USPB / SFA
OUT-OF-STORAGE CHIP QUALITY
2009-2010 MICHIGAN REGIONAL REPORT

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Procedure:

The 2009 USPB / SFA Chip Trial was harvested on September 30, 2009 at Sandyland Farms LLC, Howard City, MI. The crop experienced 2660 GDD, Base 40 from planting to vine kill. At harvest, several chip storage samples were collected from each variety. Two, 40 pound samples were collected from each entry and placed in the cooperating grower's commercial storage for evaluation in January 2010 and March of 2010 at Herr Foods, Nottingham, PA. The 40 pound tuber samples placed in the grower's commercial storage were removed from storage in mid January 2010 with a pile temperature of 54 ºF and in mid March 2010 with a pile temperature of 55 ºF. For sprout control, CIPC was applied in the storage in November 2009.

Twenty-four, 30 tuber samples were also collected from each trial entry at harvest and stored in two bulk storages at the Michigan Potato Industry Commission's (MPIC), Cargill Potato Demonstration Storage Facility. One set of twelve samples were stored at approximately 54ºF for monthly evaluation from October 2009 through May 2010. The remaining twelve, 30 tuber samples were stored at approximately 50ºF and evaluated from October 2009 to June 2010. These samples from the MPIC storage were processed at Techmark, Inc. for a glucose value (a percent by fresh weight), a sucrose rating (a percent by fresh weight), an SFA color score and an undesirable chip color score. The undesirable chip color score was reported as a percentage, by weight, of the total chips that were evaluated. For sprout control, CIPC was applied in the MPIC storages in November 2010.

Results:

Tables 1 and 2 summarize the chip quality of the 40 pound samples after being processed at Herr Foods, Inc. on January 13th, 2010 and March 17th, 2010. The varieties are listed in yield order, high to low, top to bottom, based on the 2009 field trial data. As seen in Table 1, NY138 and NY139 exhibited the least amount of chip defects. NY138 had the best SFA chip score, but suffered from a below average specific gravity. Overall, NY139 was the top performing variety in the January 13th fry test.

From Table 2, NY139 was the best overall performer in the March 17th fry test, with an SFA color score of 2, 21.5 percent chip defect and a 1.076 specific gravity.

Figures 1-48 summarize the 30 tuber chip quality samples collected at harvest from each entry and stored at the MPIC Demonstration Storage in the fall of 2009 at two temperatures. Two graphs are provided for each line at each temperature for a total of four graphs per line. The first graph in each temperature is the sugar concentration and average pile temperature curve, showing the relationship of the bin temperature on physiological age and chip quality of the variety. The second graph shows the change in SFA chip color and sugar related color defects over time in storage at the given temperature regime. The set of tubers stored at the 54 ºF temperature showed much higher levels of glucose and sucrose than expected, resulting in poor chip quality. Typically, we would expect the warmer tuber samples to fry much cleaner early in the season then run out more quickly before the end of the storage season. This group of tubers stored at the warmer storage temperature did not fry well in this study. In contrast, the colder storage (50 ºF) samples performed very well. It is possible that poor fresh air movement and higher levels of CO_2 contributed to the poor chip quality observed in the samples stored at 54 ºF. The comments about the varieties below are in yield order, high to low, top to bottom.

Atlantic: Atlantic provided a reference point for the other varieties in the trial. Typically, this variety is one of the poorest performing varieties from storage (Tables1-2) (Figures 1-4).

Snowden: Snowden stored acceptably until mid-March 2010 at 50 ºF (Figure 5-6). From Figure 5, the chip quality in this variety was best from early January 2009 until early March 2010. Snowden had an average to above average chip quality performance at Herr Foods on both processing dates for the trial (Tables 1-2).

AF2291-10: AF2291-10 had an average chip quality performance at Herr Foods on both processing dates (Tables 1-2). Glucose levels were the lowest at 50 ºF between harvest and early January 2010 (Figure 9). This was reflected in the low percent of color defects recorded in Figure 10 during this same period.

NY139: Figures 13 and 14 show good chip quality for this variety until mid-May 2010 at 50 ºF. Figure 13 shows a steady decrease in sucrose levels until stabilizing in March 2010, followed by a steady increase in concentration through April into mid-May 2010. Glucose levels remained relatively low through the end of the storage season in May. In spite of the complicating factors, the 54 ºF samples show much the same sugar changes throughout the storage season (Figures 15-16). Herr Foods data in Tables 1-2 show this variety to have an above average chip quality on both processing dates.

CO97043-14W: This variety exhibited above average chip quality at Herr Foods (Table 2). The recorded AGTRON scores for this variety, on both dates, were the highest in the trial for two seasons in a row. The reason for a poorer performance in the January Herr's samples was most likely due to some tuber rot in the samples. The sucrose levels in the 50 ºF samples were low throughout the storage season, with elevated glucose readings occurring later in the season, from mid-January 2010 until mid-May (Figure 17). The chip quality remained acceptable until early May with no major impact from the variable glucose levels (Figure 18).

Kalkaska: This variety had the poorest recorded chip quality in the trial for both testing dates at Herr Foods (Tables 1-2). Kalkaska exhibited an elevated glucose level at 50 ºF during the entire storage season (Figure 21).

NY138: This variety was the highest ranked chipper at Herr's in January and March 2010 (Tables 1-2). Sucrose levels from the 50 ºF samples remained stable season long with consistently low levels of glucose reported (Figure 25). Even the samples stored at 54 ºF managed to chip acceptably in March 2010 (Figures 27-28).

CO96141-4W: This variety performed below average on both processing dates at Herr Foods. Internal shading appeared to be a significant problem (Tables 1-2). Sucrose levels in the 50 ºF storage samples appeared to be in line, but glucose levels were slightly elevated throughout the season (Figure 29). The chip quality from this set of storage samples remained acceptable all season long (Figure 30).

CO97065-7W: CO97065-7W had a below average performer at Herr Foods on both processing dates (Tables 1-2). The chip quality of this variety was best early in storage from October 2009 until early February 2010 (Figure 34). Sucrose levels looked good from 50 ºF, but glucose levels showed the greatest stability early in the storage season (Figure 33).

ND7519-1: ND7519-1 appeared to have very good early season chip quality. This was confirmed by Herr Foods (Table 1) and the MPIC storage data (Figures 37-38). In early March, the sucrose level rose quickly followed by the glucose level (Figure 37). In mid-March, the chip quality of this line declined rapidly. A similar pattern can be observed from the 54 ºF storage samples as well (Figures 39-40).

W2717-5: W2717-5 had an average chip quality at Herr Foods (Tables 1-2). The sucrose level declined steadily October through mid-February (Figure 41). Glucose remained stable throughout the middle to end of the storage season resulting in good chip quality from the 50 ºF samples, January to early June 2010 (Figure 42). The sugar stability of this variety appeared to be good, in the middle part of the season, when exposed to warm storage temperatures (Figures 43-44).

MSJ126-9Y: This variety was ranked average to below average for both processing dates at Herr Foods (Tables 1-2). The 50 ºF storage samples showed the sucrose levels declining steadily from October to early February and remained stable until late March 2010 (Figure 45). MSJ126-9Y performed well early to mid-season from 50 ºF storage (Figure 46).

Table 1. 2009-2010 Out-of-Storage Chip Quality, January 13, 2010, Sandyland Farms, LLC [1].

Entry	Agtron Color	SFA[2] Color	Specific Gravity	Percent Chip Defects[3] Internal	External	Total	Comments
Atlantic	**54.0**	**4.0**	**1.080**	**67.1**	**8.1**	**75.2**	**Internals: Hollow heart, color in chips. Externals: Bruise, cracking. Oversize to 4 1/2".**
Snowden	**57.6**	**2.0**	**1.080**	**8.8**	**25.2**	**34.0**	**Internals: Good chip color.Externals: Good, a few scab.**
AF2291-10	56.8	2.0	1.082	11.4	7.8	19.2	Internals: Light color, some fusarium. Externals: A few scab. Large grade to 4".
NY 139	58.2	2.0	1.085	9.9	5.0	14.9	Internals: Nice color, a few hollow. Externals: Good externals. Oversize, some 5".
CO97043-14W	63.6	3.0	1.074	22.0	21.4	43.4	Internals: Internal brown spot, color in chips. A few sprout and a few bruise. Externals: Heavy scab, a few green. Low gravity. Oversize to 4 1/2".
Kalkaska	53.2	4.0	1.078	33.1	7.9	41.0	Internals: Lot of shading in chips. Externals: Light scab, 4 green. Good size to 3 1/2".
NY 138	60.3	1.0	1.076	1.5	7.7	9.2	Internals: Good chip color. Externals: Nice. Oversize 5 ".
CO96141-4W	56.4	4.0	1.071	25.7	25.8	51.5	Internal: Some black internal & shading. External: Scab and fusarium. Too large to 4 1/2". Low gravity.
CO97065-7W	55.9	3.0	1.080	30.4	16.1	46.5	Internals: A few internal color. Freeze and bruise. Externals: Some scab. Large grade to 4"
ND7519-1	62.8	2.0	1.088	2.8	19.1	21.9	Internals: Good chip color. Externals:A few scab & starch pockets. 9 green. Good size profile. Nice sample overall.
W2717-5	58.6	3.0	1.086	26.9	8.2	35.1	Internals: Some color, stem end browning, vascular browning and a few with freeze damage. Externals: A few scab. Good size profile.
MSJ126-9Y	59.3	3.0	1.069	8.6	12.2	20.8	Internals: Some light shading. Yellow flesh. Externals: A few bruise. Nice grade to 3 1/2 ".

[1] Samples removed from 54 ºF storage and processed by Herr Foods Inc., Nottingham, PA on January 13, 2010.

Chip defects are included in Agtron and SFA samples.

[2] SFA Color: 1= lightest, 5 = darkest

[3] Percent Chip Defects are a percentage by weight of the total sample; comprised of undesirable color, greening, internal defects and external defects.

Table 2. 2009-2010 Out-of-Storage Chip Quality, March 17, 2010, Sandyland Farms, LLC [1].

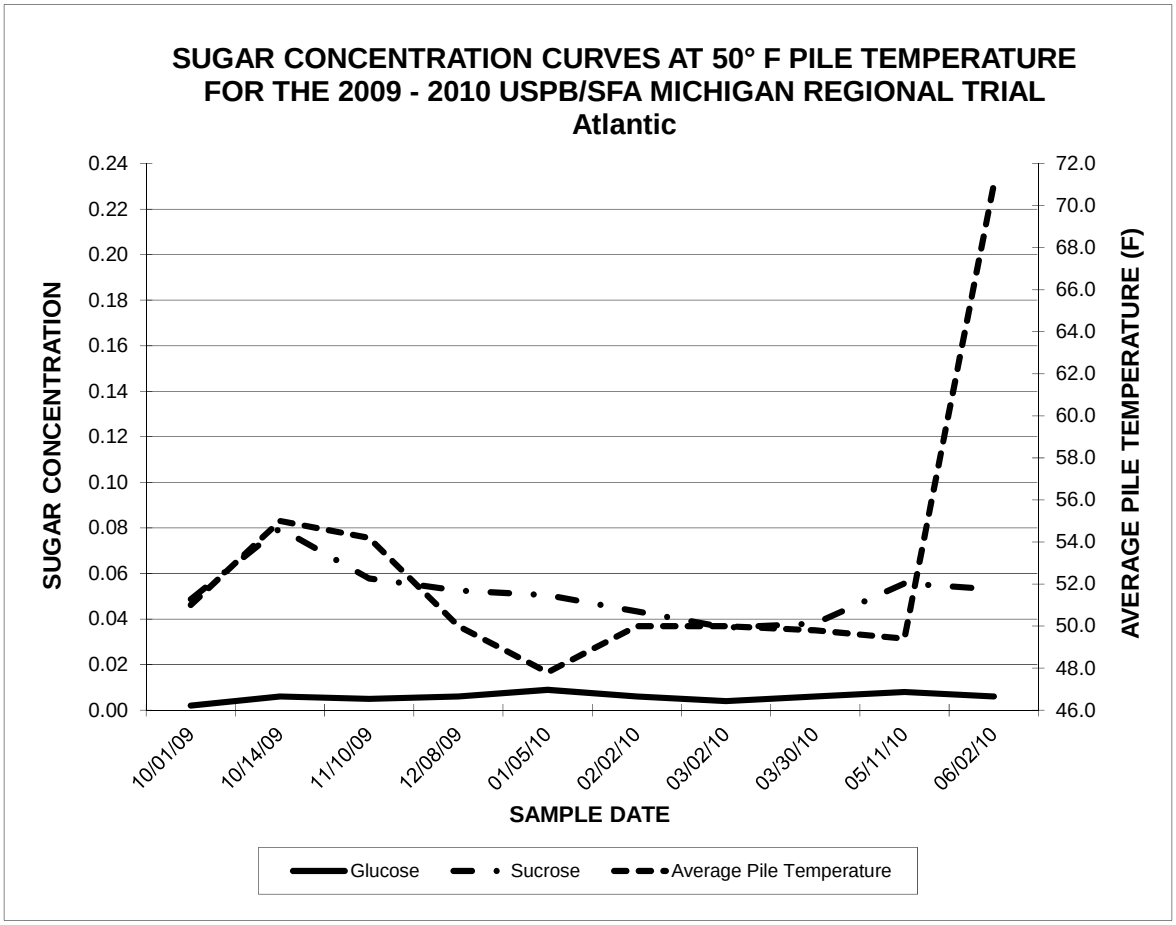
Entry	Agtron Color	SFA[2] Color	Specific Gravity	Percent Chip Defects[3] Internal	External	Total	Comments
Atlantic	**57.0**	**5.0**	**1.080**	**31.9**	**29.1**	**61.0**	**Internals: Hollow heart, chip color . Externals: Some bruise with fusarium.**
Snowden	**59.2**	**3.0**	**1.082**	**6.1**	**17.1**	**23.2**	**Internals: Nice chip color. Externals: A few pitted scab. Shows on chips. Nice size.**
AF2291-10	62.9	2.0	1.083	3.8	25.2	29.0	Internals: Nice chip color. Externals: A few scab. Shows in chips. Nice size overall, a few too large to 4".
NY 139	61.2	2.0	1.076	3.8	17.7	21.5	Internals: Nice color. Externals: 5 green chips. Large grade to 4".
CO97043-14W	64.1	2.0	1.070	3.4	12.9	16.3	Internals: Nice color! Externals: Lot of pitted scab! Large grade to 4".
Kalkaska	48.8	5.0	1.078	93.3	4.3	97.6	Internals: Chips very dark, a few internal brown center. Externals: Good externals, just a few scab. Nice size mix 2" - 3 1/2".
NY 138	60.4	2.0	1.071	5.8	11.2	17.0	Internals: Good chip color. Externals: A few bruise with fusarium. Oversize 5 "!
CO96141-4W	57.3	4.0	1.064	56.9	3.2	60.1	Internals: Lot of shading. Externals: A few scab. Some too large (oblong) to 4 1/2".
CO97065-7W	50.6	5.0	1.073	64.7	13.2	77.9	Internals: Lots of color, dark centers. Externals: Some bruising. Oversize to 5" !
ND7519-1	53.4	4.0	1.089	67.2	10.0	77.2	Internals: Lots of color. Externals: Some surface scab & a few bruise. Small size profile.
W2717-5	59.3	3.0	1.078	20.6	21.5	42.1	Internals: A few internal center color. Externals: Mechanical injury, a few scab, some growth cracks.
MSJ126-9Y	62.7	3.0	1.064	20.5	12.7	33.2	Internals: A few dark blotches at stem. Externals: Some mechanical injury, shows in chips. Size range 1 3/4" - 3 3/4".

[1] Samples removed from 54 ºF storage and processed by Herr Foods Inc., Nottingham, PA on March 17, 2010.
Chip defects are included in Agtron and SFA samples.

[2] SFA Color: 1= lightest, 5 = darkest

[3] Percent Chip Defects are a percentage by weight of the total sample; comprised of undesirable color, greening, internal defects and external defects.

Figure 1.



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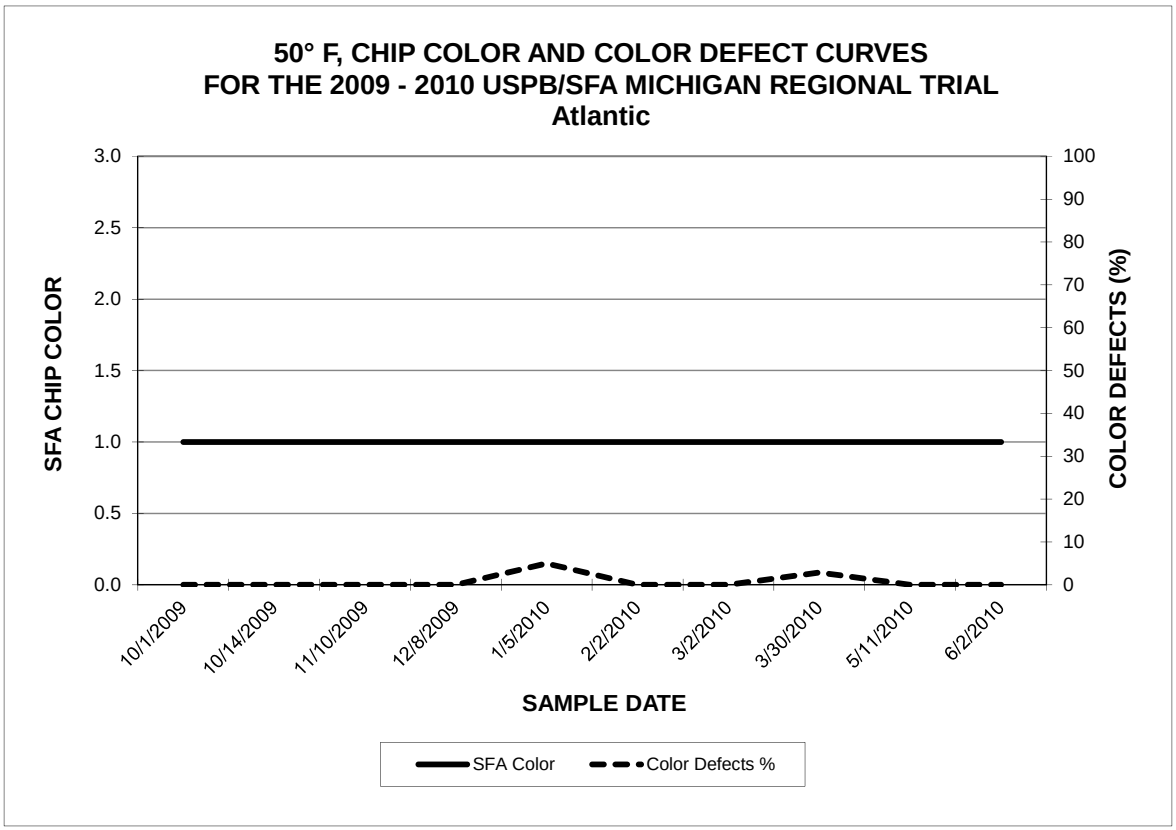

