	9.0 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.15	0.07	0.22	0.07
1913 Evito Manzate Bravo Zn	3.8 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	60 GPA ATV	0.19	0.08	0.23	0.07
1914 Evito Manzate Bravo Zn	3.8 fl oz / a 2.0 lb / a 2.125 pt / a	1,3 5,7,9,11 2,4,6,8,10	5 GPA Hand	0.18	0.09	0.21	0.08
LSD <sub>P</sub> = 0.05				NS	NS	NS	NS