

USPB / SFA
OUT-OF-STORAGE CHIP QUALITY
2014-2015 MICHIGAN REGIONAL REPORT

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Procedure:

The 2014 USPB / SFA Chip Trial was harvested on October 9, 2014, at Sandyland Farms LLC, Howard City, MI. The crop experienced 2670 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 to be evaluated in January 2015 and April 2015 at Herr Foods, Nottingham, PA. (Tables 1-2). The 40 pound tuber samples placed in the grower's commercial storage were removed from storage in mid-January 2015 and in early April 2015 with a pile temperature of 56 °F and 52 °F respectively. For sprout control, CIPC was applied to the storages in November 2014.

Eighteen, 30 tuber samples were also collected from each trial entry at harvest; nine, 30 tuber samples were stored at each of two temperatures. One sample bag for each month, at each of two temperatures, was stored in two separate bulk storages at the Michigan Potato Industry Commission's (MPIC) Cargill Potato Demonstration Storage Facility. One sample bag from each of the twelve varieties was stored at approximately 50 °F and 54 °F for monthly evaluation from October 2014 through June 2015. These samples from the MPIC storage were processed at Techmark, Inc. for sucrose and glucose values (percent of fresh weight), an SFA color score and an undesirable chip color rating. The undesirable chip color rating was reported as a percentage, by weight, of the total chips that were evaluated. See Figures 1 – 48. For sprout control, CIPC was applied in the MPIC storages in November 2014.

Results:

Tables 1 and 2 summarize the chip quality of the 40 pound samples after being processed at Herr Foods, Inc. on January 12th and April 6th, 2015. In Tables 1 and 2, the varieties are listed in chip quality performance order based on Herr Food's observations. As seen in Table 1, A01143-3C and A00188-3C exhibited the least amount of total chip defects on this processing date. Overall, Herr Foods ranked W5955-1 as the top performing chip quality variety in the January 12th fry test. W5955-1 was recorded as having the highest specific gravity in the trial on this processing date. In contrast, AF4157-6, A01143-3C and CO02024-9W recorded the lowest specific gravity in January 2015. W6609-3 recorded the highest Agron score on this date at 64.6.

From Table 2, W5955-1 was again selected by Herrs as being the best overall performer in the April 6th fry test, with 21.9 percent total chip defects recorded. W5955-1 also recorded the highest Agtron score on this date at 64.0. A01143-3C was recorded having the lowest percent of total chip defects at 17.9 percent.

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 2014 at two temperatures. Two graphs are provided for each line at each temperature, for a total of four graphs per line. The first graph at each temperature is the sugar concentration and average pile temperature curve, showing the relationship of the bin temperature on physiological age and sugar stability of each 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 comments about the varieties below are in alphabetical order. For yield and raw tuber quality data at harvest, please see the 2014 field trial results.

A00188-3C: This line yielded below the trial average in both 2013 and 2014. A00188-3C was reported to have mixed reviews from our processor cooperator. At the January processing date, A00188-3C was ranked second for overall chip quality, having the second fewest total chip defects on this date. In April 2015, this clone was ranked last for processing performance exhibiting edge browning and poor chip color related to simple sugar accumulation (Tables 1-2). This same trend was observed in the smaller storage samples, where A00188-3C chip processed well in December and January at both temperature as depicted in Figures 1-4. Prior to December 2014, this line had some free sugars affecting chip quality and then began to break dormancy in early February resulting in poor chip quality in mid to late season storage.

A01143-3C: A01143-3C was a strong yielding line in the 2014 on-farm variety trial. In addition, this clone ranked above average at Herr Foods on both chip processing dates. This variety recorded the fewest total chip defects, on both processing dates at 17.7 percent in January, 2015 and 17.9 percent in April 2015 (Tables 1-2). The sucrose and glucose levels, from the small bag samples that were stored at the cooler storage temperature, were trending upward from early 2015 through the end of the storage season (Figure 5). This is an odd result and not necessarily explainable. The increase in simple sugar did not result in poor chip quality as indicated by Figure 6. The 54 °F storage samples remained stable until mid-May resulting in good chip quality season long (Figures 7-8).

AC01151-5W: AC01151-5W was again a below average performer in the on-farm variety trial. This variety performed below the trial average at the January processing dates, but was ranked third overall in April at Herr Foods (Tables 1-2). Chip processing quality at the 50 °F storage temperature was variable through much of the storage season (Figure 10). At 54 °F, the sucrose and glucose levels remained stable until mid-April 2015, followed by a sharp

increase in the sucrose concentration in early May (Figure 11). Chip quality appears to have remained acceptable until early May (Figure 12).

AF4157-6: This clone was the poorest yielding variety in the 2014 on-farm trial. The chip quality at Herr Foods on both processing dates was ranked above average (Tables 1-2). Figures 13-14 show stable sucrose and glucose levels season long, resulting in acceptable chip quality through mid-April 2015. At the 54 °F storage temperature, the sucrose and glucose levels were moderately stable season long (Figure 15). Acceptable chip quality was observed through mid-April 2015 (Figure 16).

Atlantic: This check variety was the fourth highest yielding line in 2014. Atlantic provided a chip quality reference point for the variety trial directly out-of-the-field. Sugar data was collected for this variety through January 2015 (Figures 17-20).

CO02024-9W: The yield performance of this line was very good in the 2014 on-farm variety trial. The chip quality for this variety was ranked average to below average on both processing dates at Herr Foods (Tables 1-2). Sugar stability remained good for this clone at 50 °F until mid-April (Figure 21). The warmer storage temperature appears to have triggered dormancy break in mid-February (Figure 23). This reaction was delayed by approximately one and a half months at the cooler temperature (Figure 21). The cooler storage temperature appears to have maintained tuber quality for a longer period of time resulting in better chip quality later in the season (Figure 22). The warm storage temperature resulted in tubers that expressed a greater variability in chip quality (Figure 24).

CO02321-4W: The chip quality performance for this variety was ranked as average at Herr Foods on both processing dates (Tables 1-2). The sucrose values of this line were stable at 50 °F until mid-April 2015, recording good chip quality season long at this storage temperature (Figures 25-26). At 54 °F, sucrose levels began to rise in mid-April 2015 with no impact on chip quality being observed until late April (Figures 27-28).

CO03243-3W: This variety had a strong agronomic performance in 2014, ranking 1st overall in yield. CO03243-3W had an average to below average chip quality performance at Herrs in January and April 2015 (Tables 1-2). The sucrose values of this line were stable at 50 °F until mid-April 2015, recording good chip quality season long at this storage temperature (Figures 29-30). Similar chip quality was observed at the 54 °F storage temperature with stable sugar values being exhibited through mid-April. Elevated glucose levels were observed after late April 2015 (Figure 31). Chip quality appeared to remain stable until mid-April, at which time the chip defect levels began to increase (Figure 32).