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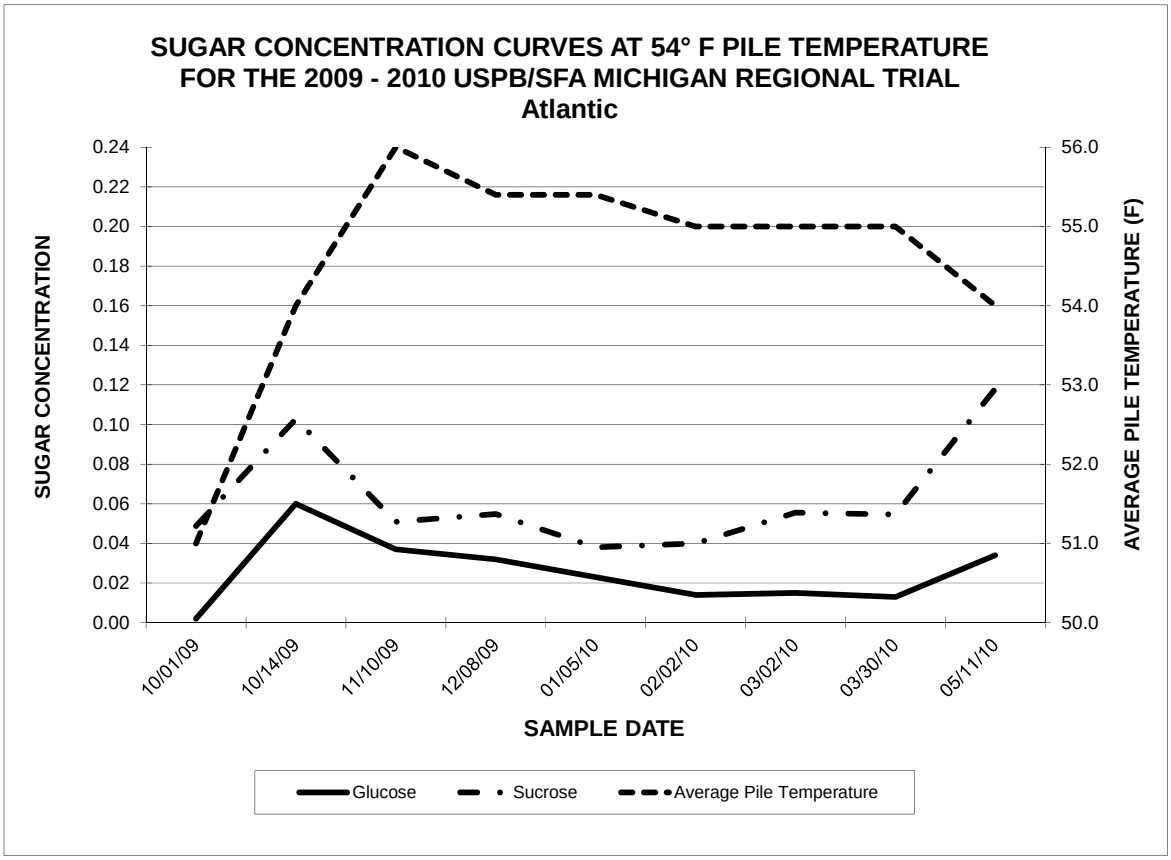

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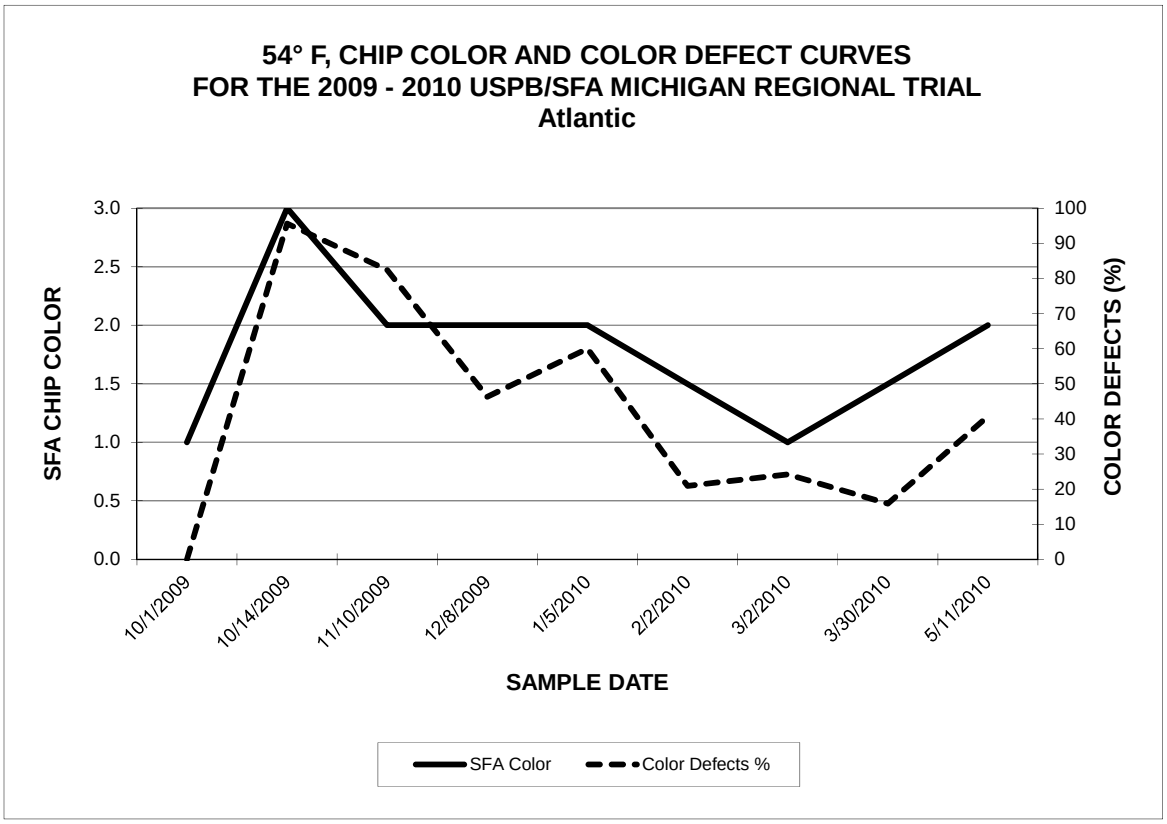

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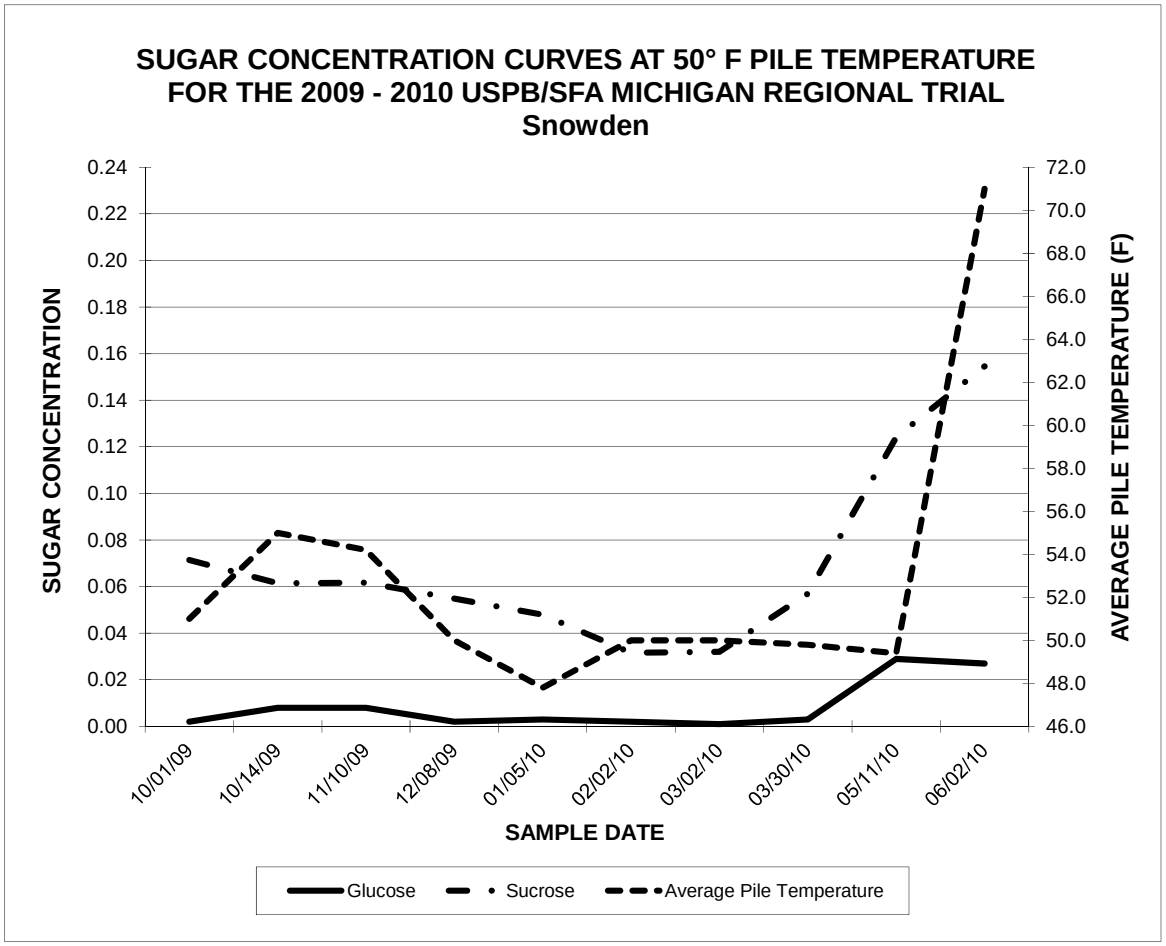

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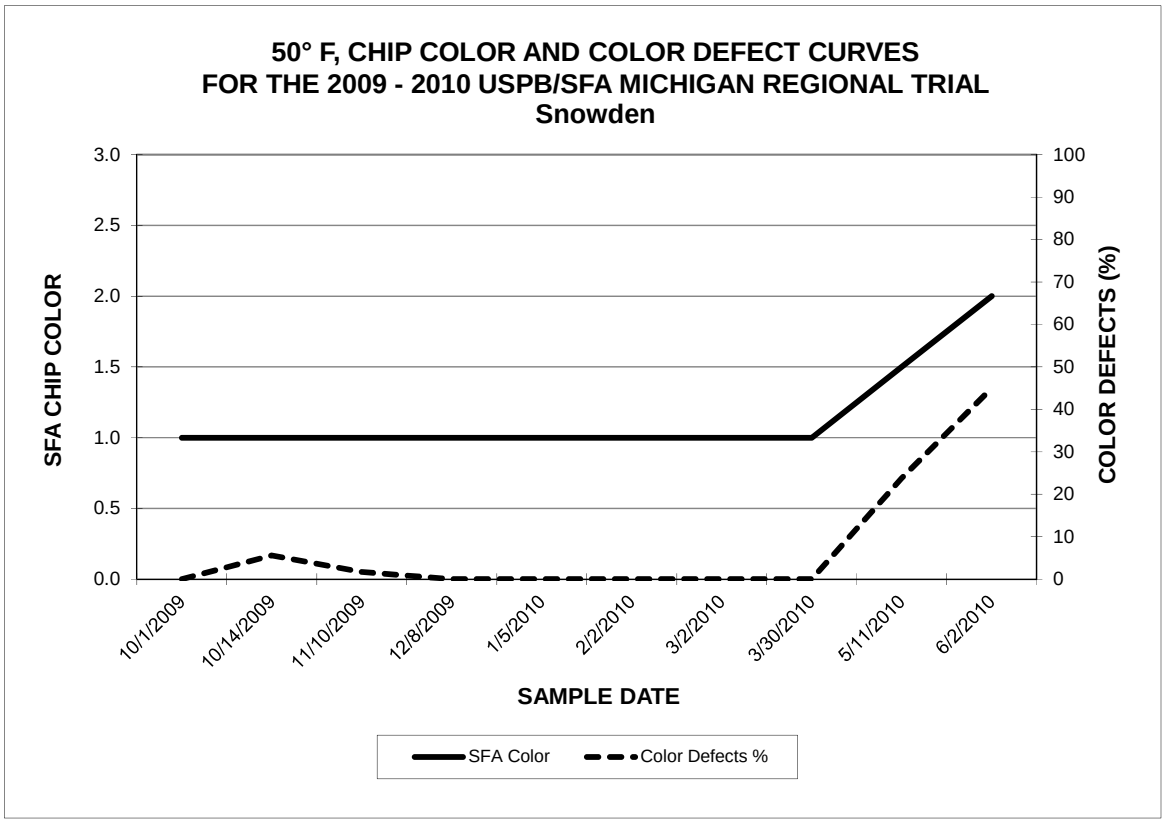

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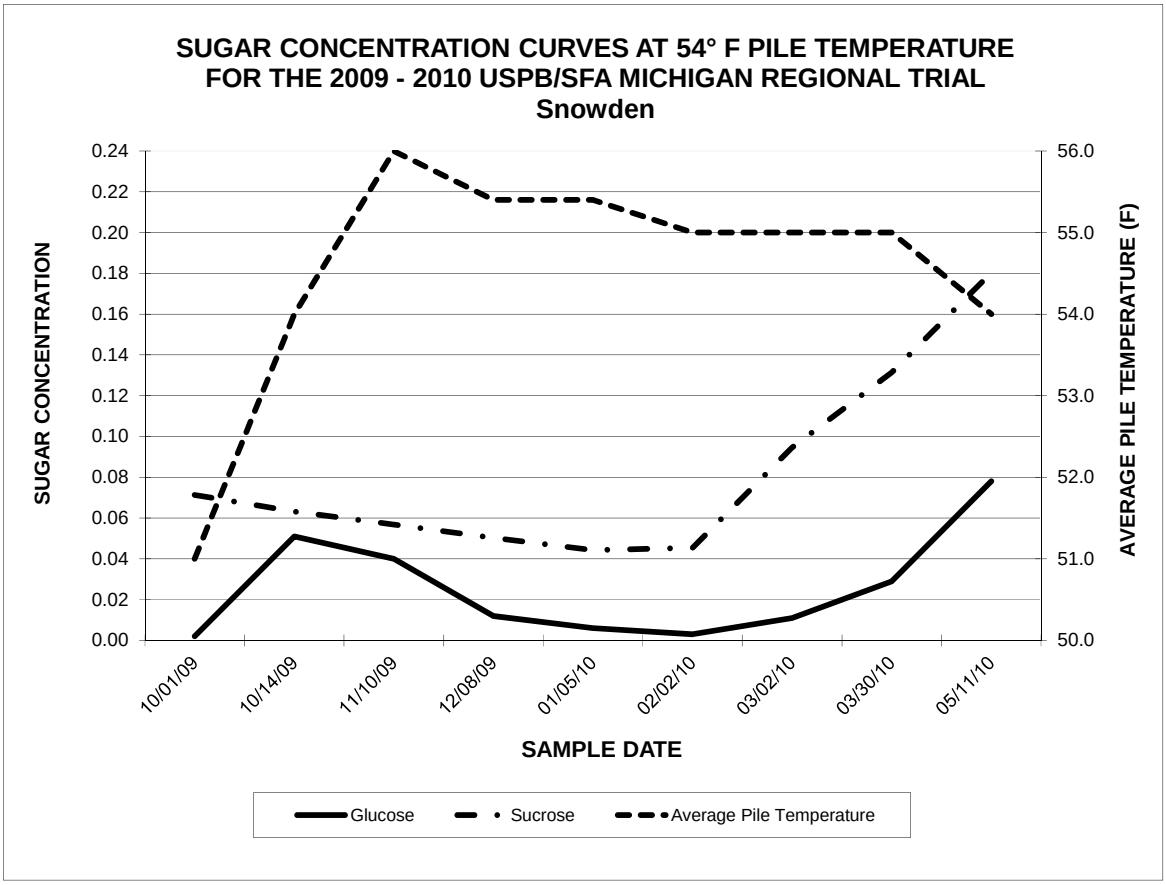

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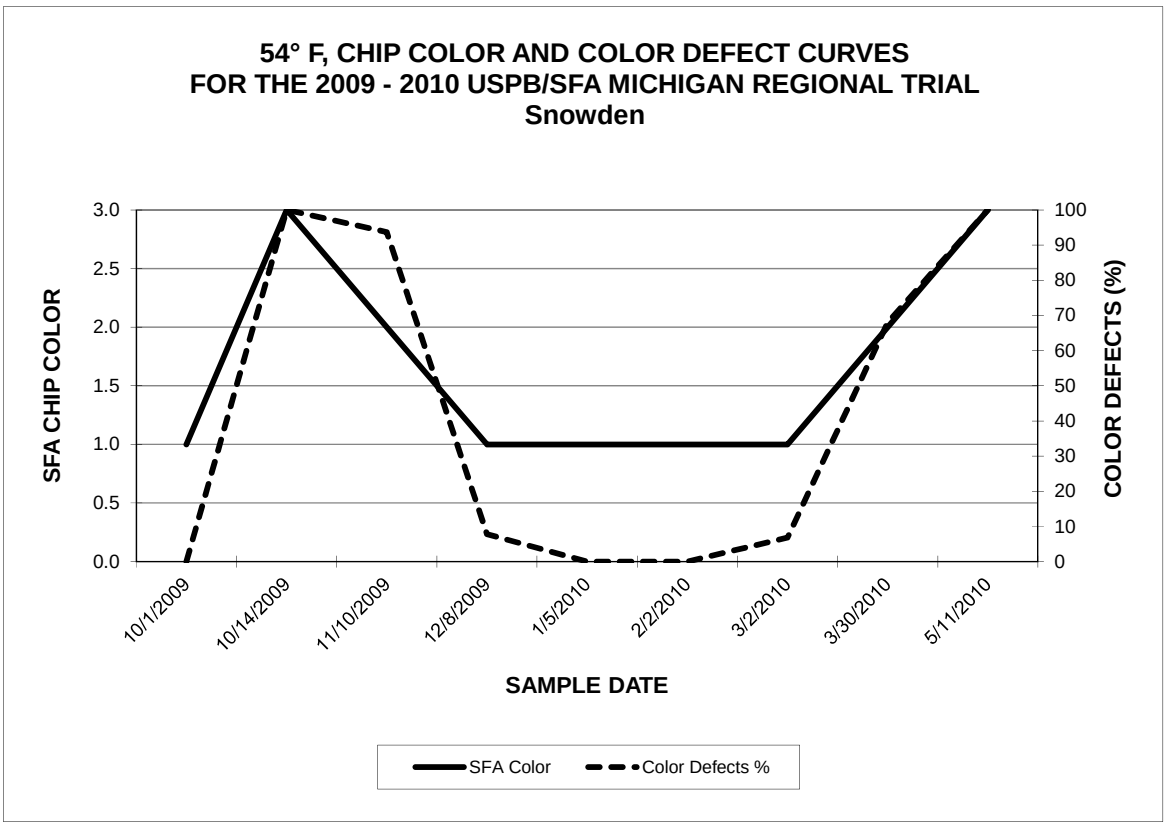

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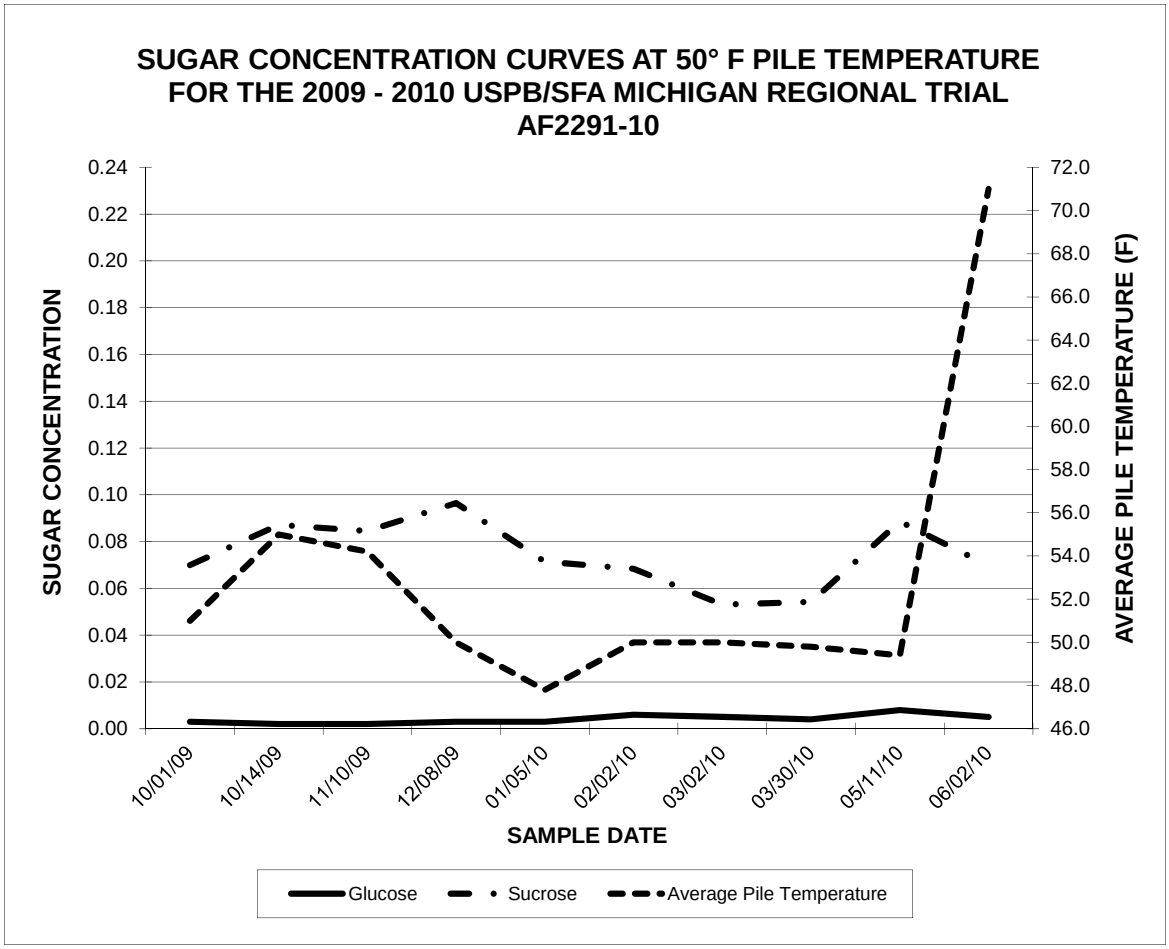

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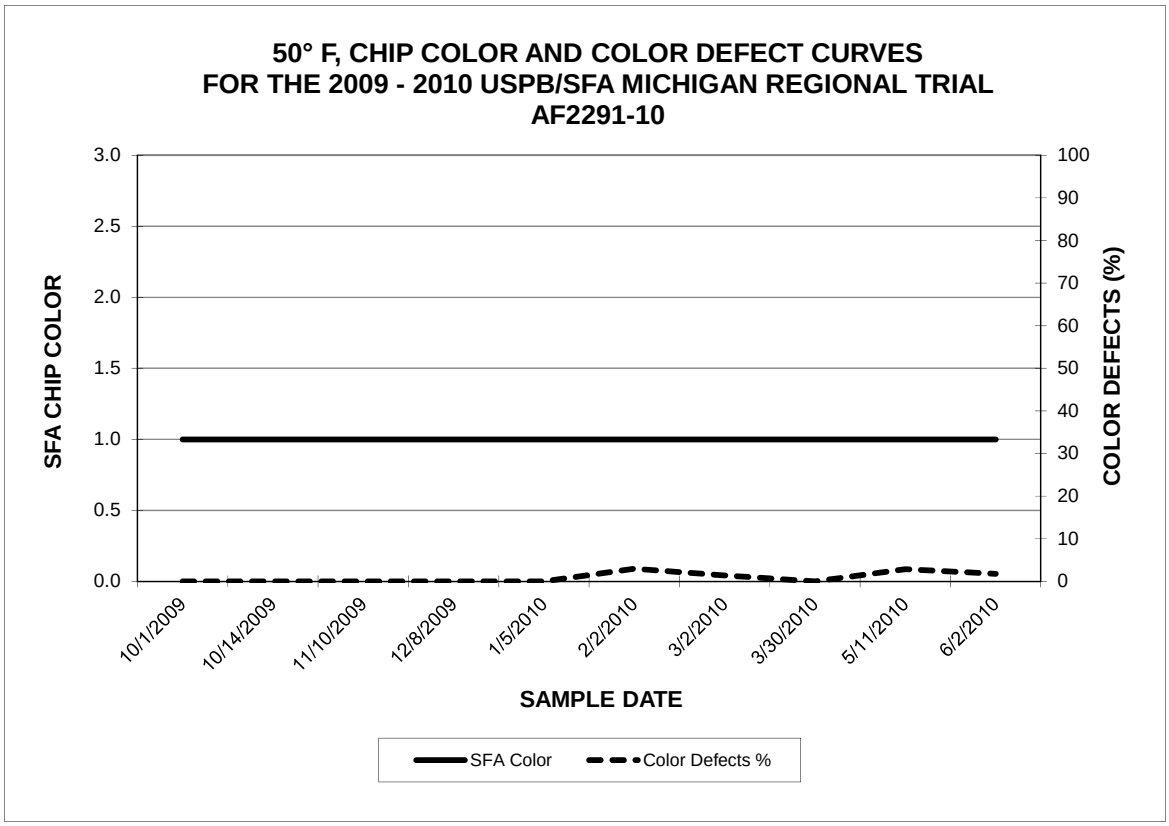

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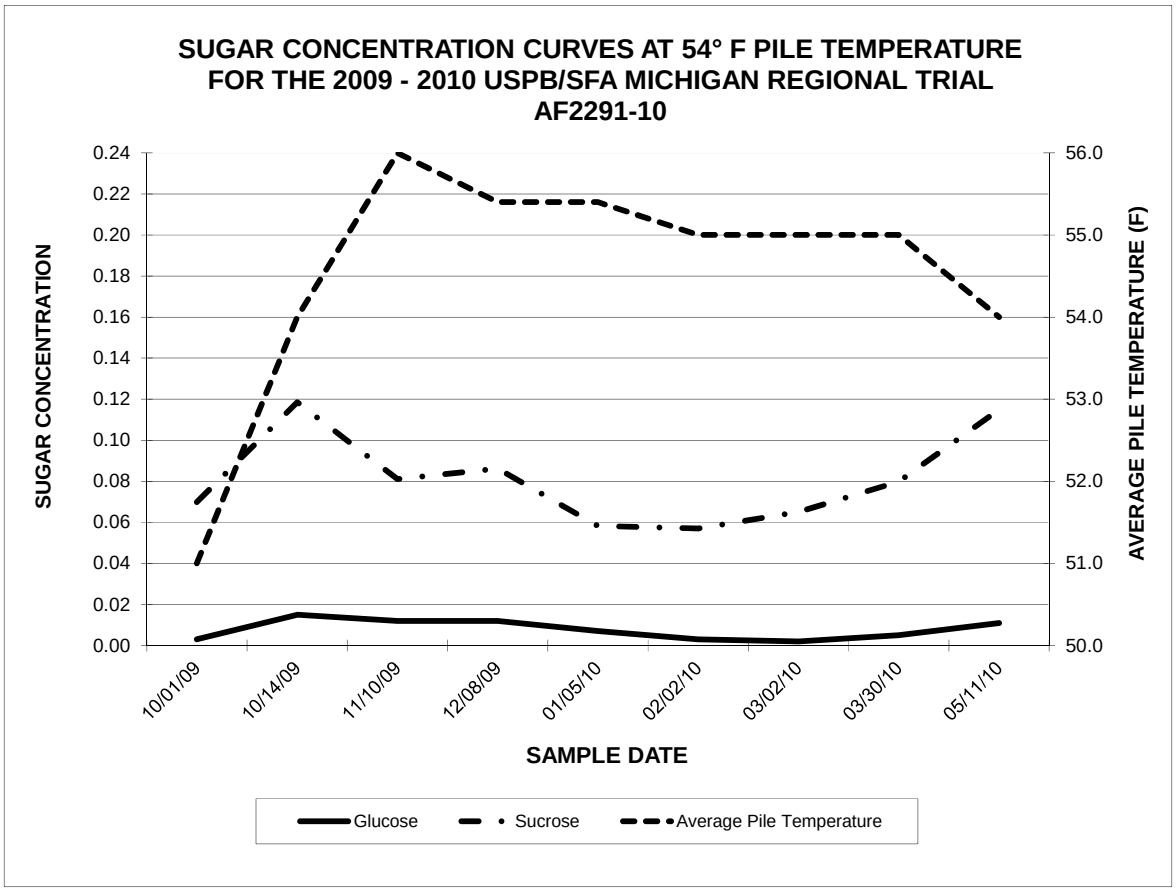

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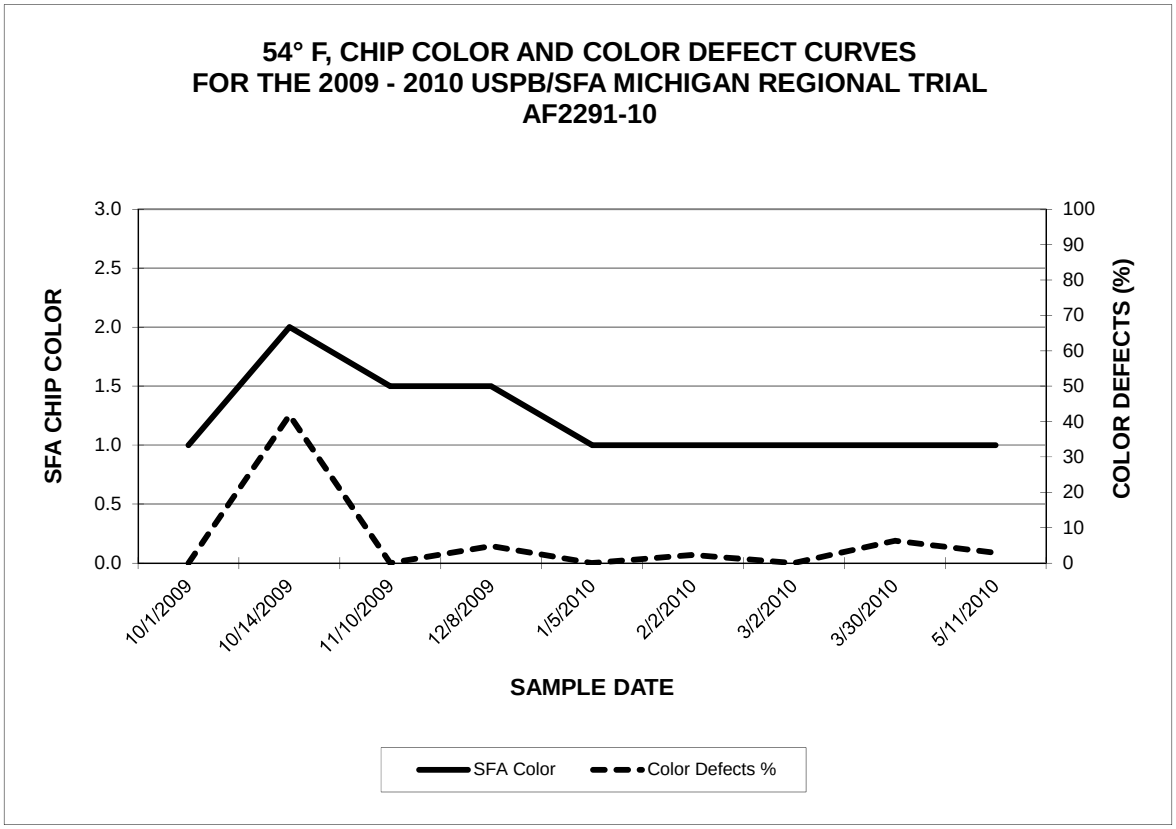

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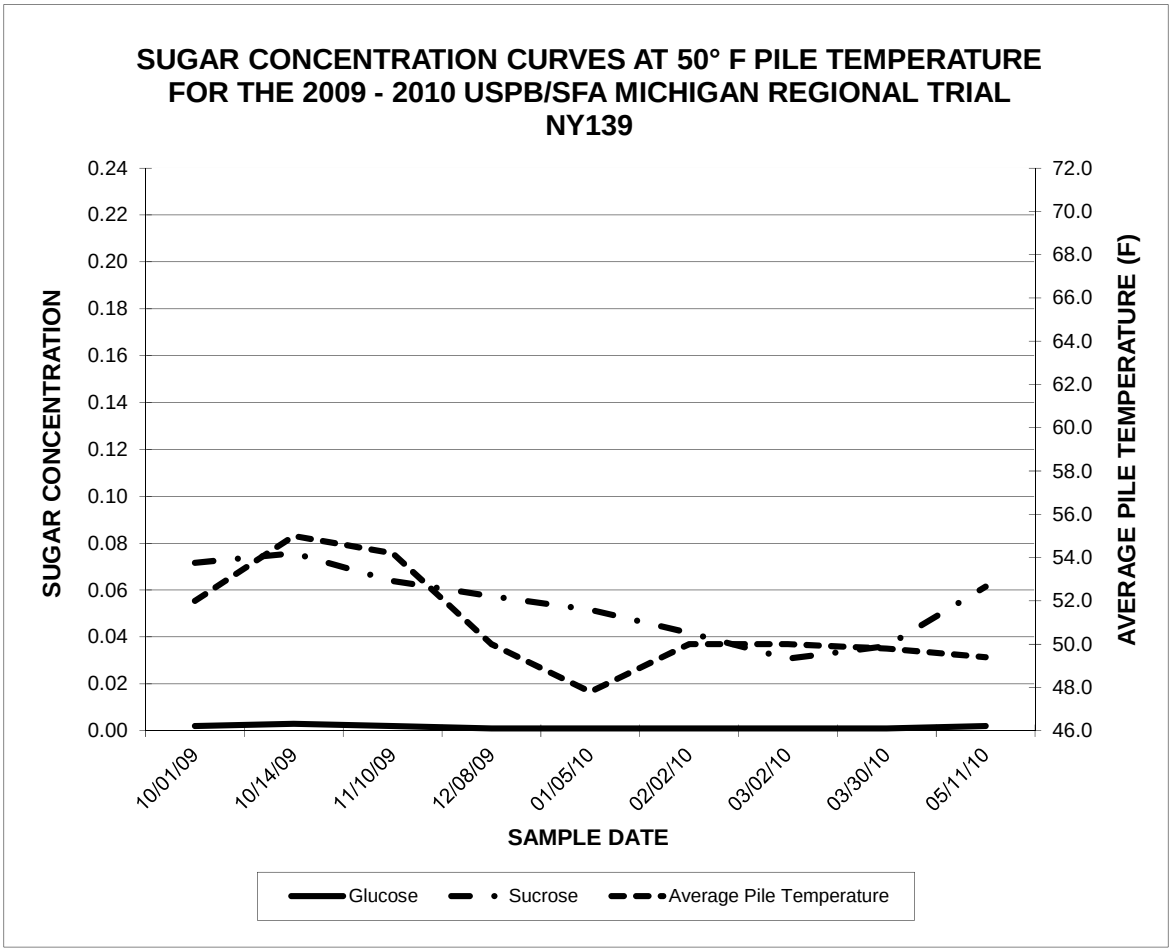

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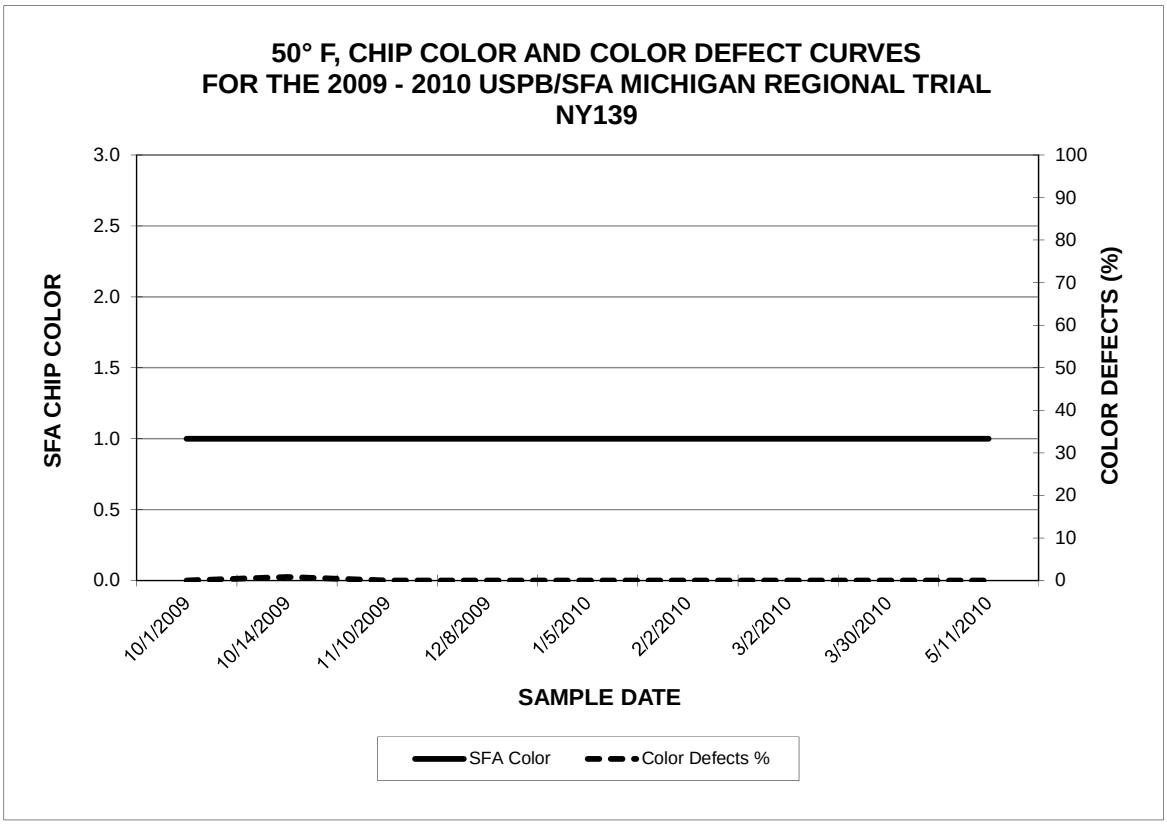

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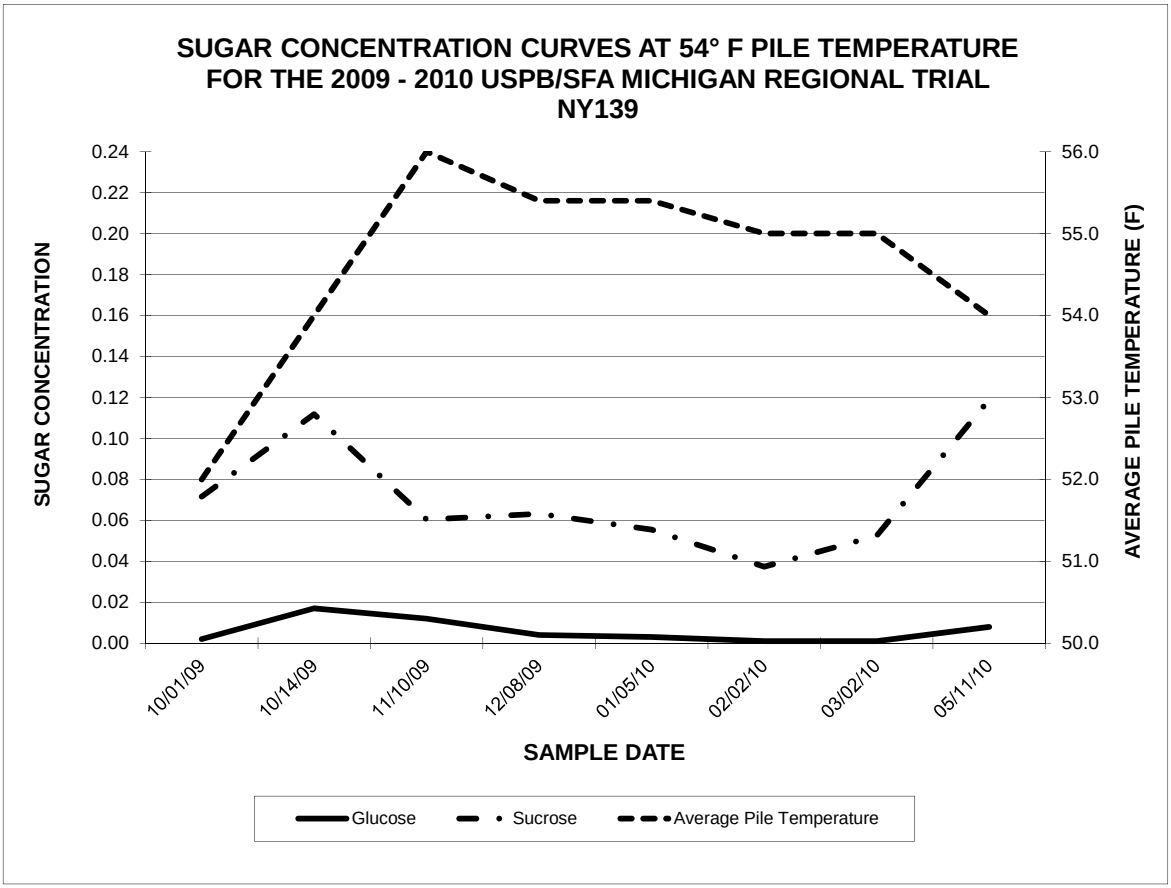