MSL007-B: This variety exhibited an above average yield in the 2014 on-farm trial. In January 2015, Herrs ranked MSL007-B 8th overall for chip quality performance (Table 1). In

April 2015, at Herrs, MSL007-B was below average due to internal color and edge defects being present in the finished chips (Table 2). At 50 °F, the sucrose and glucose levels rose steadily from mid-February 2015 through the remainder of the storage season (Figure 33). The glucose levels appear to have been elevated season long resulting in marginal chip quality at this temperature for most of the season. The sucrose and glucose increases were similar at 54 °F to the cooler storage temperature (Figures 33, 35). The chip quality performance for this variety was similar at both temperatures (Figures 34, 36). This variety struggled to clean-up and look good at any point during the storage season.

Snowden: Snowden was ranked last at Herr Foods on January 12th, 2015, then was ranked 6th on the April 6th, 2015 processing date (Tables 1-2). The bag samples, at both storage temperatures appeared to lose sugar stability in mid-February 2015 (Figures 37, 39). The effects of the elevated sucrose and glucose levels, have a greater impact on chip color more quickly at 54 °F (Figures 39-40). At the cooler storage temperature, Snowden chip processed acceptably into mid-April 2015 (Figure 38).

W5955-1: W5955-1 yielded at the trial average in 2014. On both processing dates, at Herr Foods, this line ranked the highest for chip processing quality (Tables 1-2). The chip quality of W5955-1 on April 6th was recorded as having the third fewest total chip defects of the varieties evaluated. For the small bag samples stored at the cooler storage temperature, the sugar levels remained very stable all season long (Figure 41). This resulted in good chip quality until early May 2015 (Figure 42). Tubers from this line, when stored at the warmer (54 °F) temperature, began losing sugar stability in mid-March and rapidly increased in simple sugar concentration (Figure 43). Chip quality also declined quickly in mid-March 2015 resulting in poor chip quality after this period (Figure 44).

W6609-3: W6609-3 was a low yielding line in the 2014 on-farm variety trial. W6609-3 was ranked above average for chip quality at Herr Foods on both processing dates (Tables 1-2). In the small bag samples, sugar levels were stable at the colder storage temperature until mid-March (Figure 45-46), resulting in good chip quality during this period. The warmer 54 °F storage sample performed similarly to that of the cooler storage temperature with a rapid increase in simple sugar concentration in early March (Figures 47-48).

Table 1. 2014 SFA Variety Trial January 12, 2015¹

Entry	Agron Color	SFA ² Color	Specific Gravity	Percent Chip Defects ³			Comments
				Internal	External	Total	
W5955-1	60.8	2	1.079	17.2	21.0	38.2	Good chip color. Light scab, some greening. Oversize to 4".
A00188-3C	60.8	2	1.076	9.4	17.8	27.2	Nice chip color. Cracks and some bruising. Size ok to small.
AF4157-6	58.2	3	1.070	16.5	26.4	42.9	Some blotching at stemend, otherwise good color. Some pitted scab. Size ok.
A01143-3C	57.5	3	1.070	9.0	8.6	17.6	Defects in chips, otherwise good color. Good externals. Good overall size, Low gravity.
W6609-3	64.6	3	1.073	8.5	29.0	37.5	Defects in chips. Some bruise.
CO02321-4W	58.5	3	1.076	18.9	18.5	37.4	Some edge browning. Light scab, blotches on skin. Good overall size.
CO03243-3W	58.6	3	1.074	13.8	24.0	37.8	Green, defects on chips. Pitted scab. Lots of undersize (1 1/2").
MSL007-B	58.4	3	1.072	29.4	12.6	42.0	Light shading and vascular. Nice size and grade. Good externals.
CO02024-9W	57.3	3	1.068	27.1	15.9	43.0	Defects in chips. Scab, bruise, starch deposits. Low specific gravity. Good size.
ACO1151-5W	57.9	3	1.072	13.4	19.7	33.1	Vascular, starch pockets in chips. Lots of pitted scab. Too small.
Atlantic	56.3	4	1.074	25.3	42.0	67.3	Poor chip color. A few surface defects. Some oversize to 4 1/2".
Snowden	59.1	4	1.076	26.4	27.6	54.0	Lots of chip defects. Lots of pitted scab. Nice size.

¹Samples collected at harvest on October 9th, 2014, and processed by Herr Foods, Inc., Nottingham, PA on January 12, 2015.

Chip defects are included in Agron and SFA samples.

²SFA Color: 1= lightest, 5 = darkest

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

Table 2. 2014 SFA Variety Trial April 6, 2015¹

Entry	Agron Color	SFA ² Color	Specific Gravity	Percent Chip Defects ³			Comments
				Internal	External	Total	
W5955-1	64.0	3	1.068	7.8	14.1	21.9	Hollow heart. Good chip color. External bruise. Oversize to 4".
A01143-3C	63.1	3	1.071	5.4	12.5	17.9	Hollow heart. A few green, starch pockets. Good chip color. Good externals. Oversize to 4".
AC01151-5W	57.4	3	1.067	8.1	11.9	20.0	A few starch pockets. Good chip color. Pitted scab. Good size profile.
W6609-3	58.9	3	1.069	15.9	23.0	38.9	A few light necrosis. Light scab, good externals overall. Some oversize to 4".
AF4157-6	60.7	4	1.070	13.9	10.4	24.3	A few green, good chip color. Pitted scab. Good size profile.
Snowden	58.7	4	1.069	17.5	22.2	39.7	Hollow heart. Edge chip color, light shading. Pitted scab, external bruise. Good size, round.
CO02321-4W	56.7	5	1.073	22.1	21.1	43.2	Black edge defects on chips. Pitted scab, dry rot. Oversize to 4".
CO03243-3W	62.5	4	1.070	28.3	19.7	48.0	Light chip shading. Bruising with dry rot, scab. Large grade.
CO02024-9W	57.8	4	1.072	39.3	13.6	52.9	Edge defects, some vascular. Bruise, Pitted scab. Good size profile.
MSL007-B	55.2	5	1.068	44.9	33.3	78.2	Black chip edge defects. Color blotches. External injury/bruise with dry rot. Large grade, oversize.
A00188-3C	59.6	5	1.074	53.9	16.6	70.5	Chip edge color, poor overall color. Light scab, mechanical injury. Uniform, good size profile.

¹Samples collected at harvest on October 9th, 2014, and processed by Herr Foods, Inc., Nottingham, PA on April 6th, 2015.

Chip defects are included in Agron and SFA samples.

²SFA Color: 1= lightest, 5 = darkest

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

Figure 1.

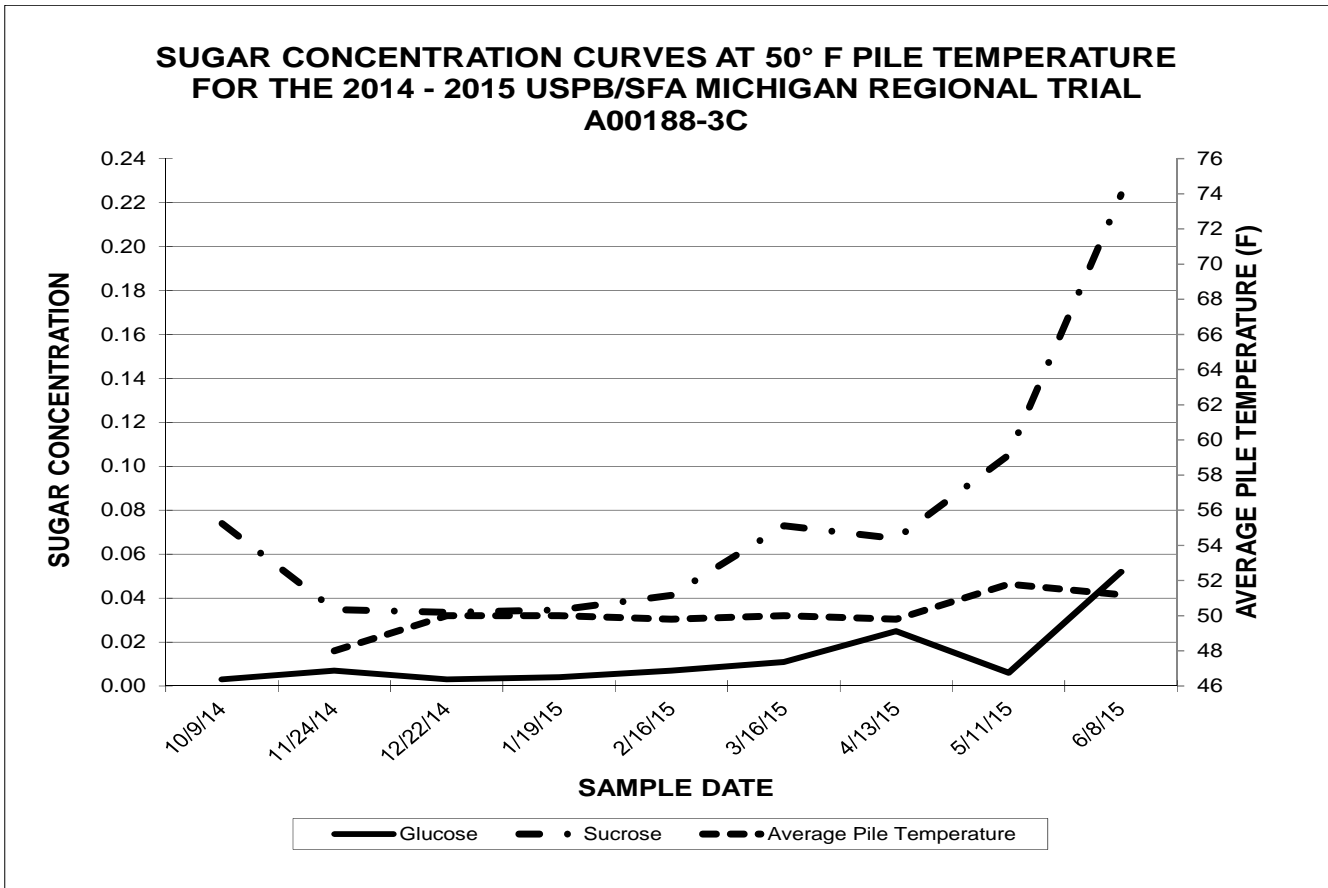


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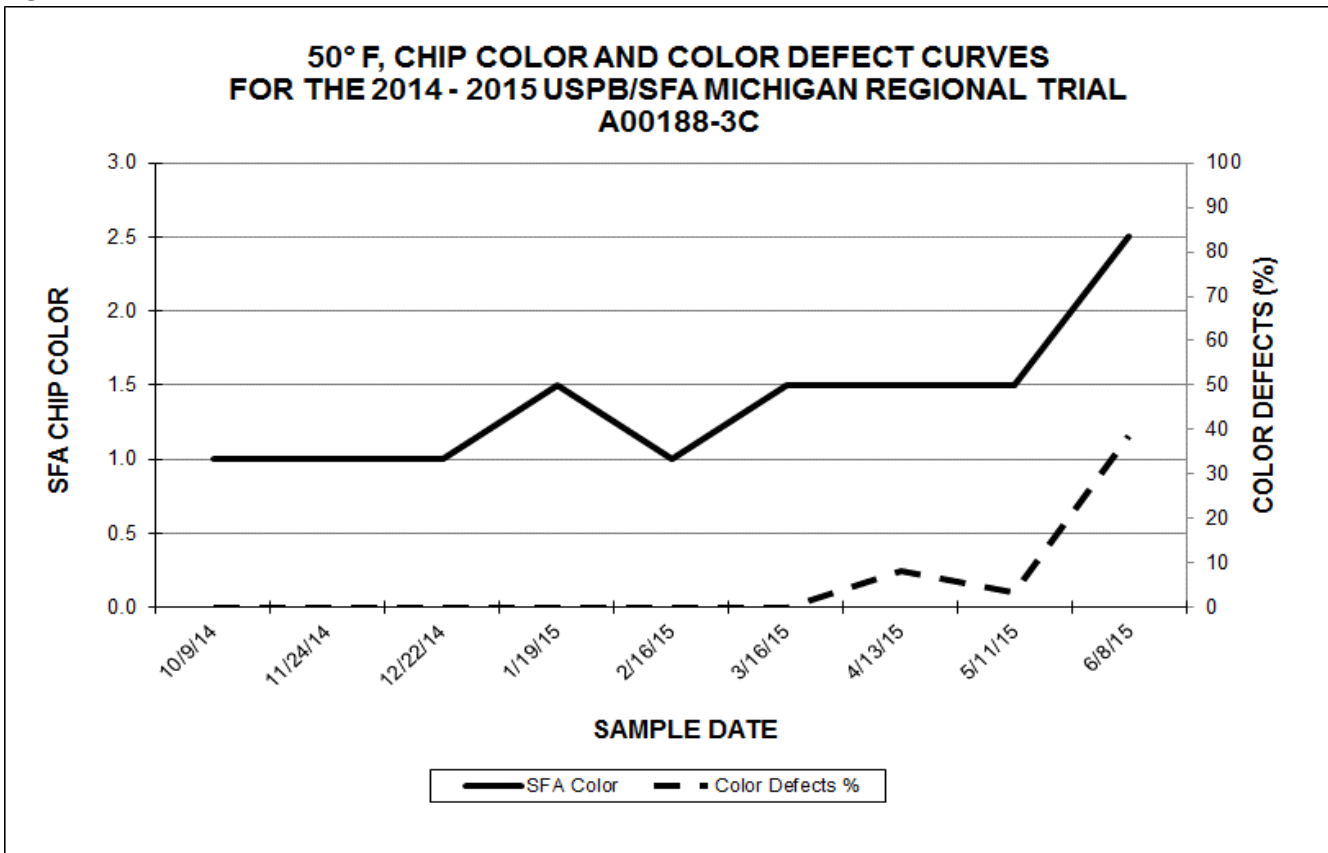