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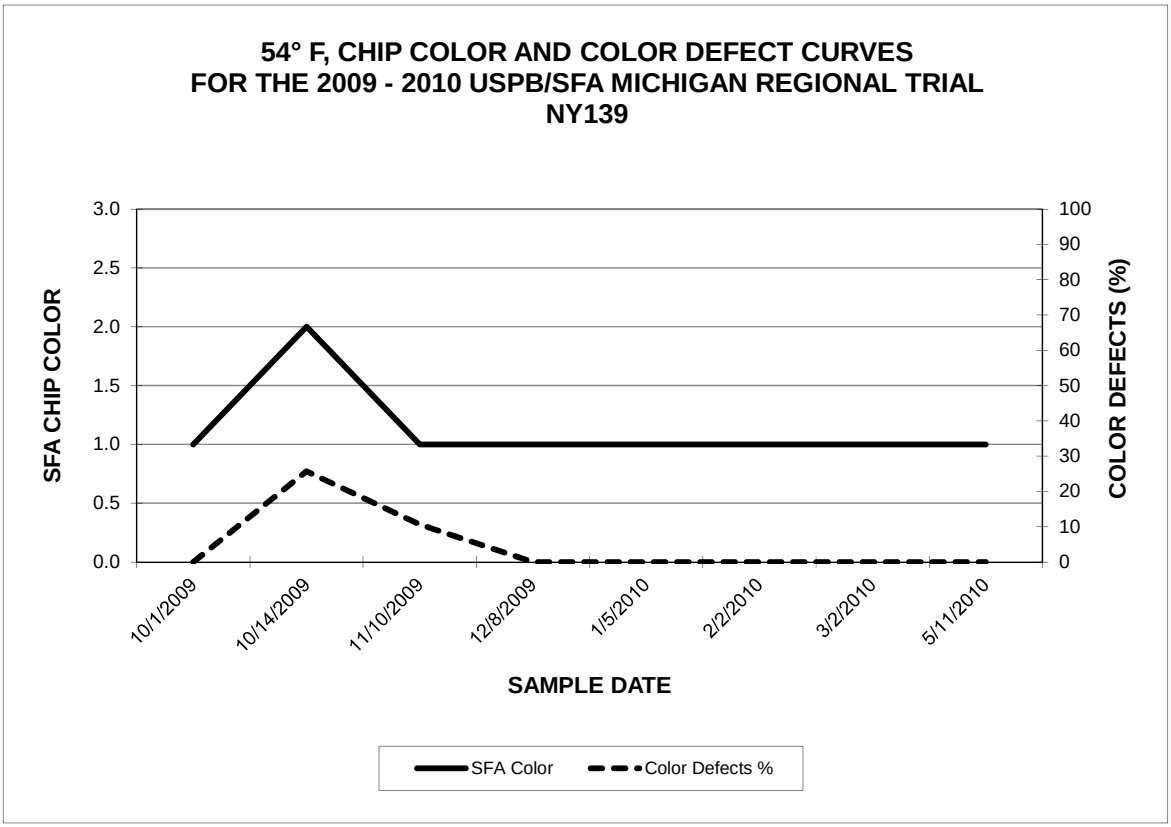

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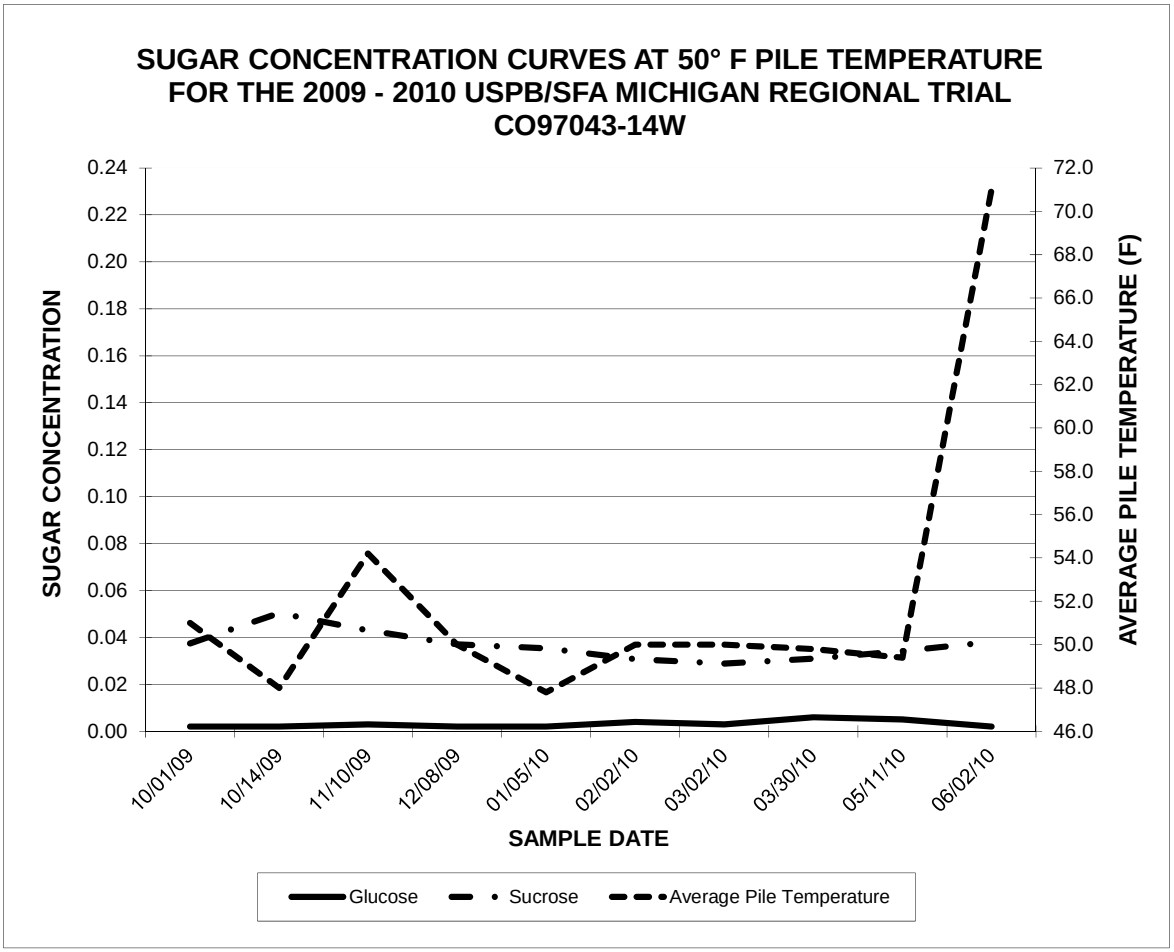

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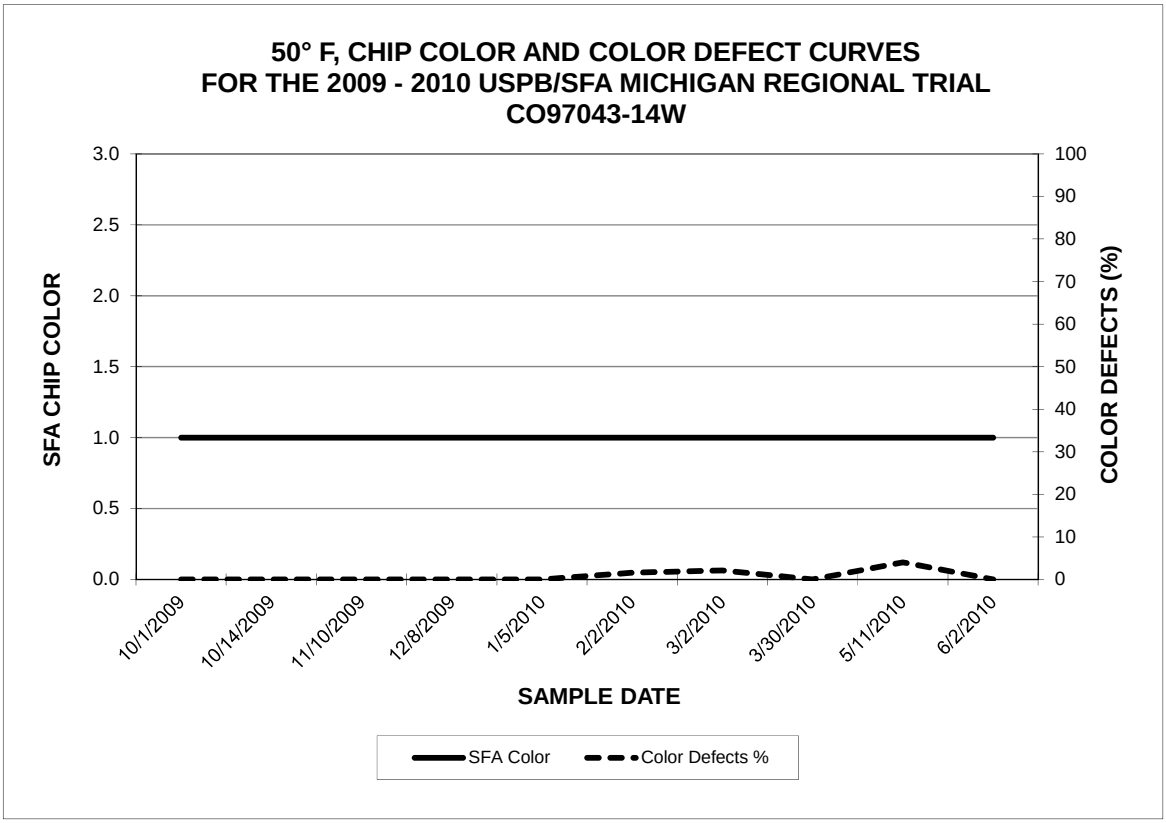

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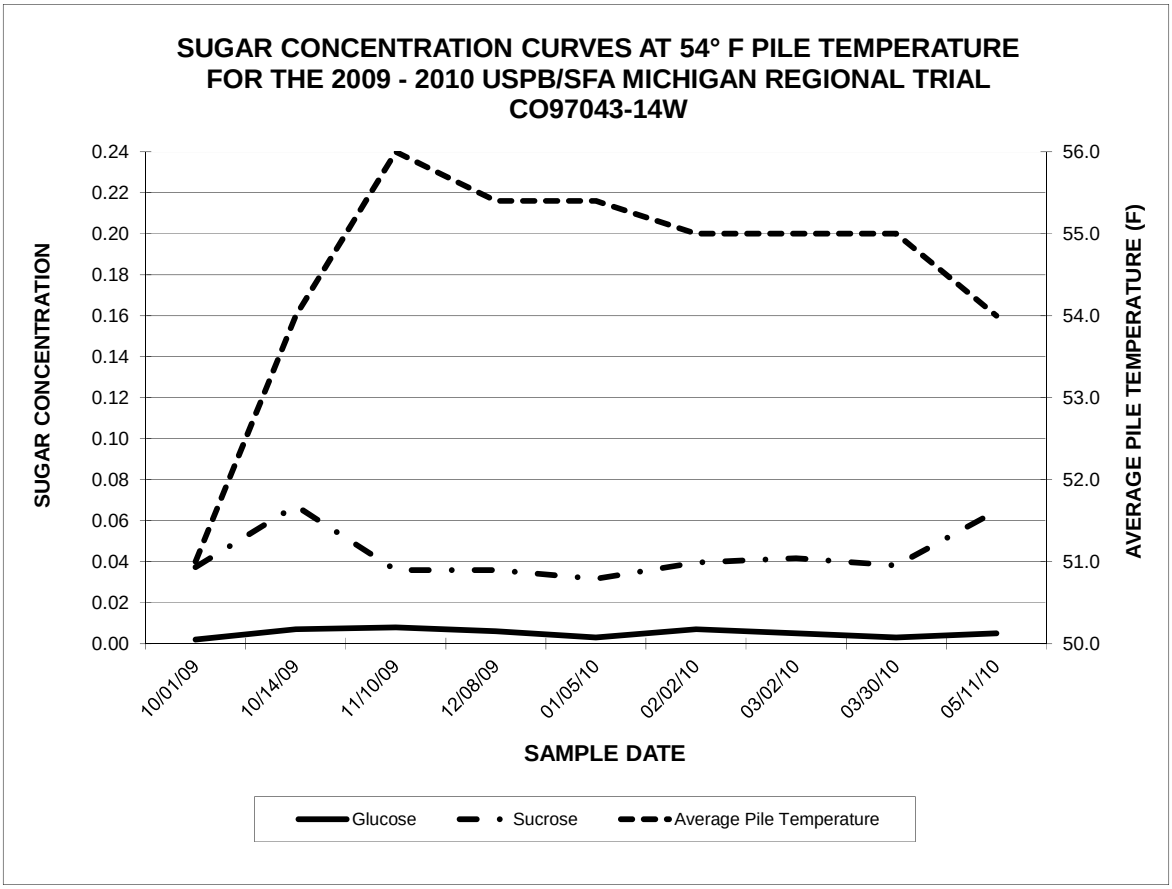

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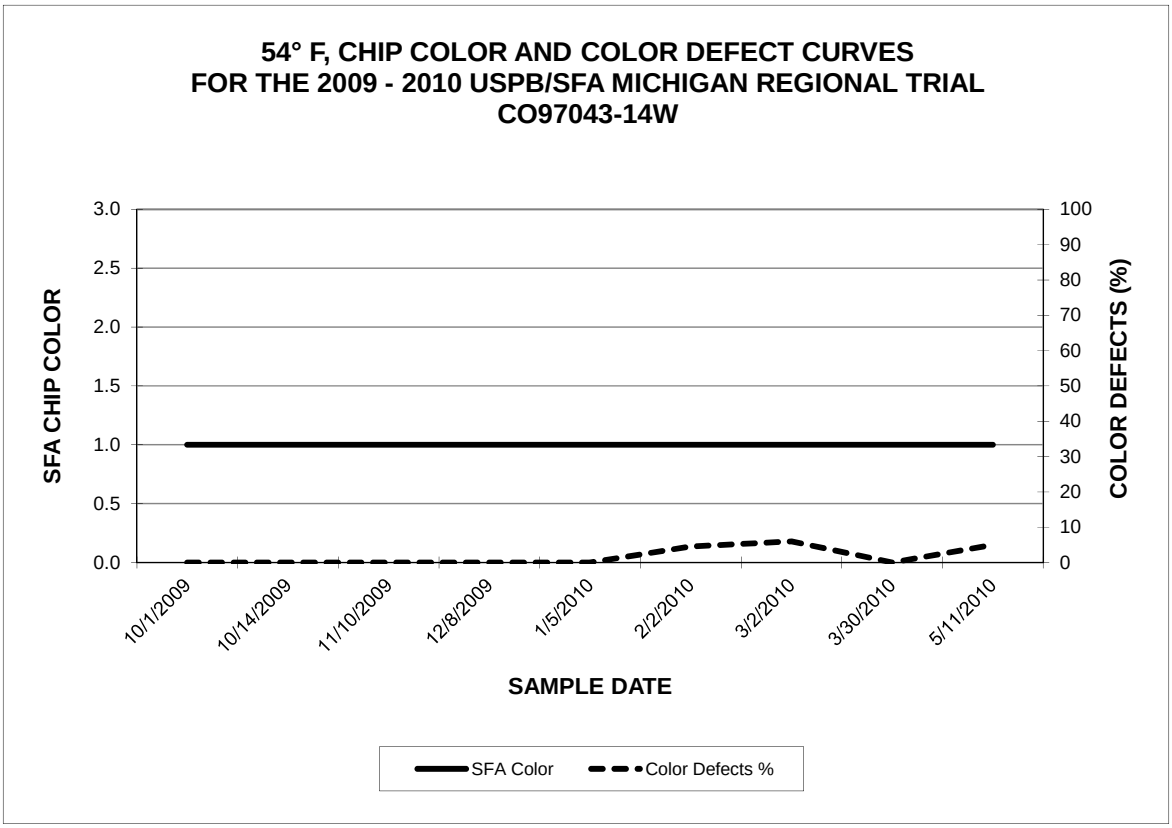

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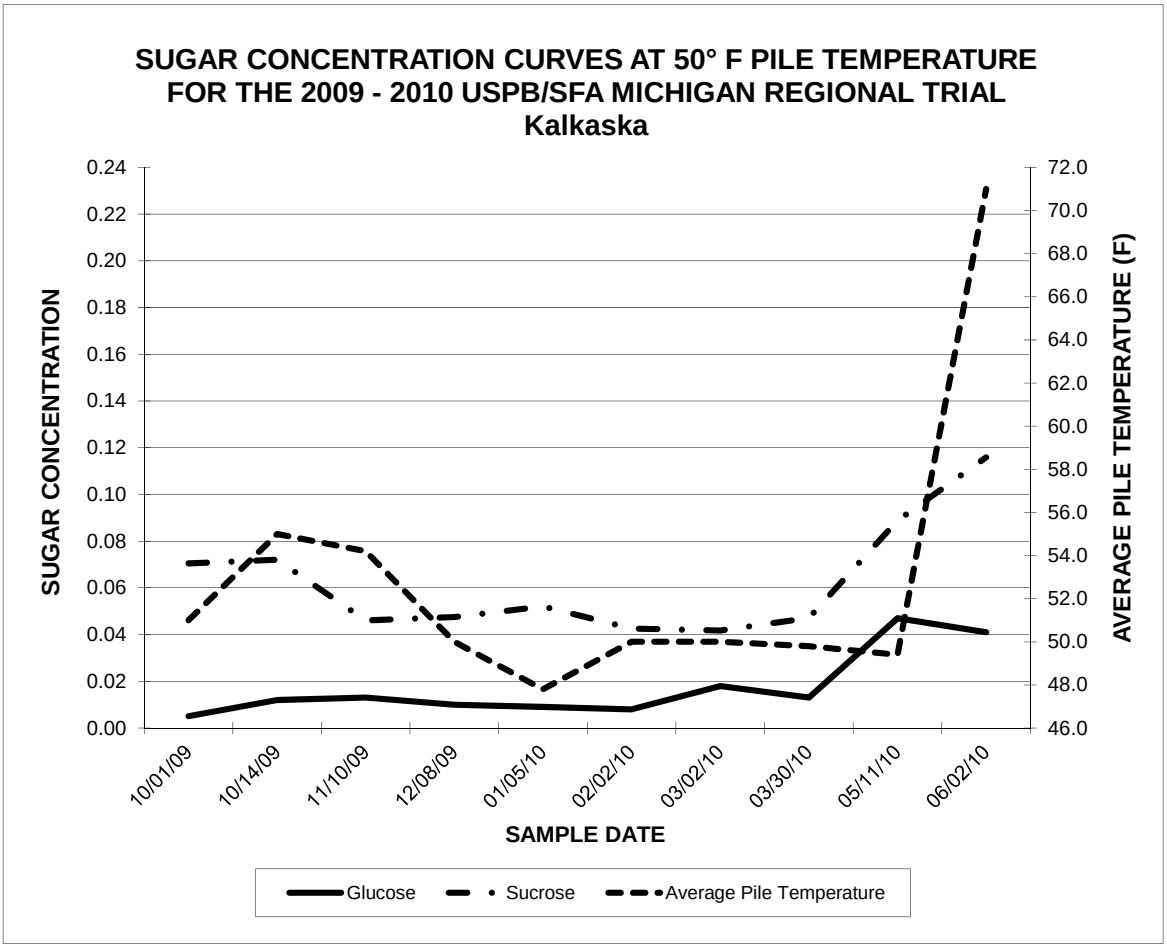

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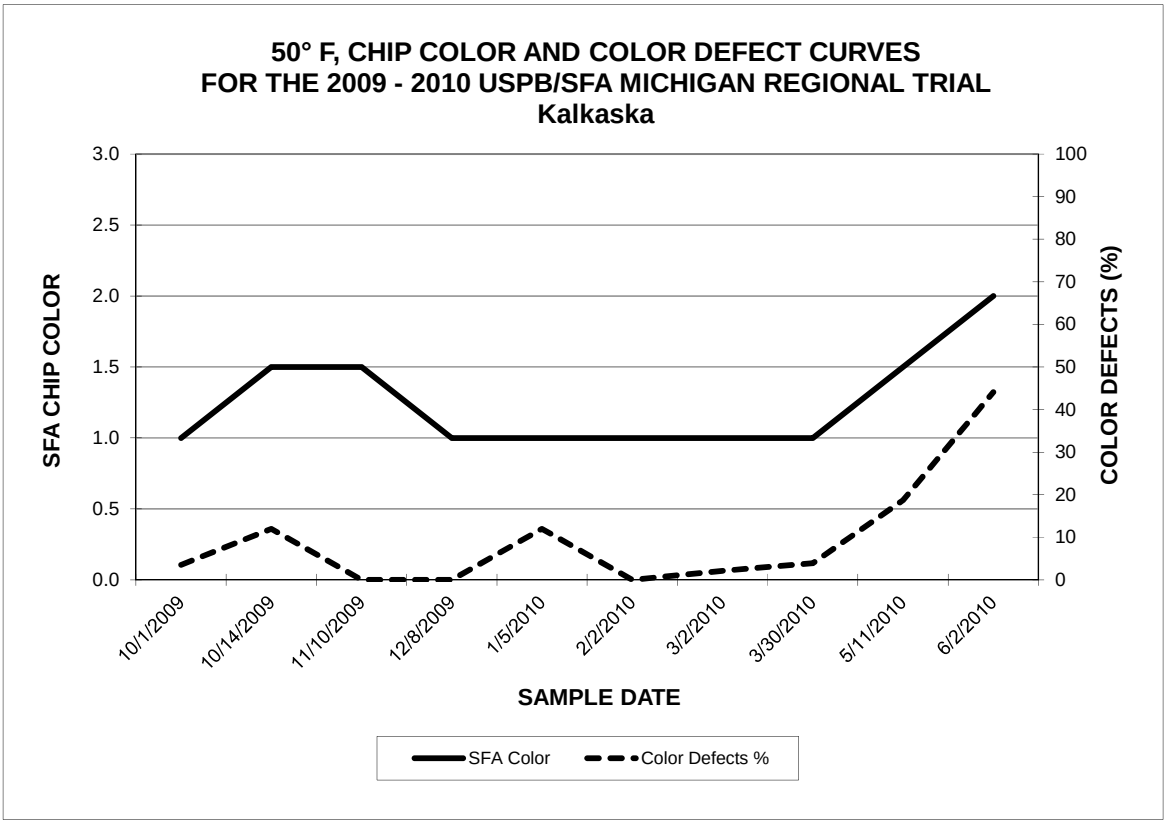