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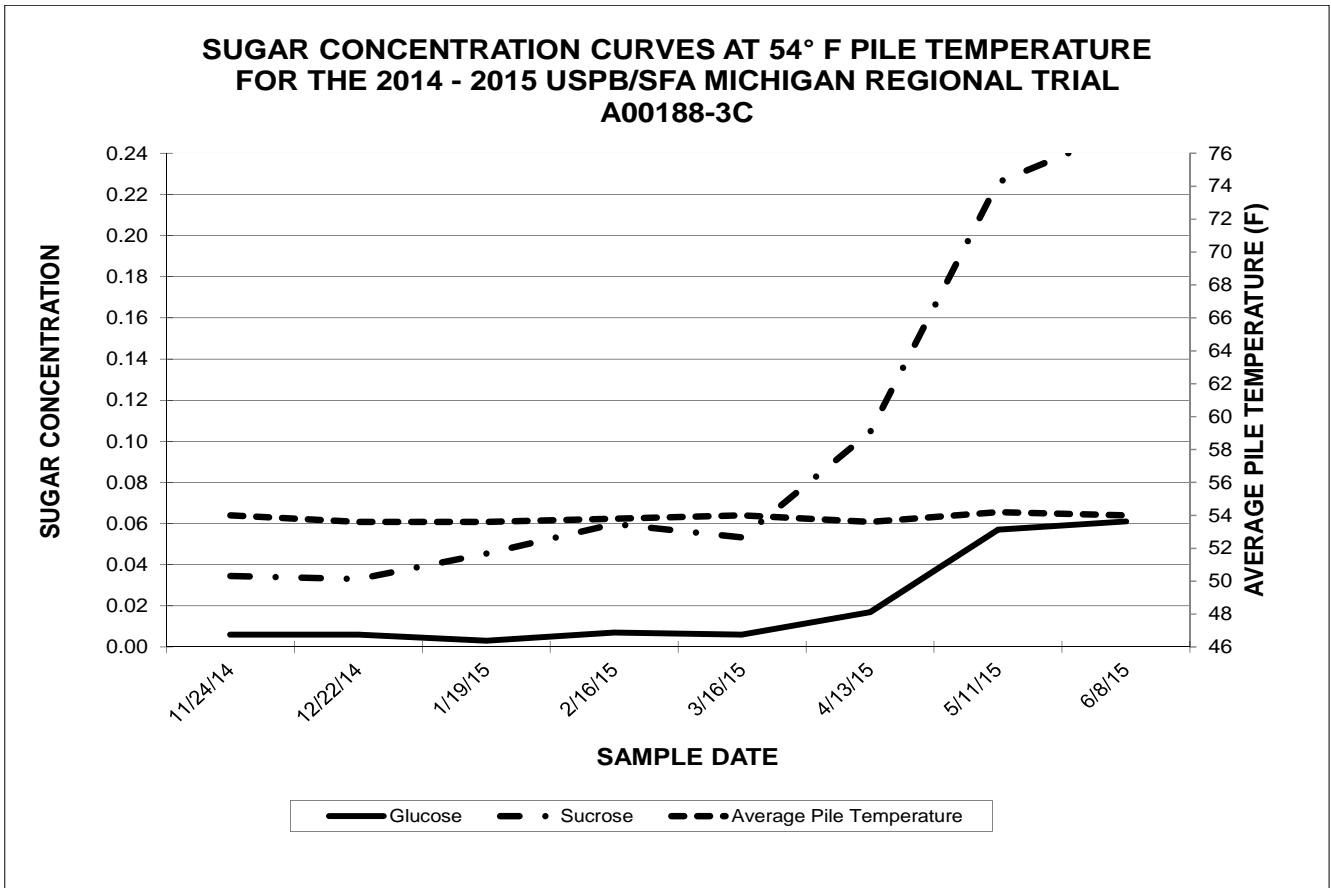


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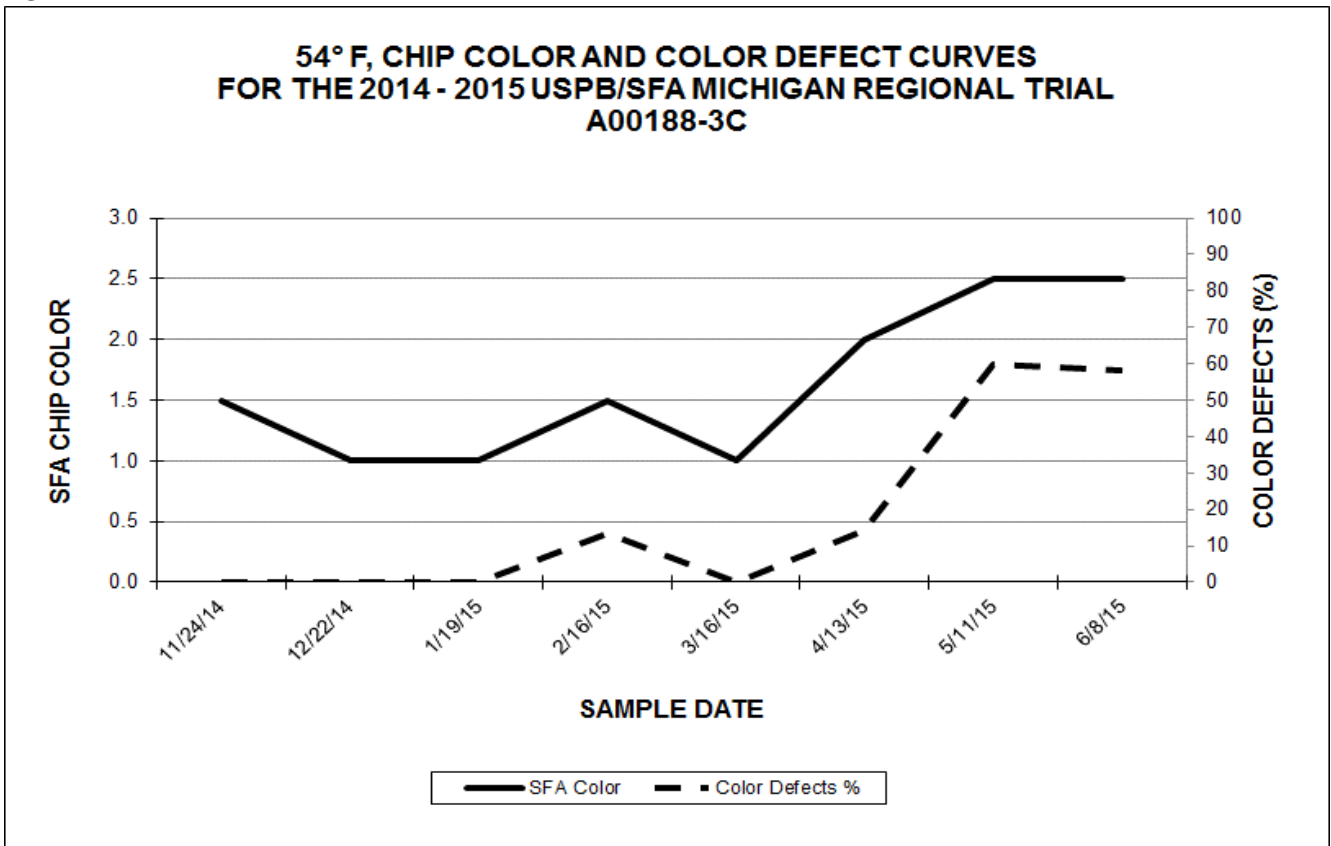