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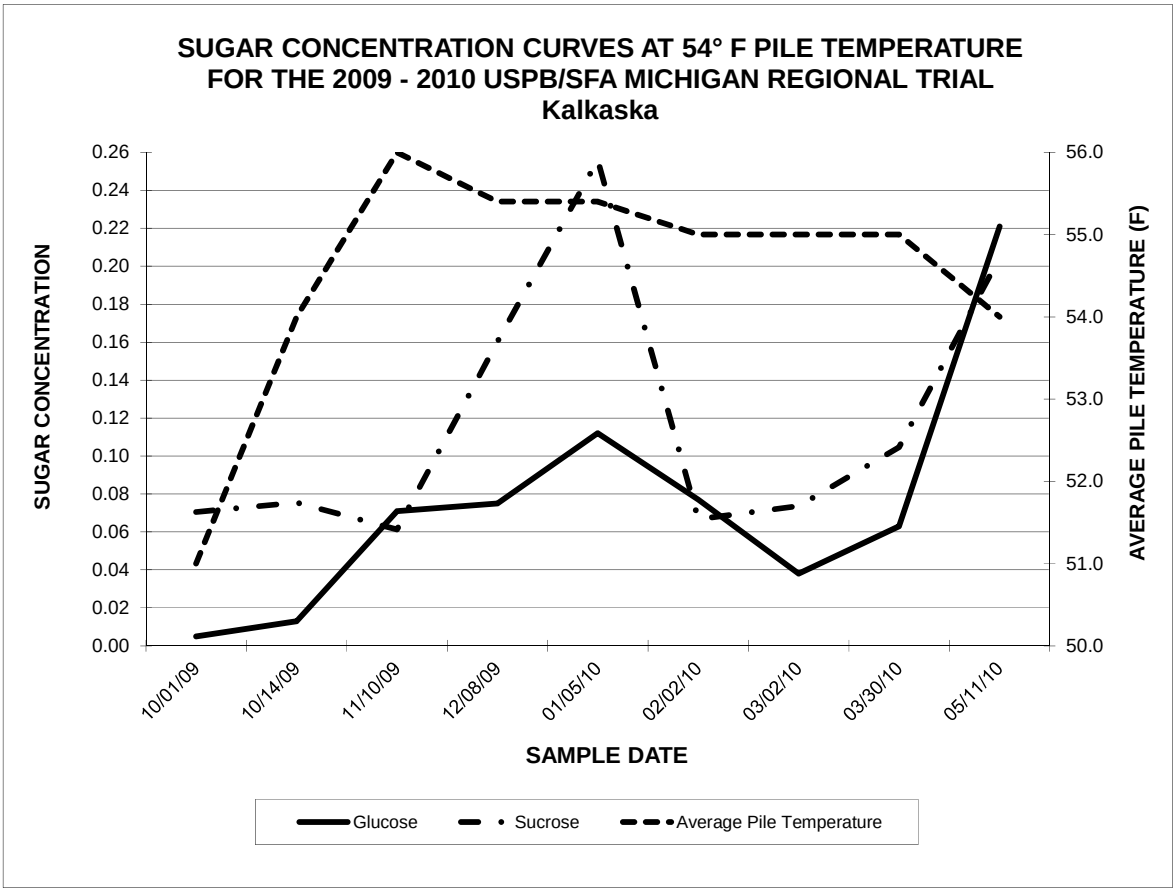

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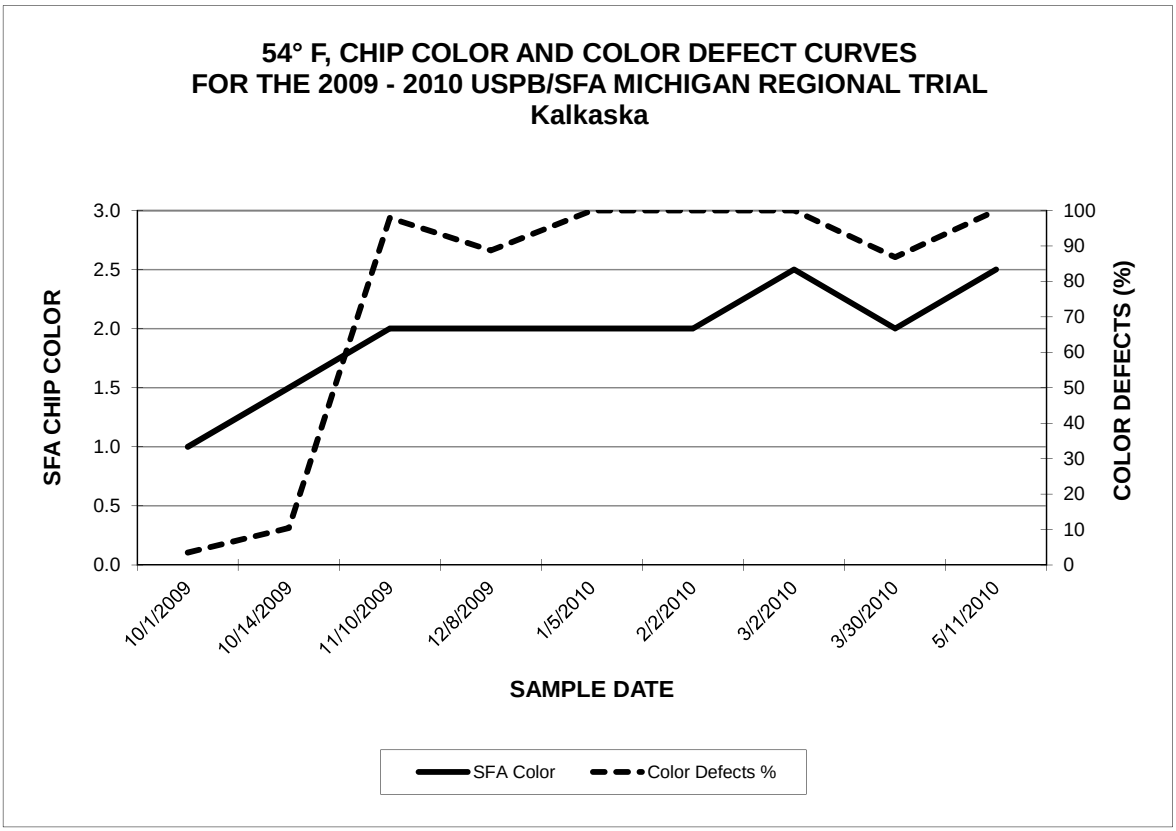

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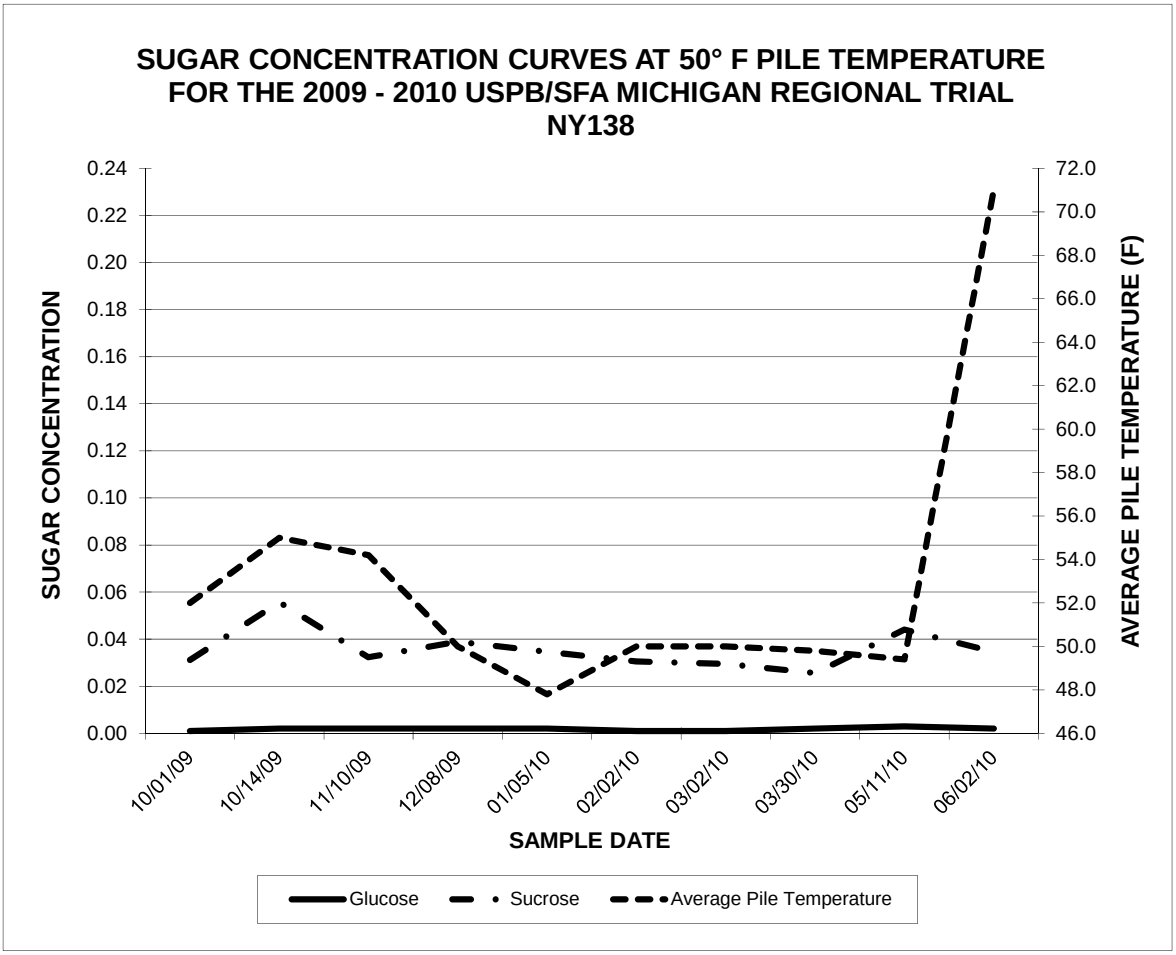

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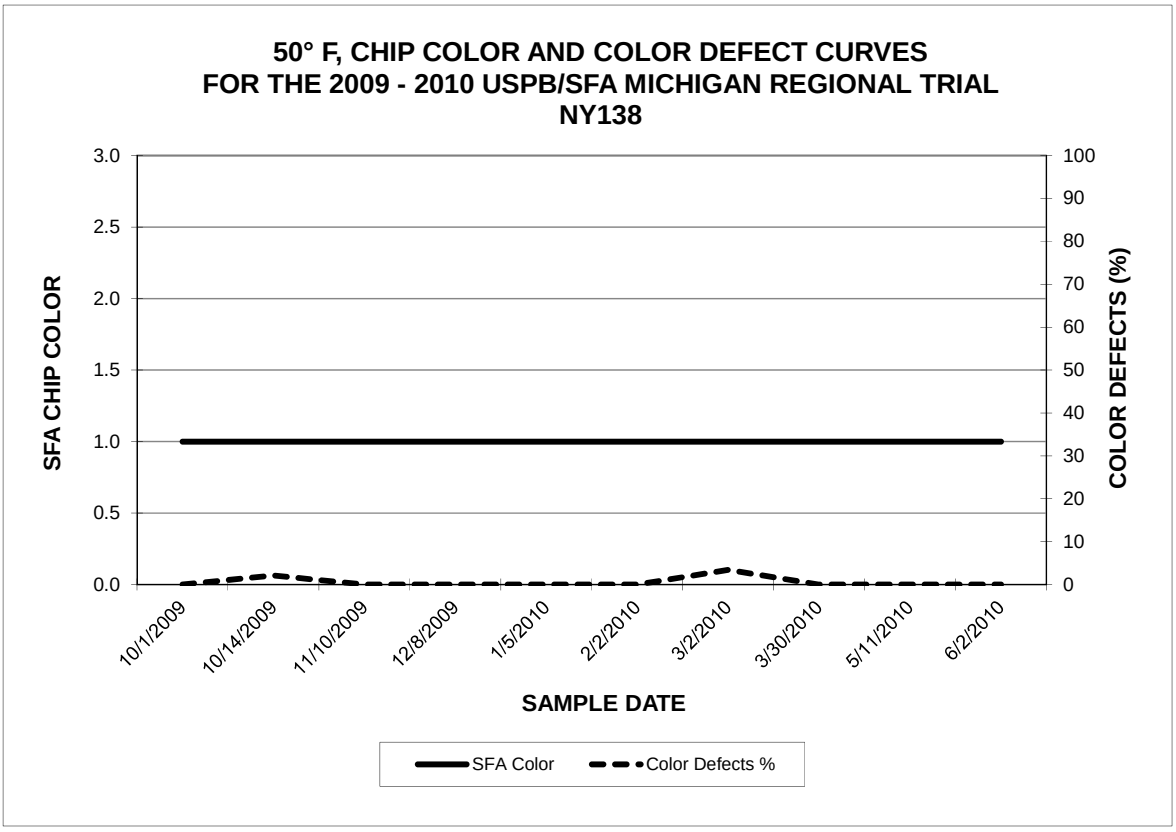

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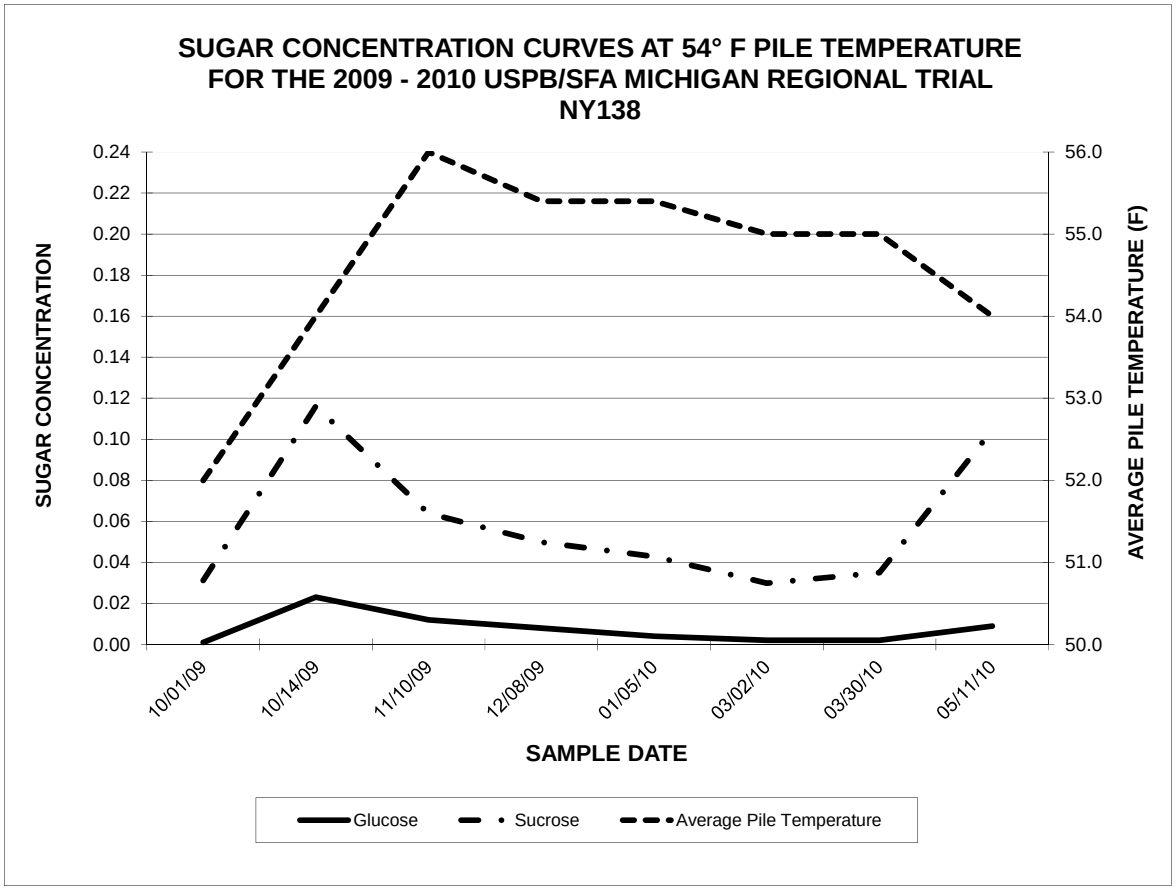

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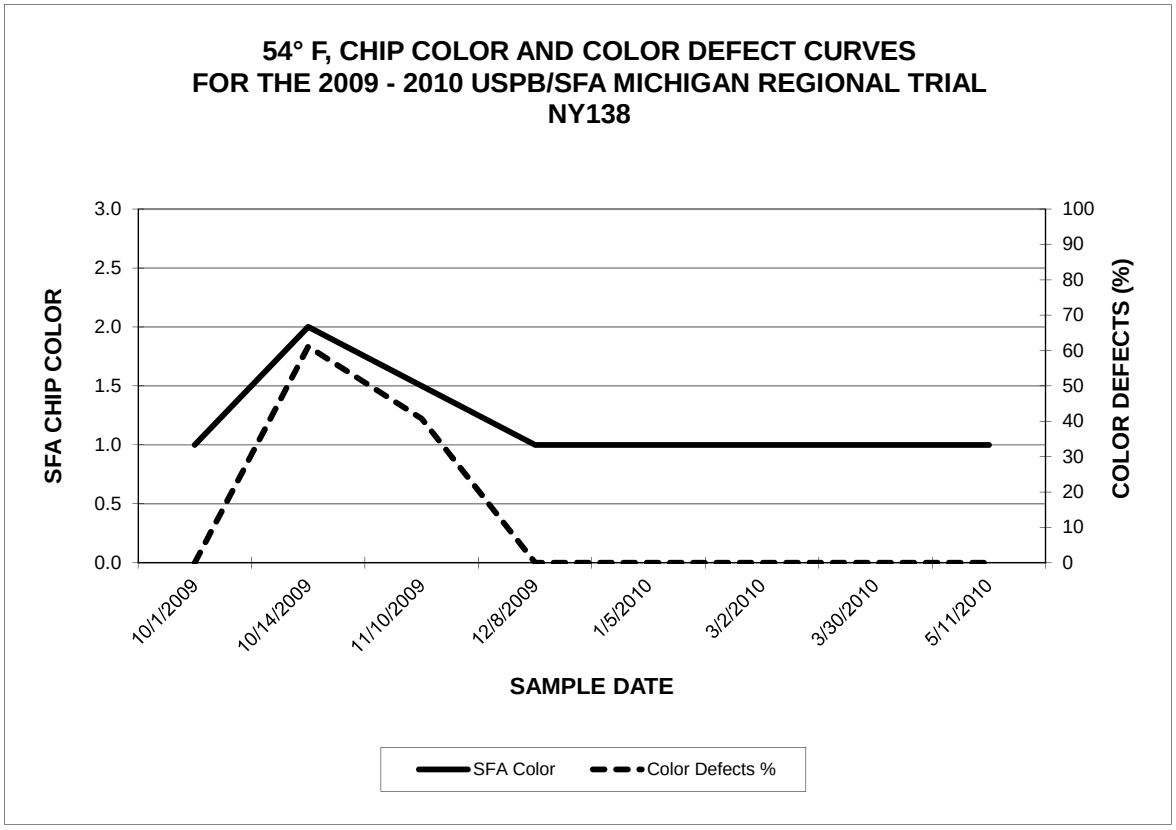