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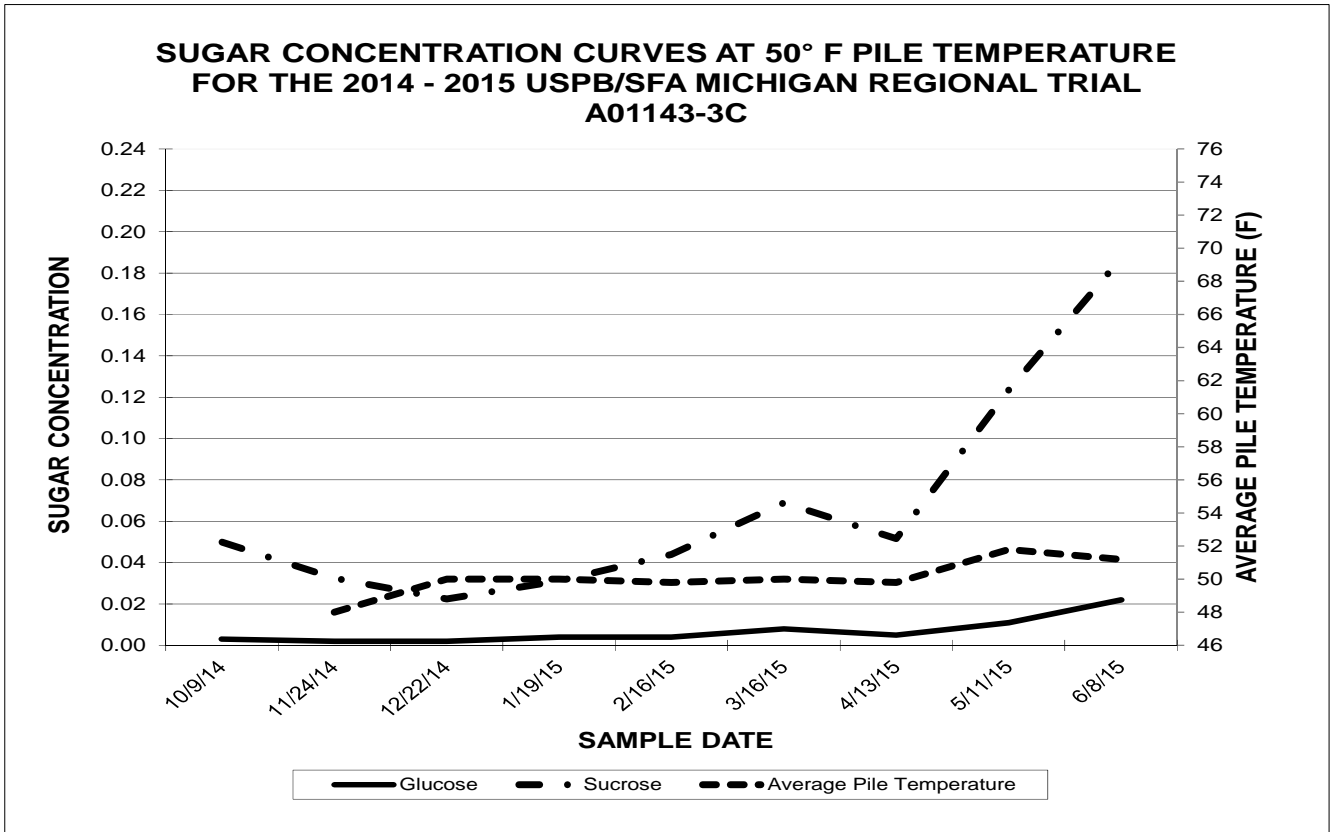


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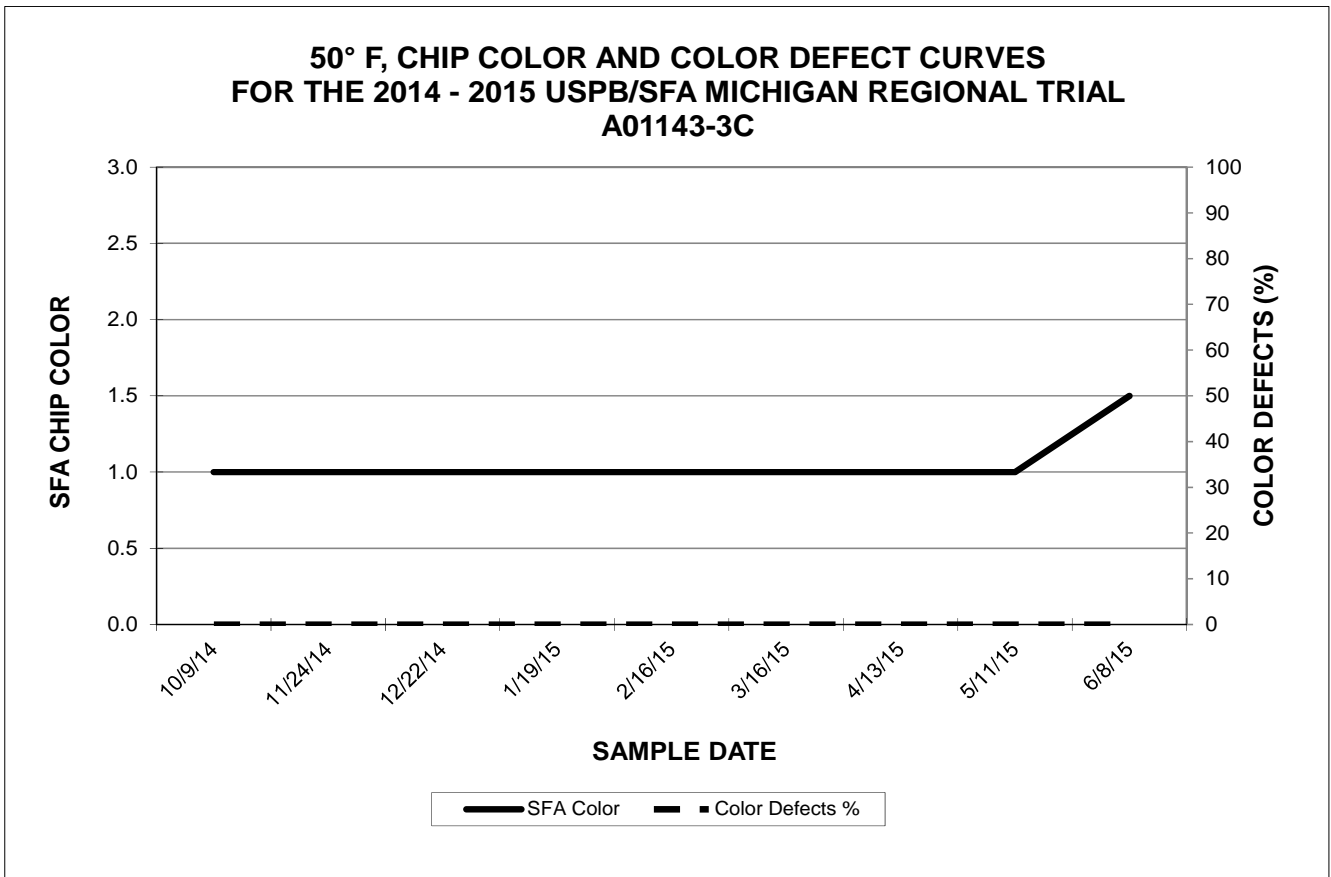


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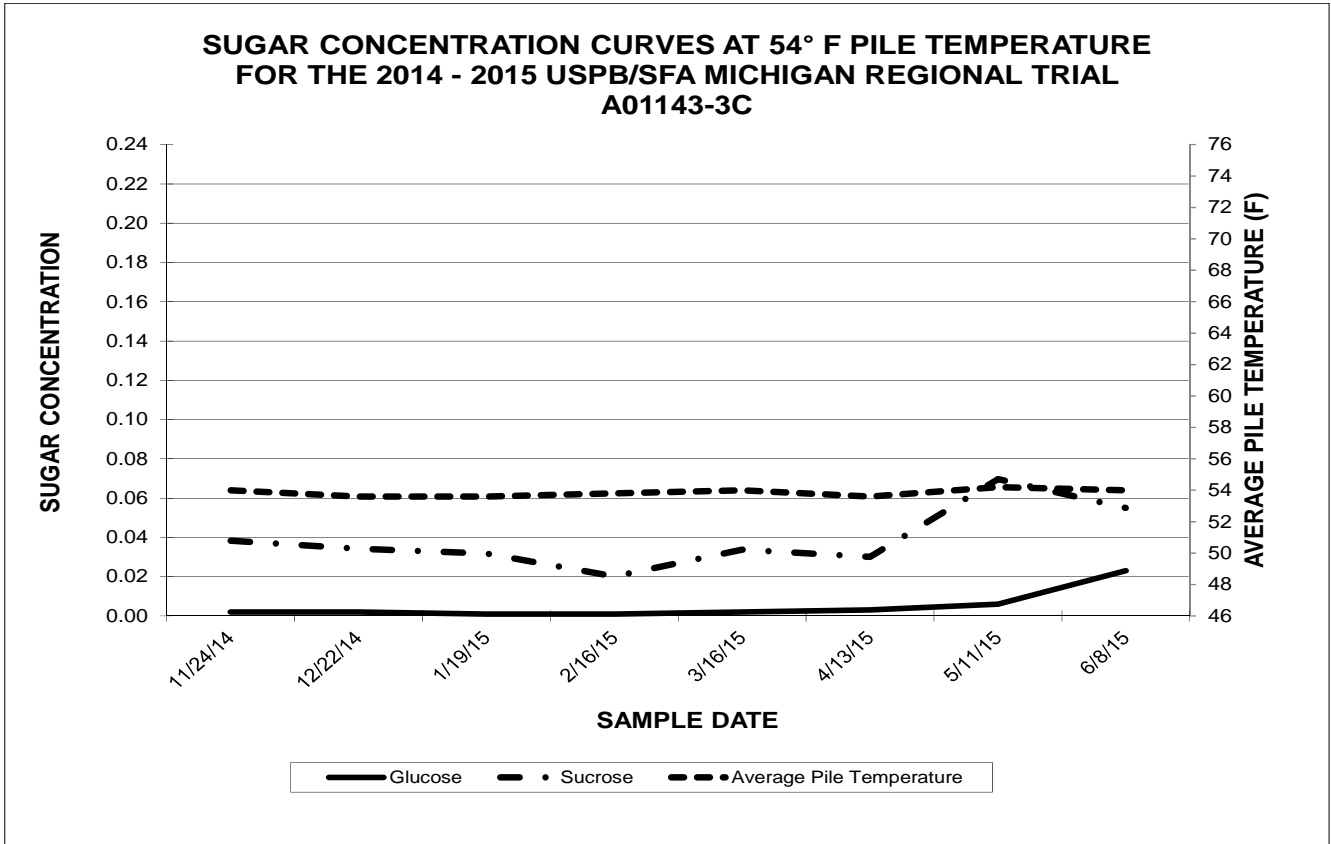