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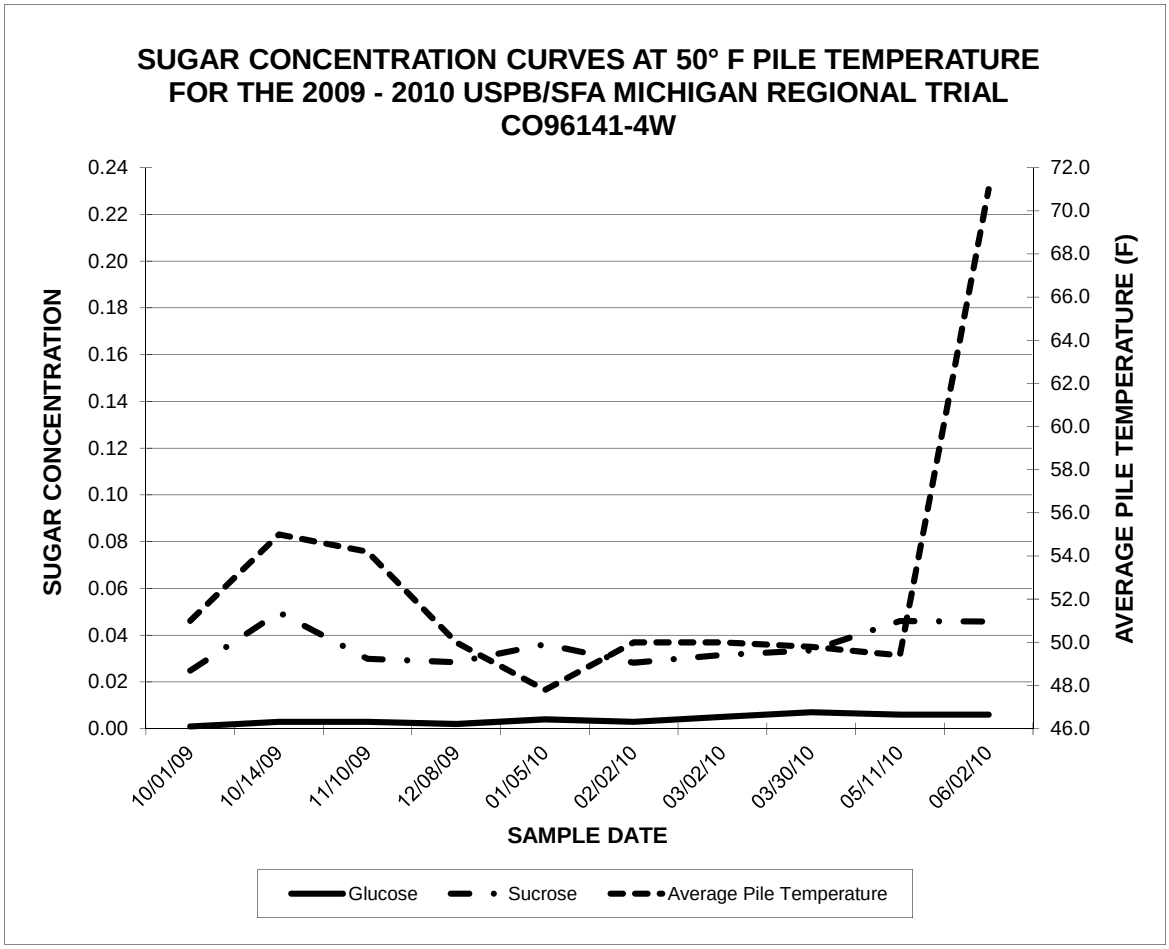

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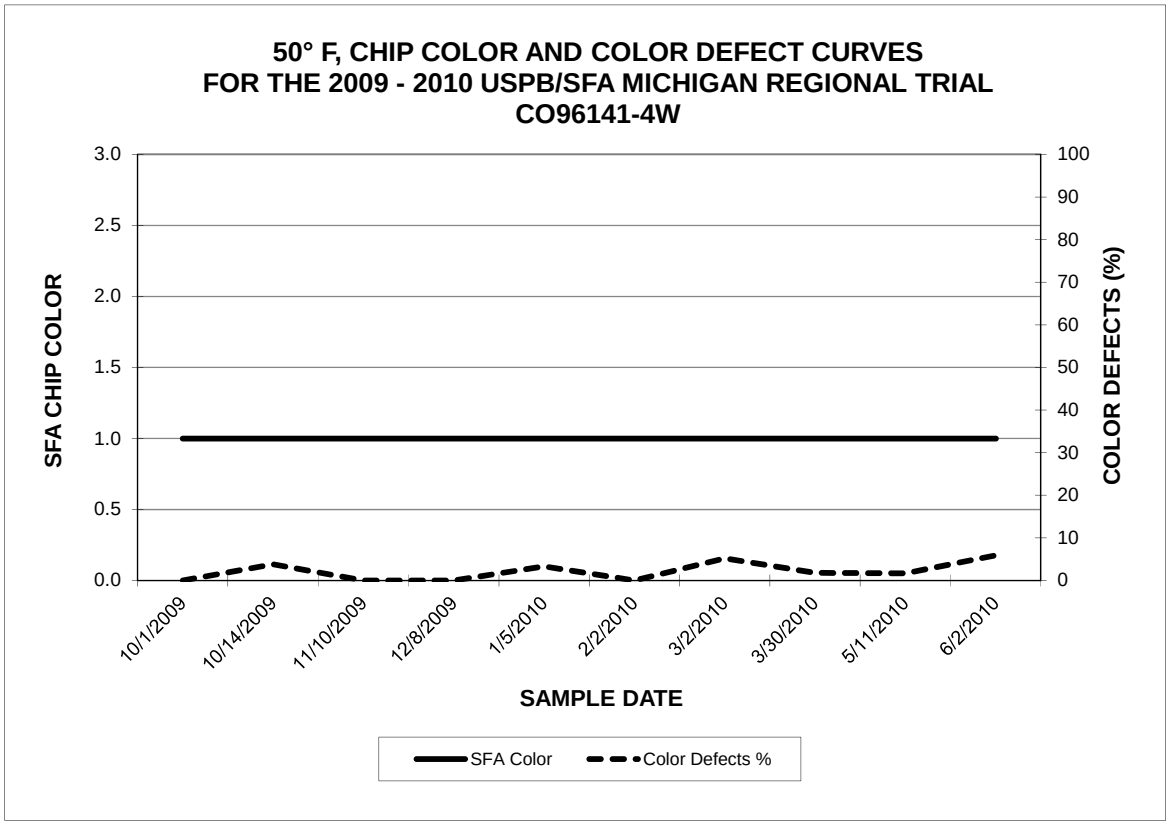

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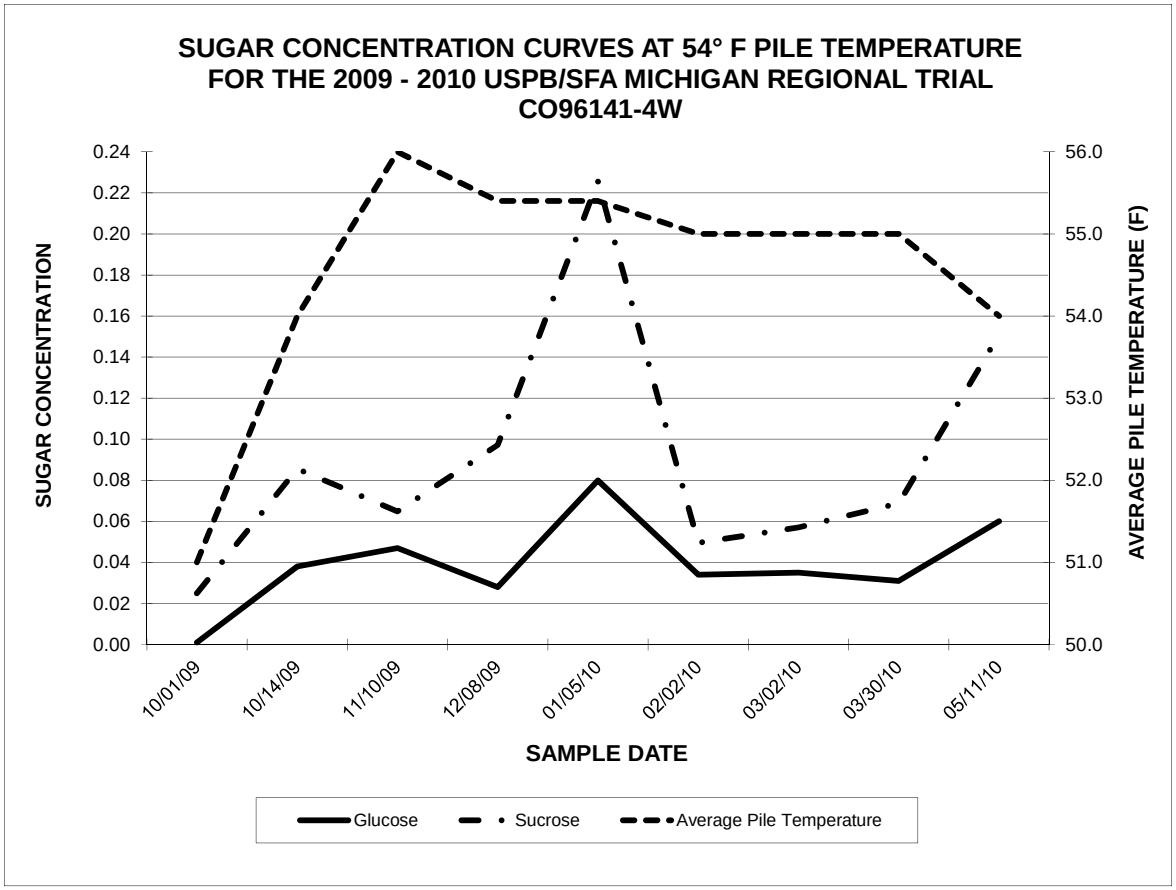

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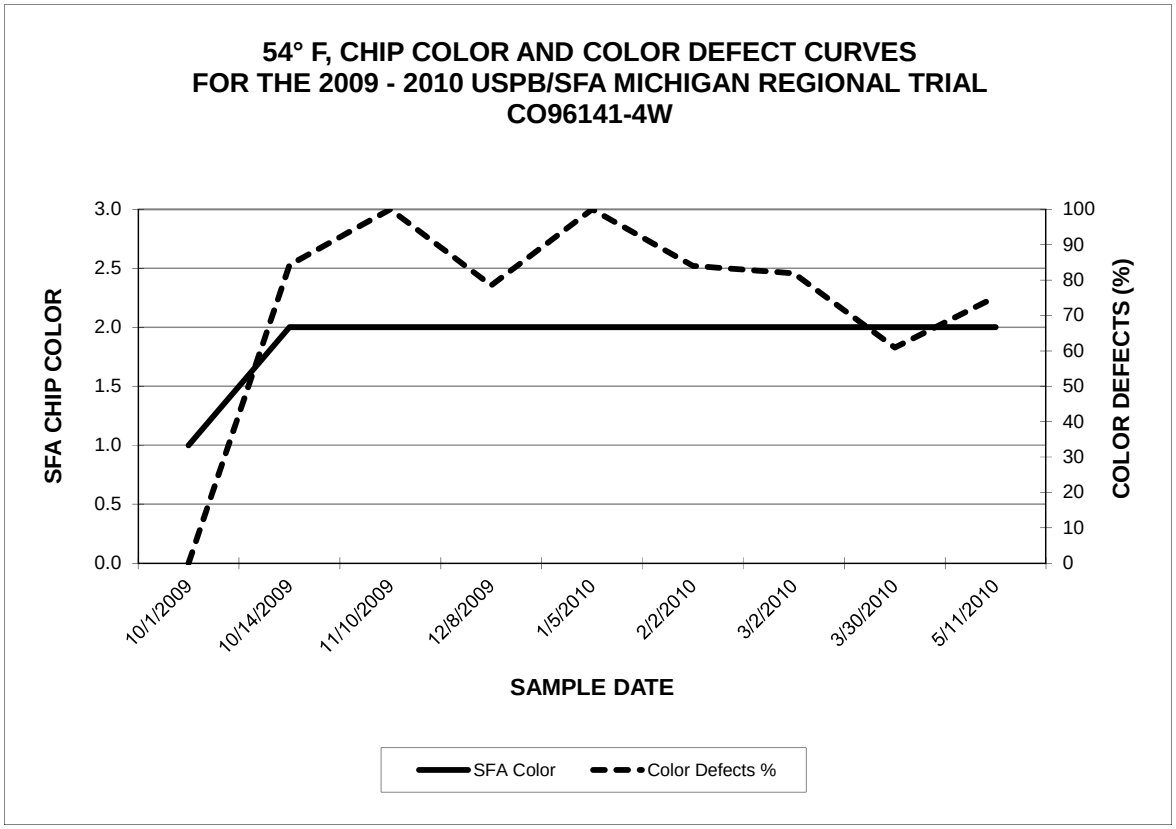

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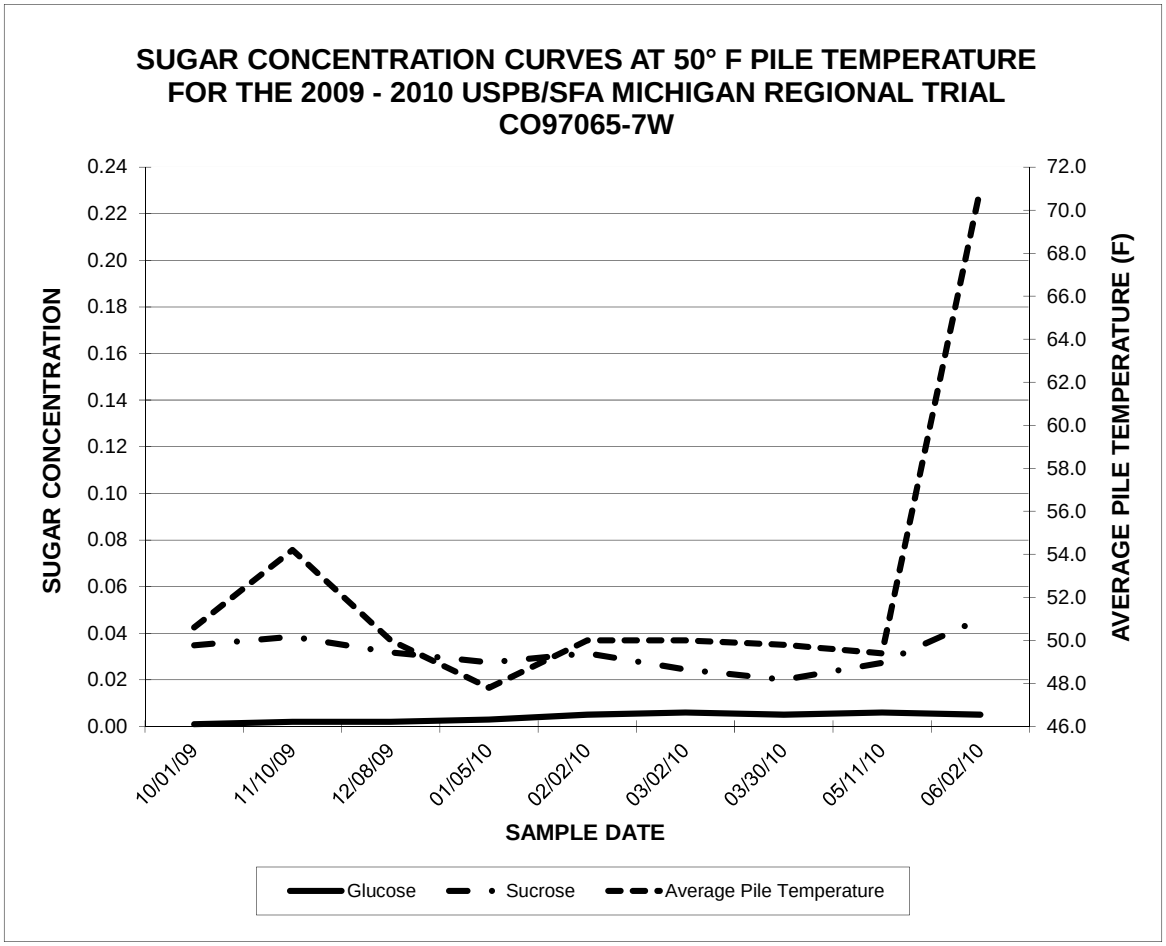

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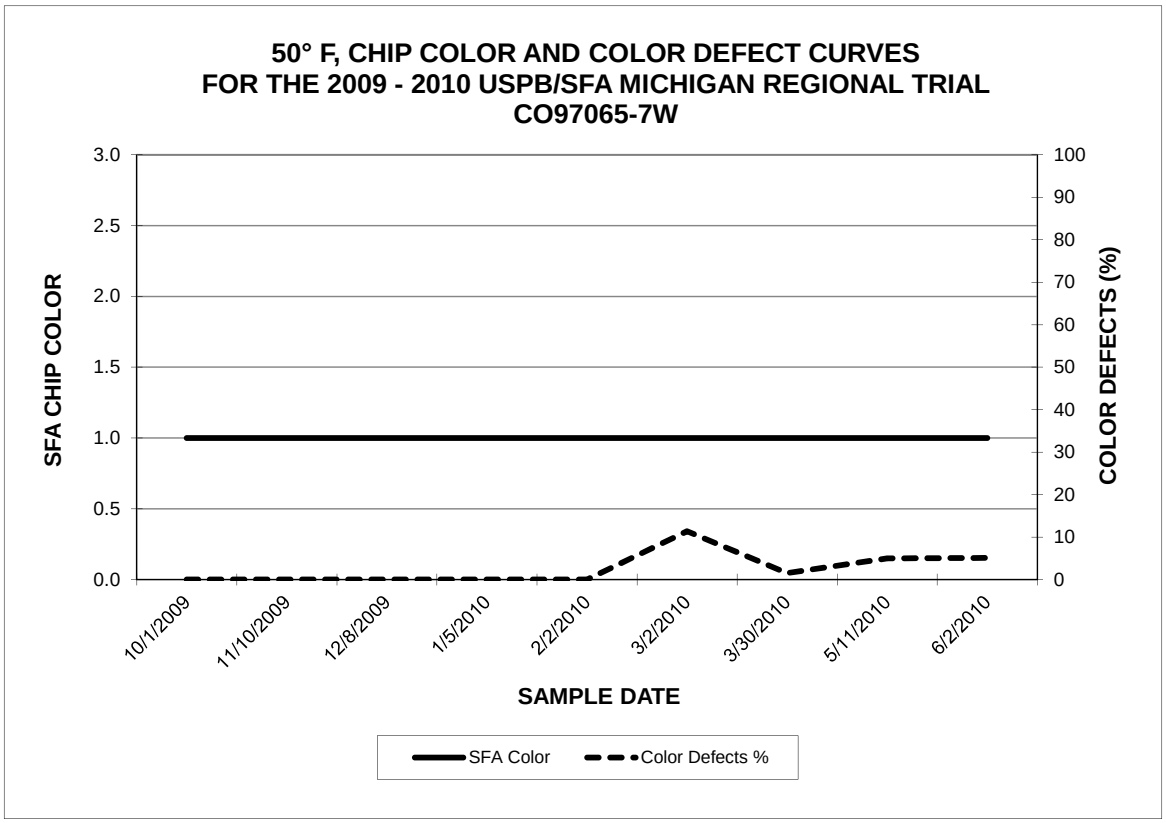
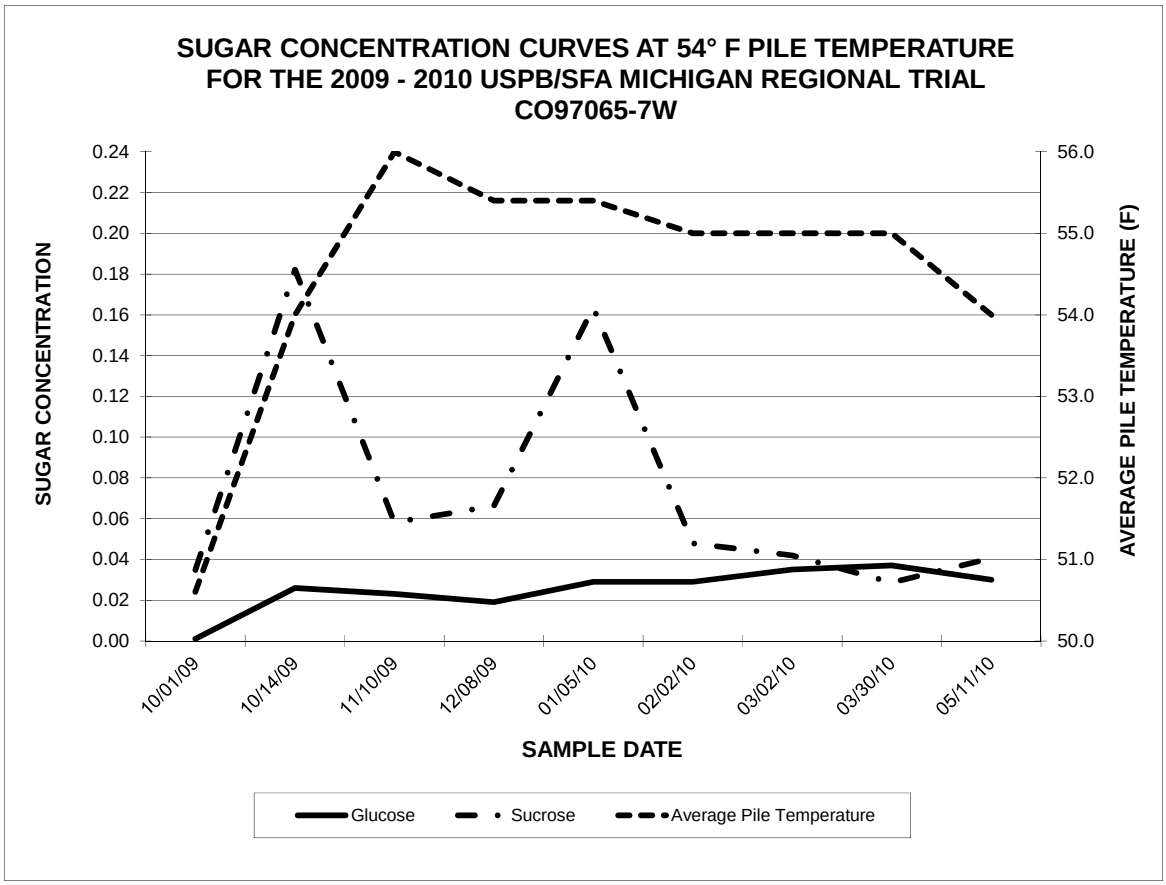


Figure 35.