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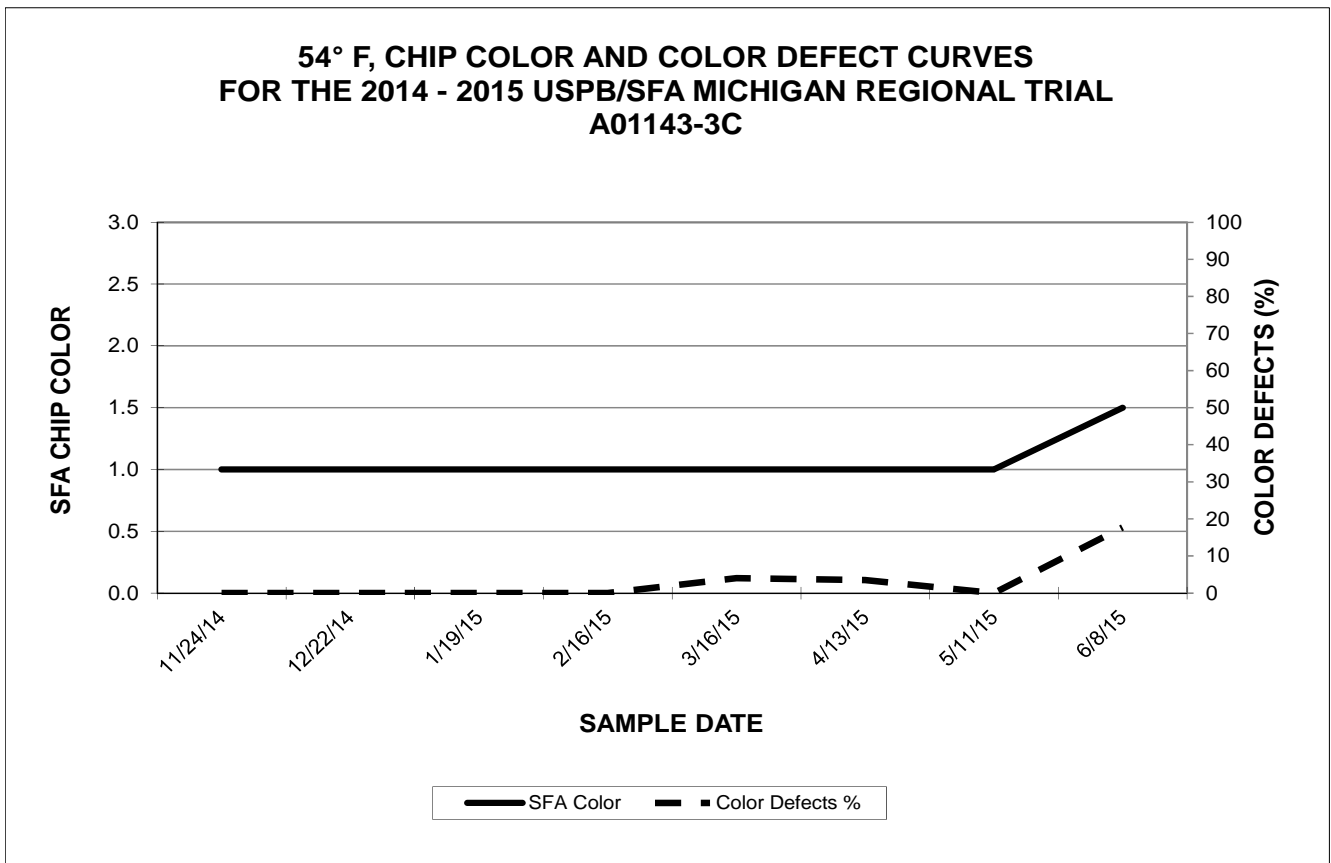


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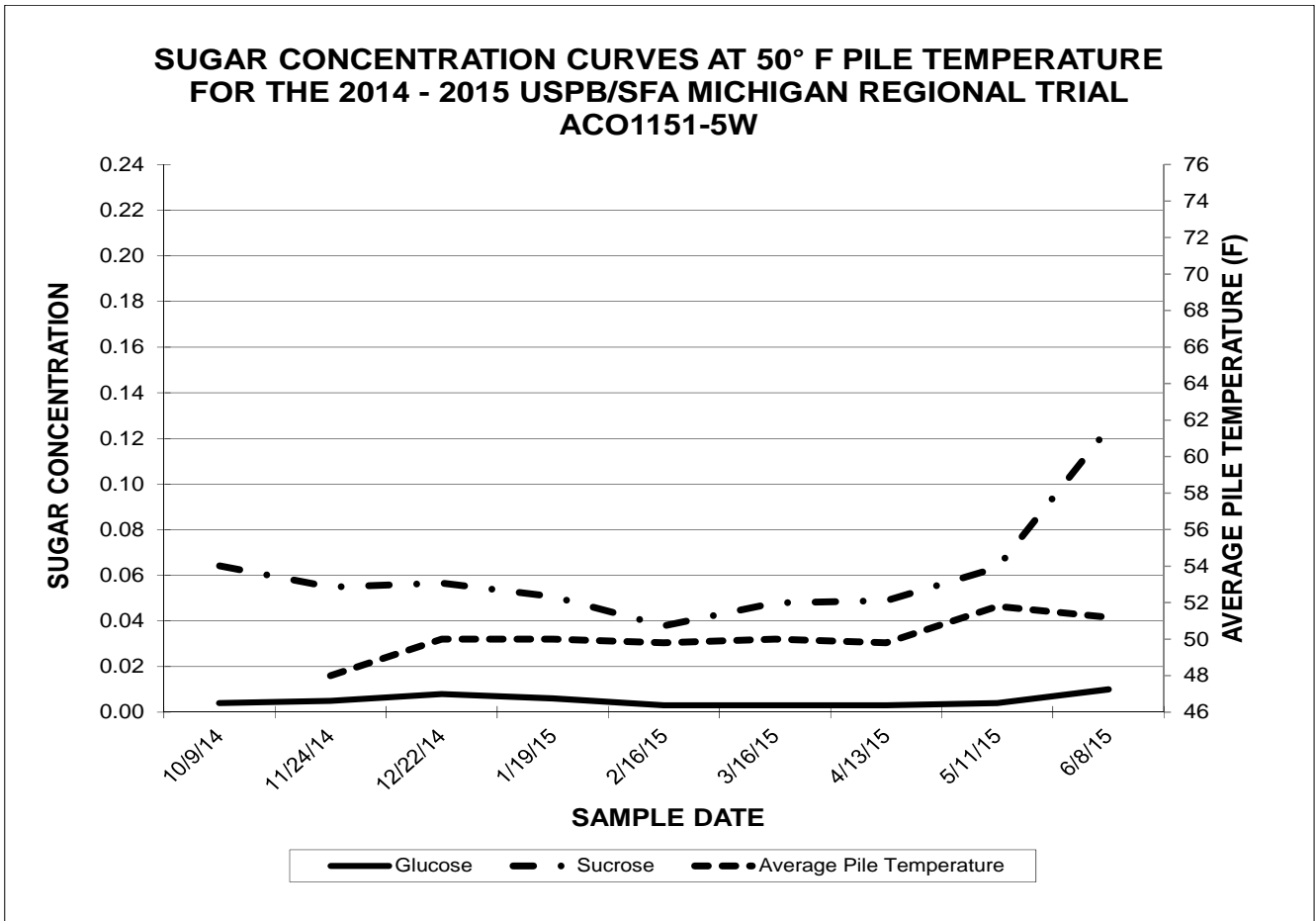