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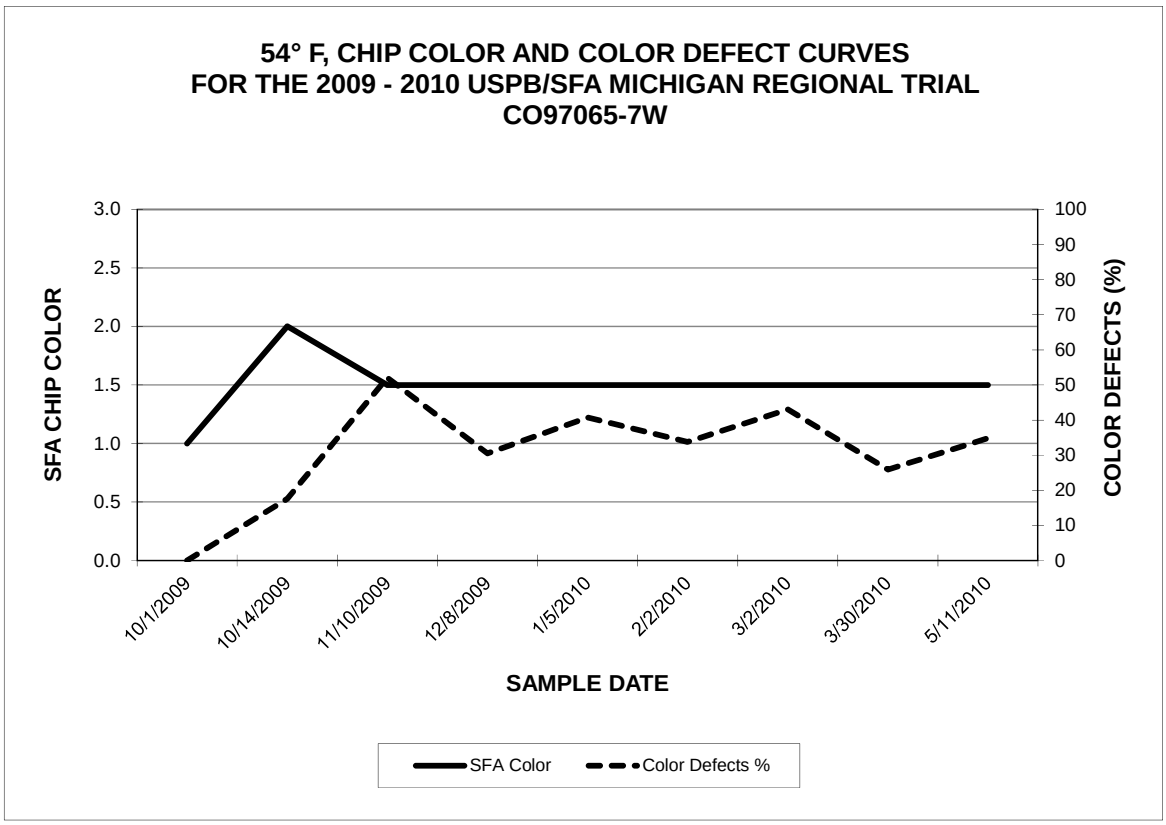

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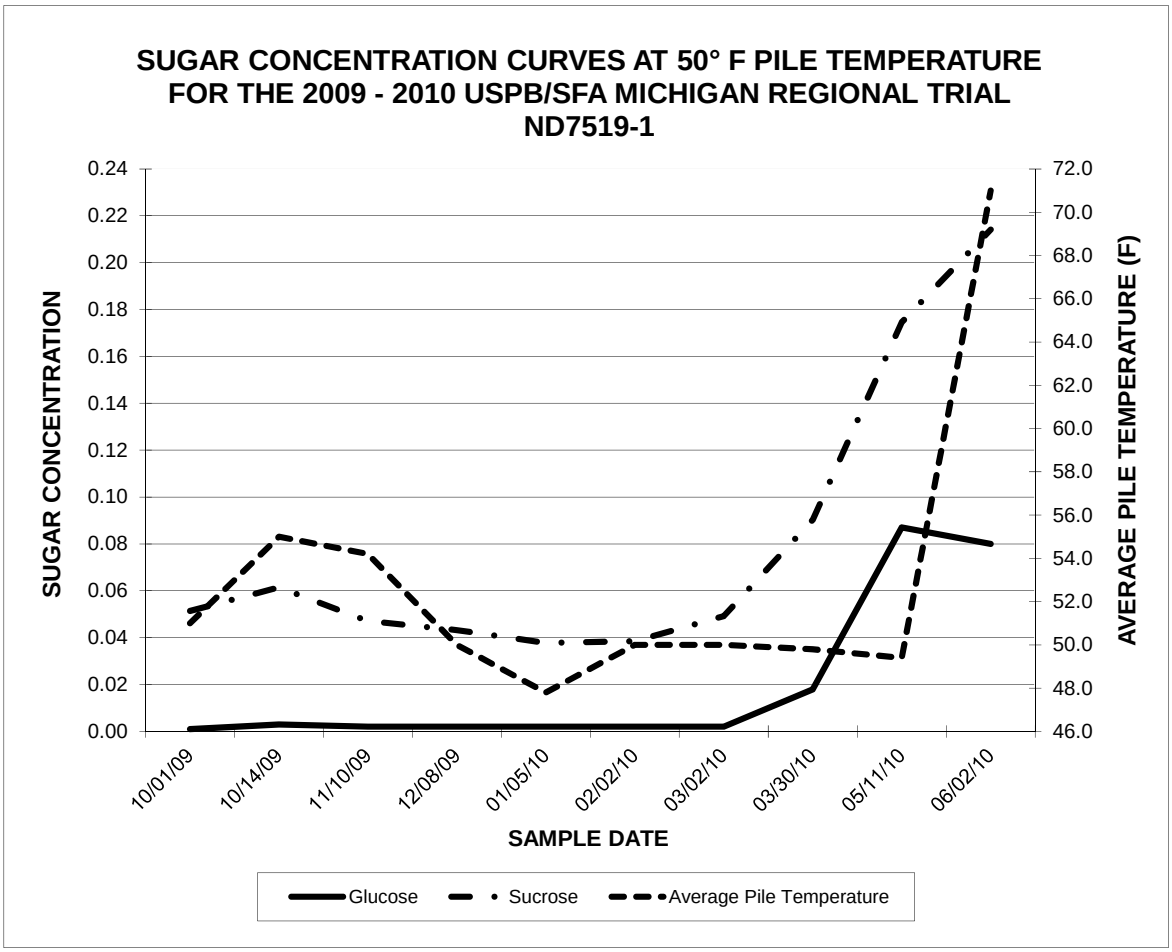

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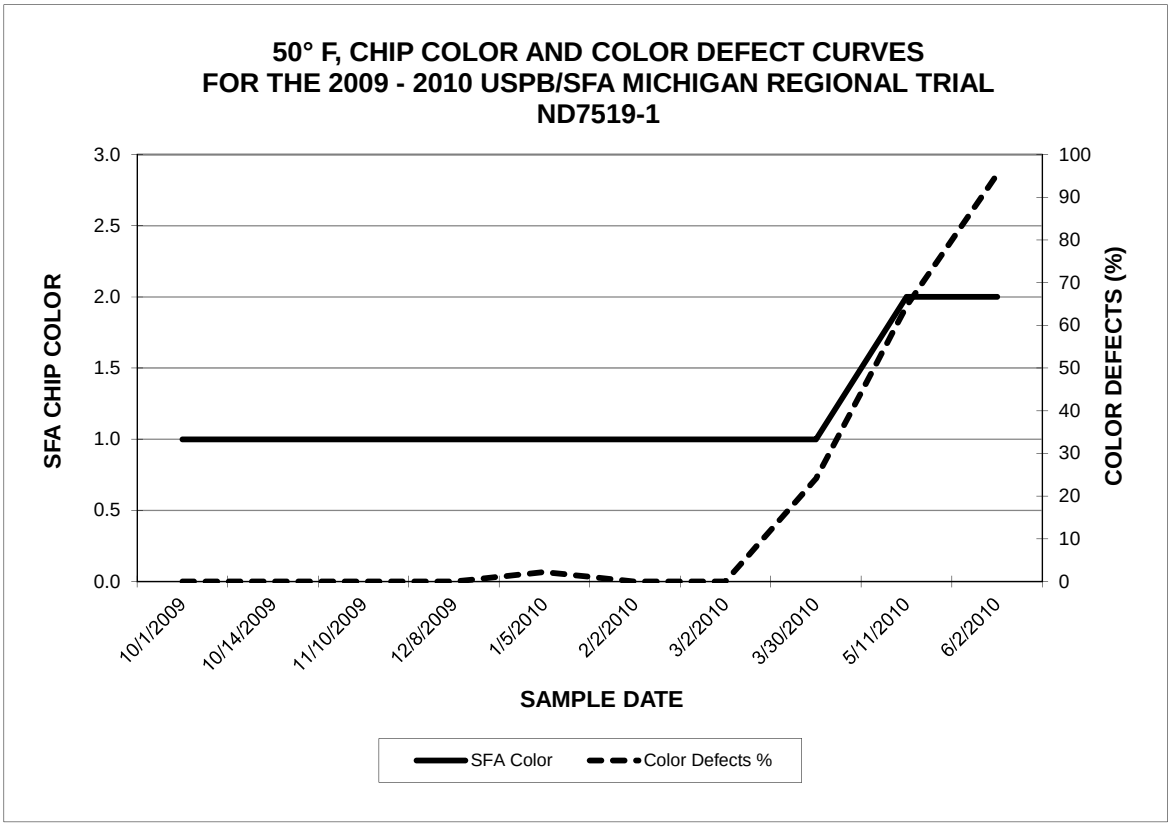

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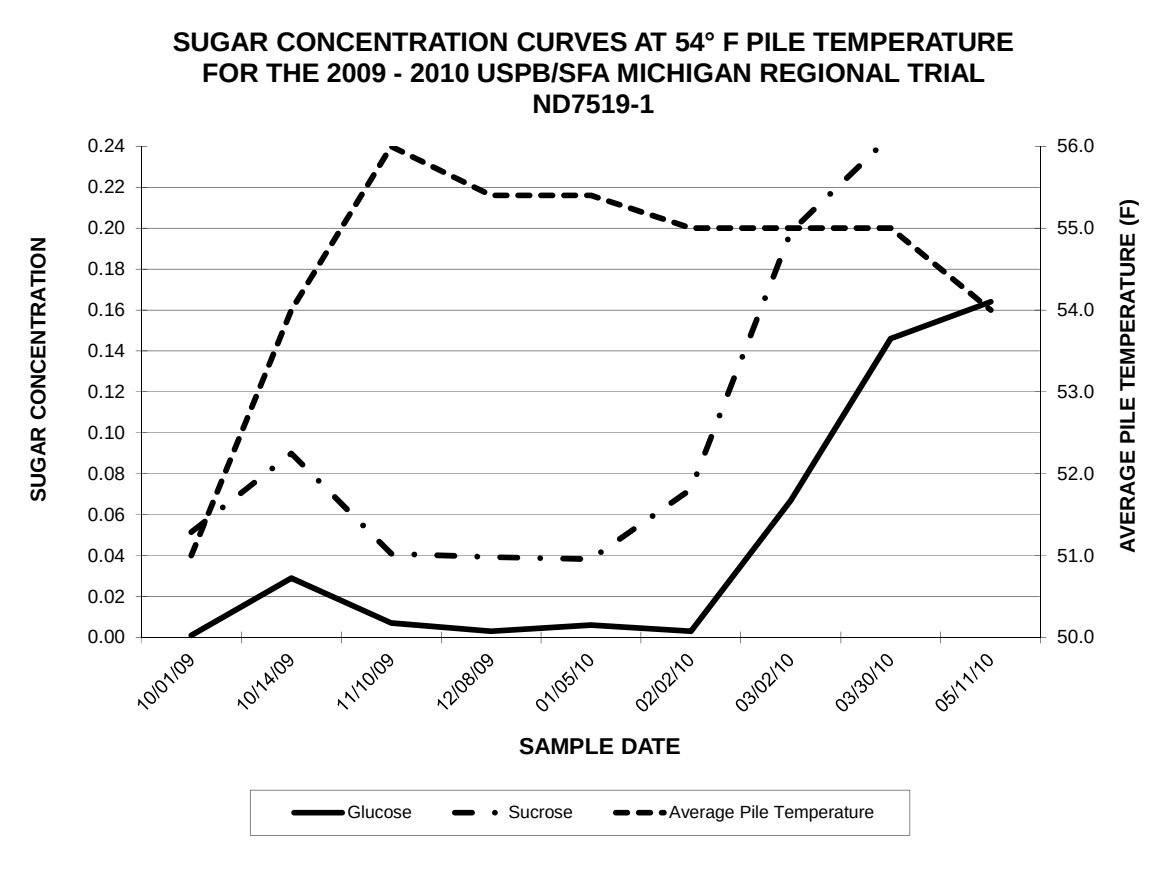

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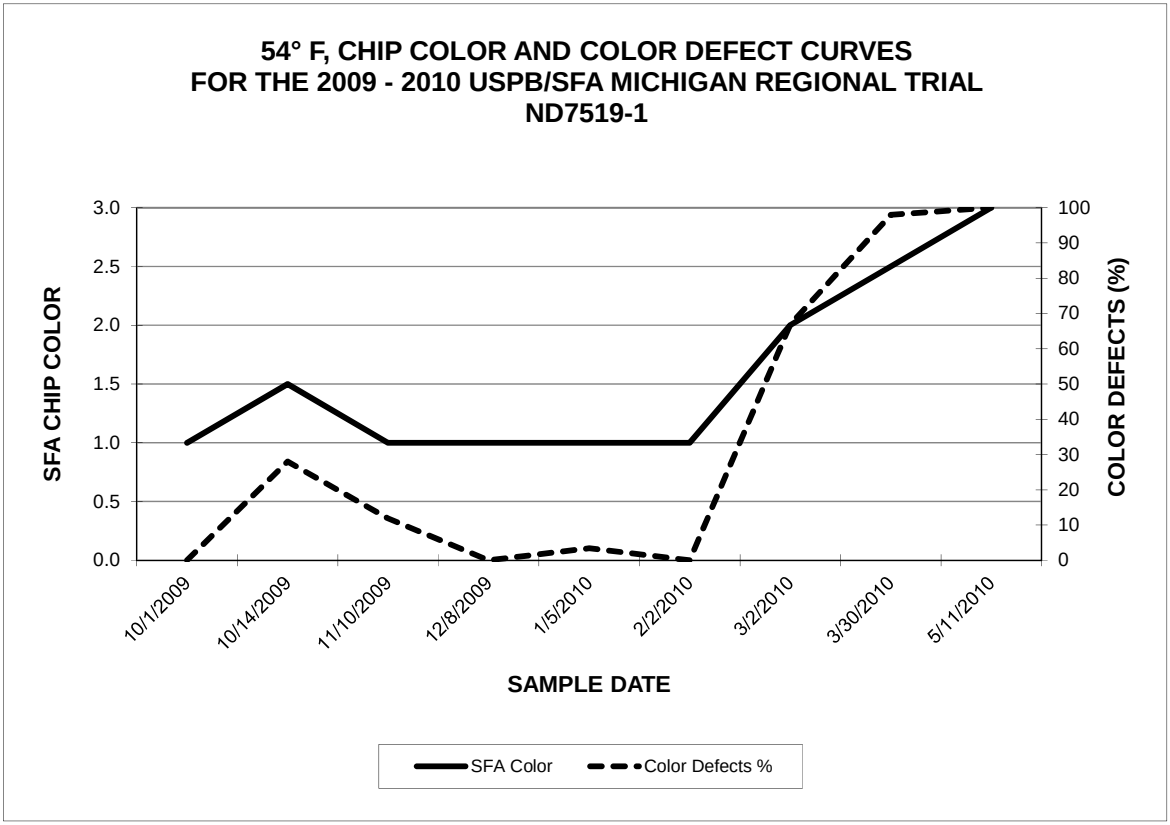

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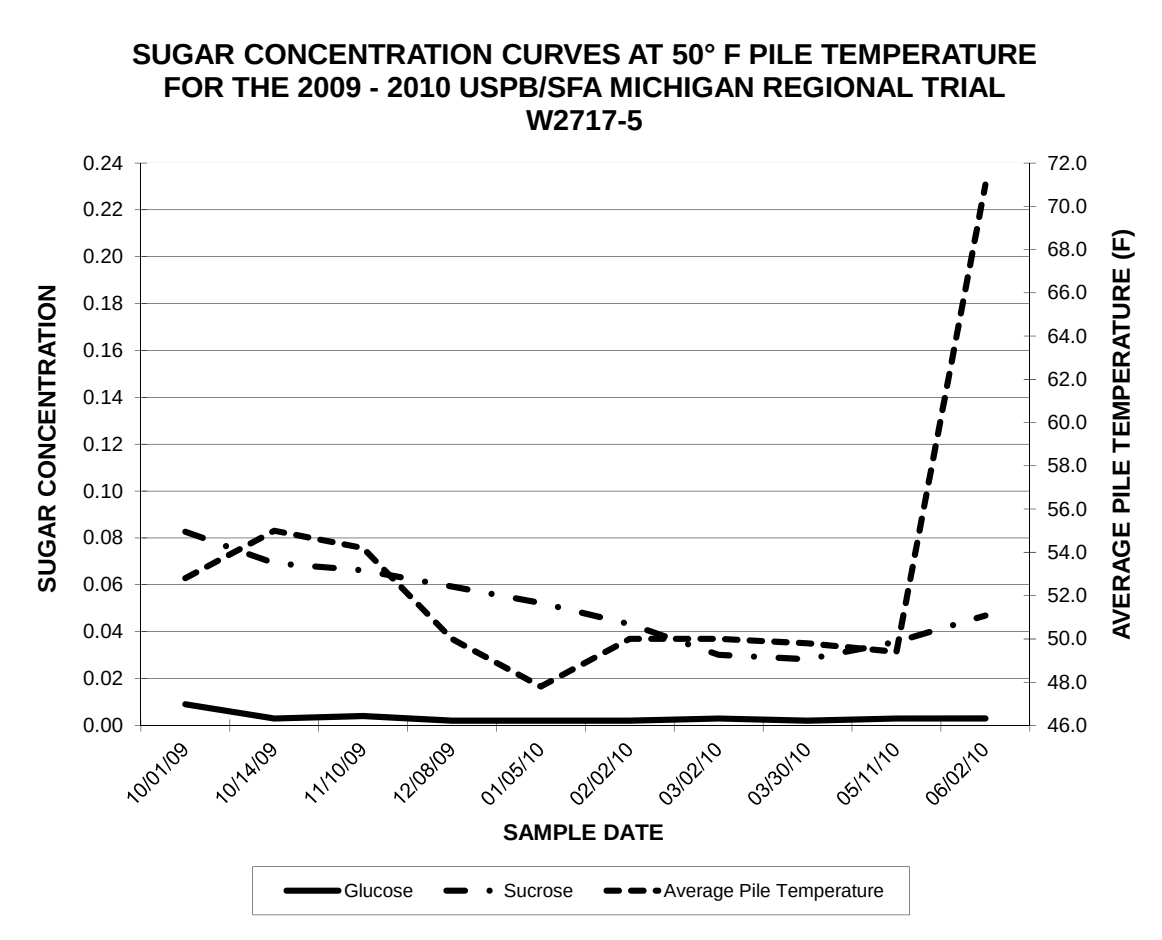

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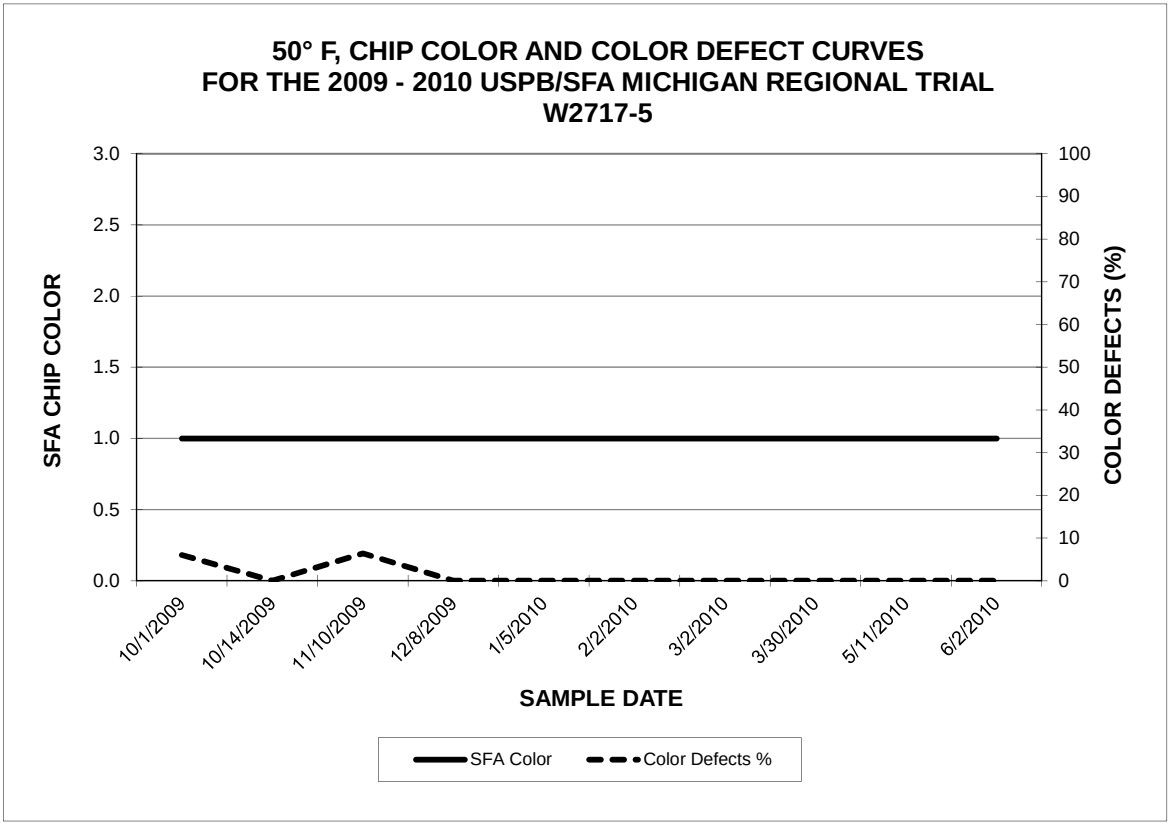

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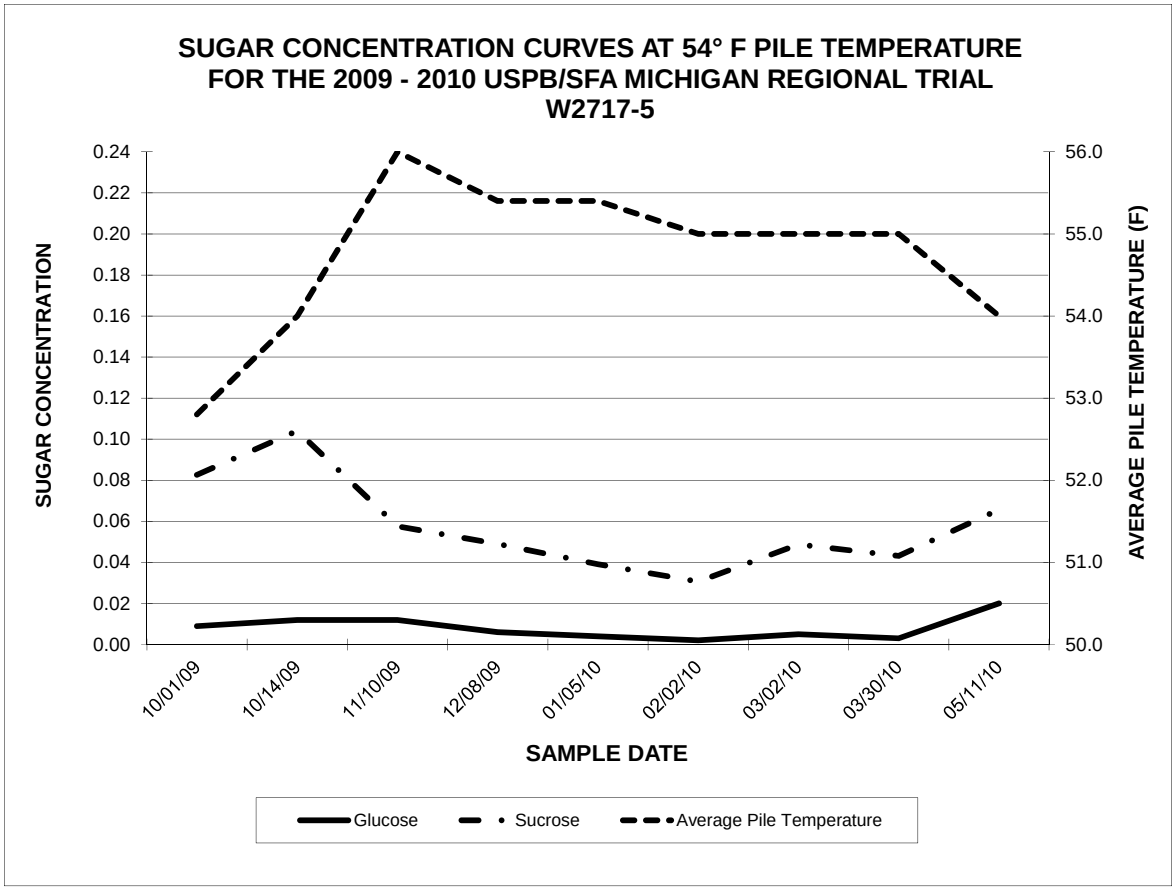

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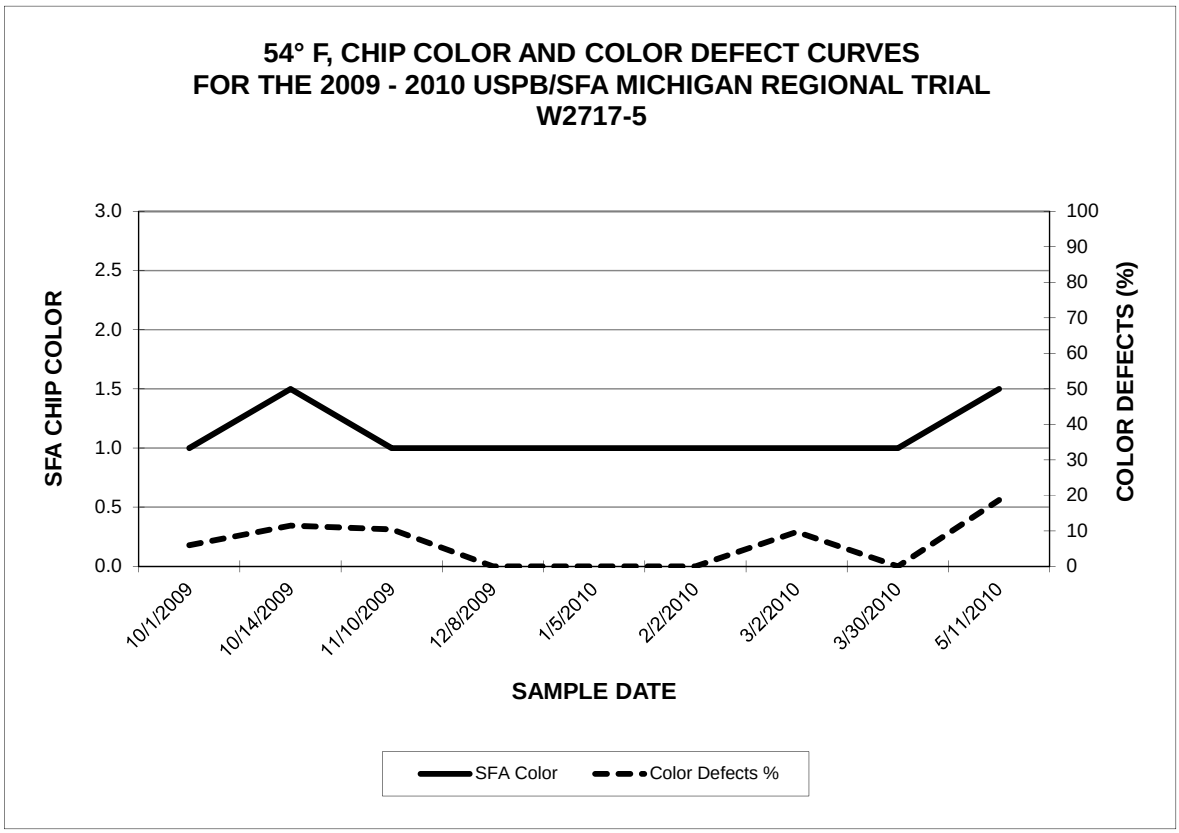

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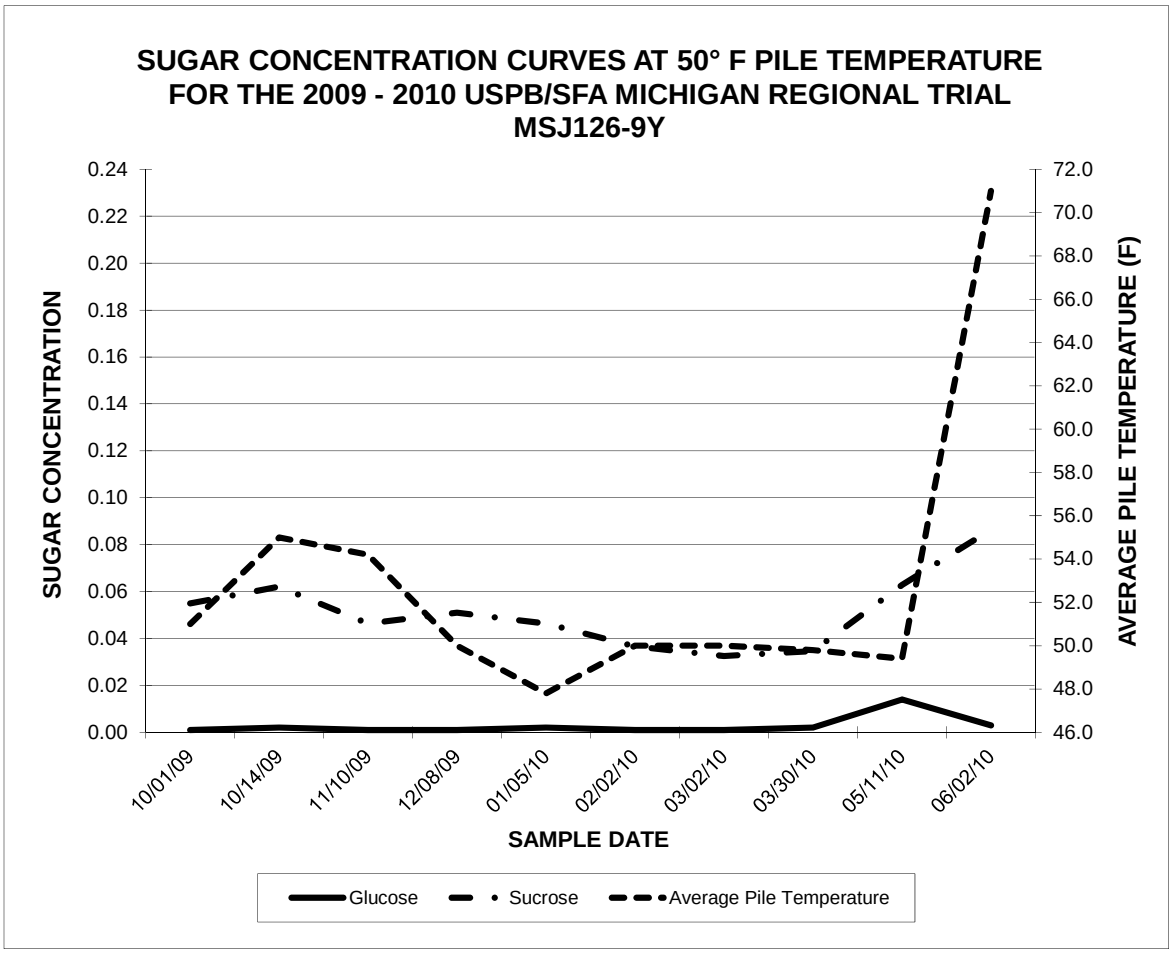

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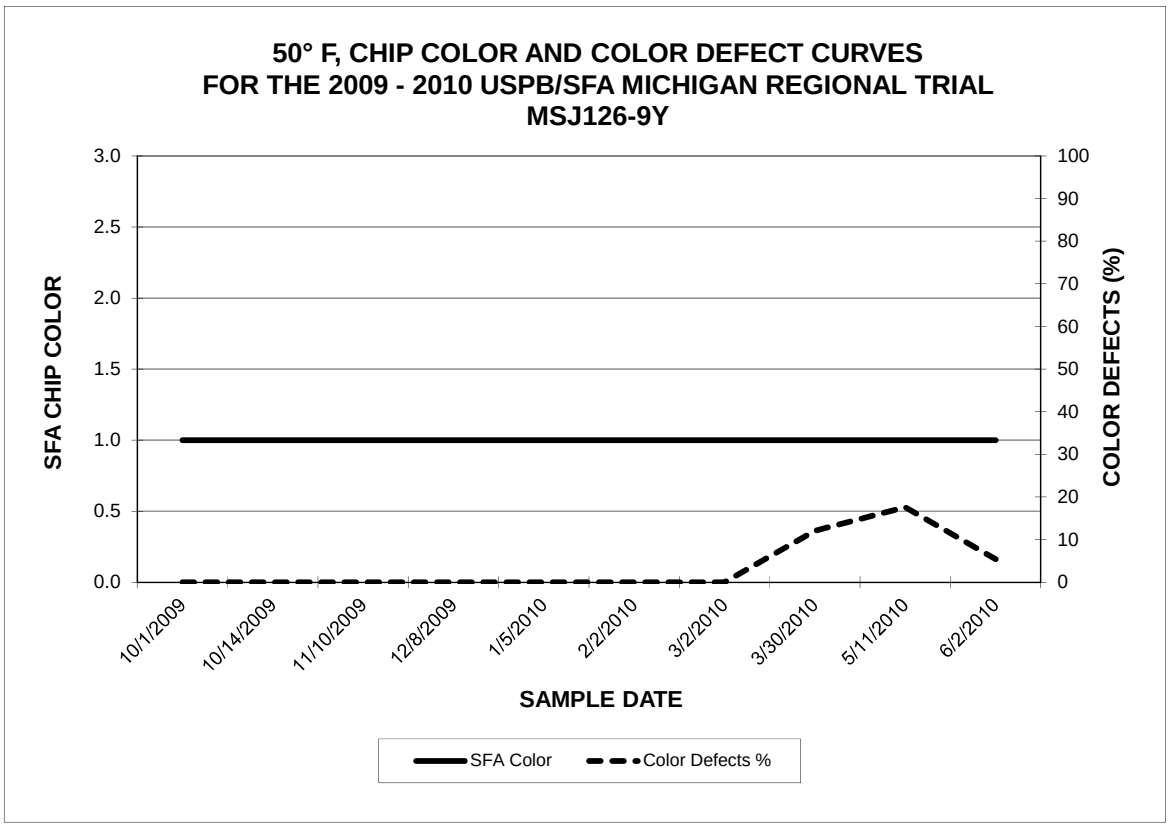

Figure 47.

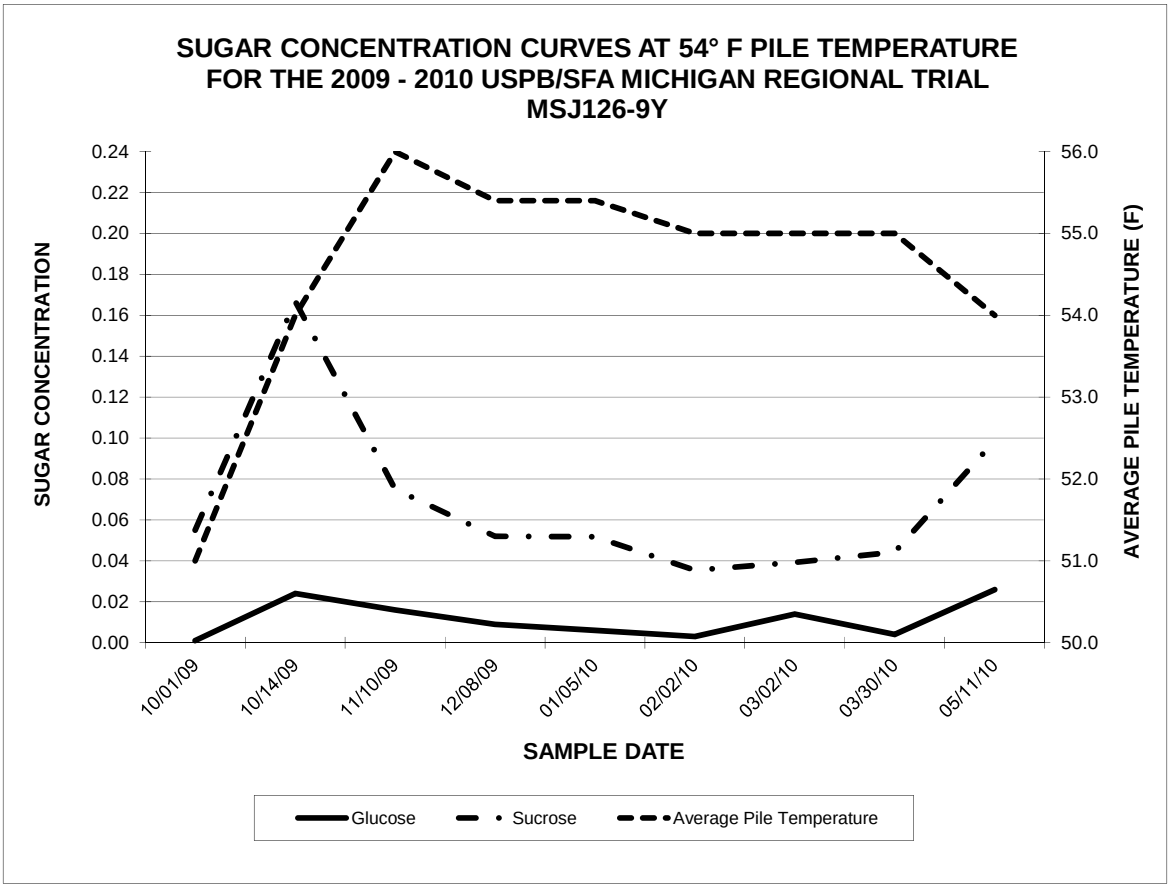

Figure 48.