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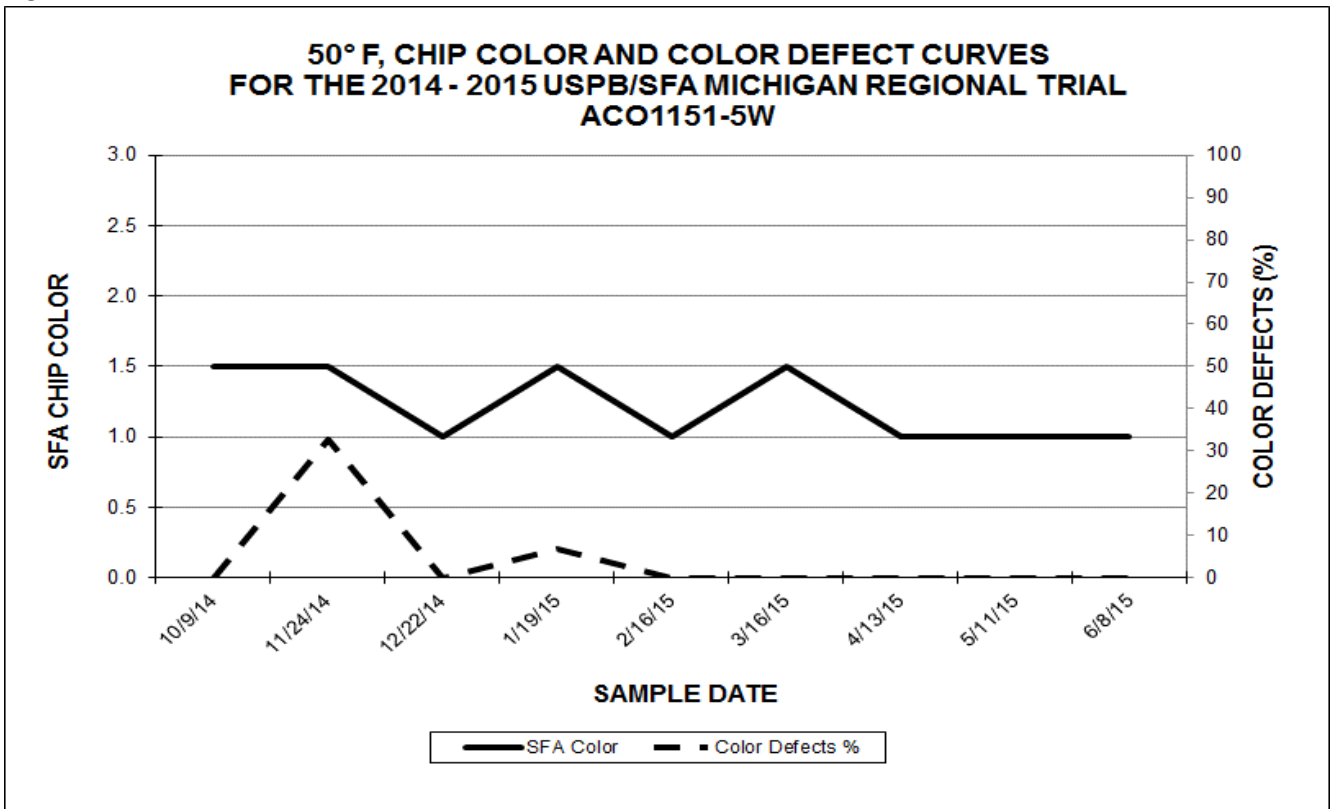


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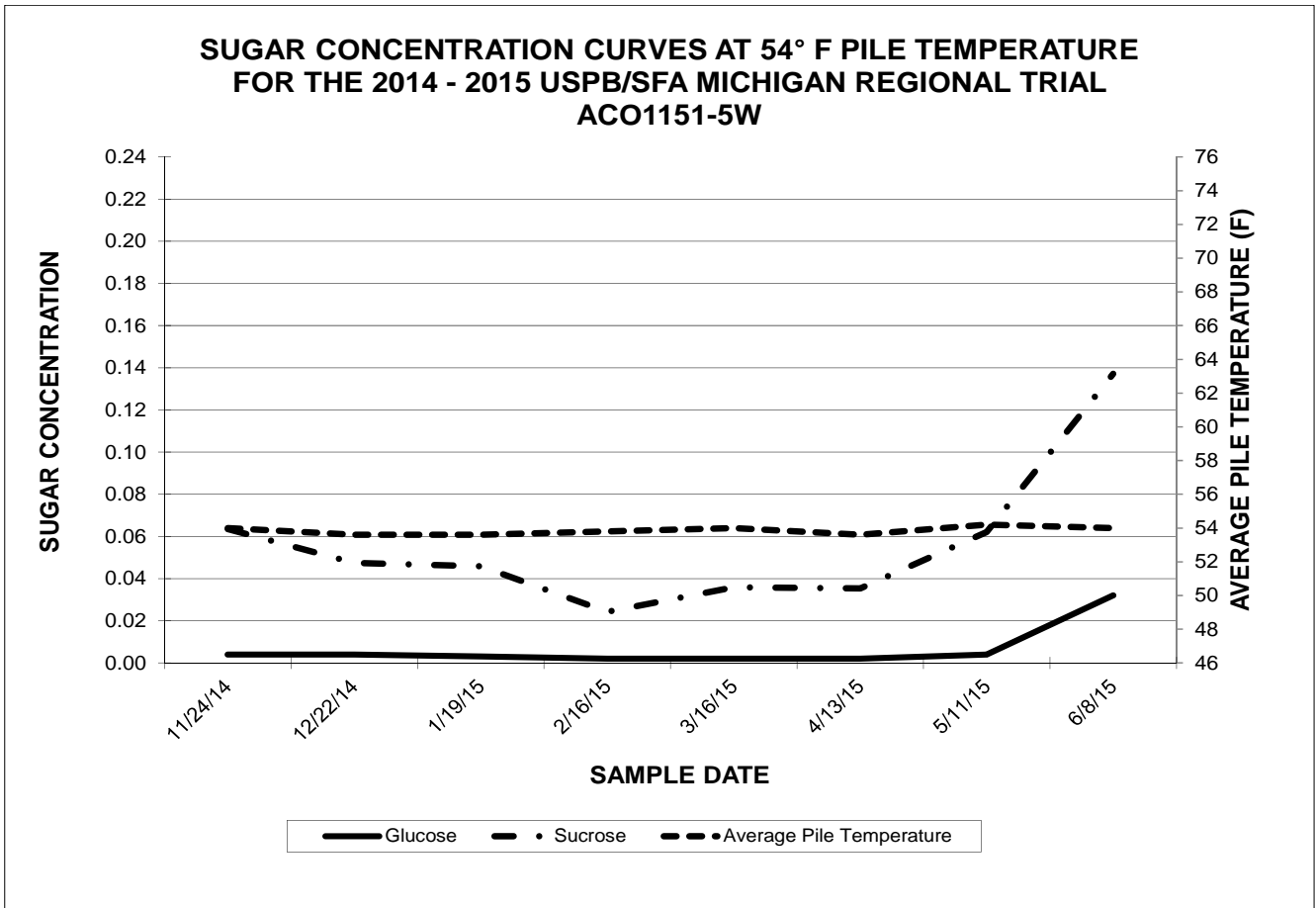


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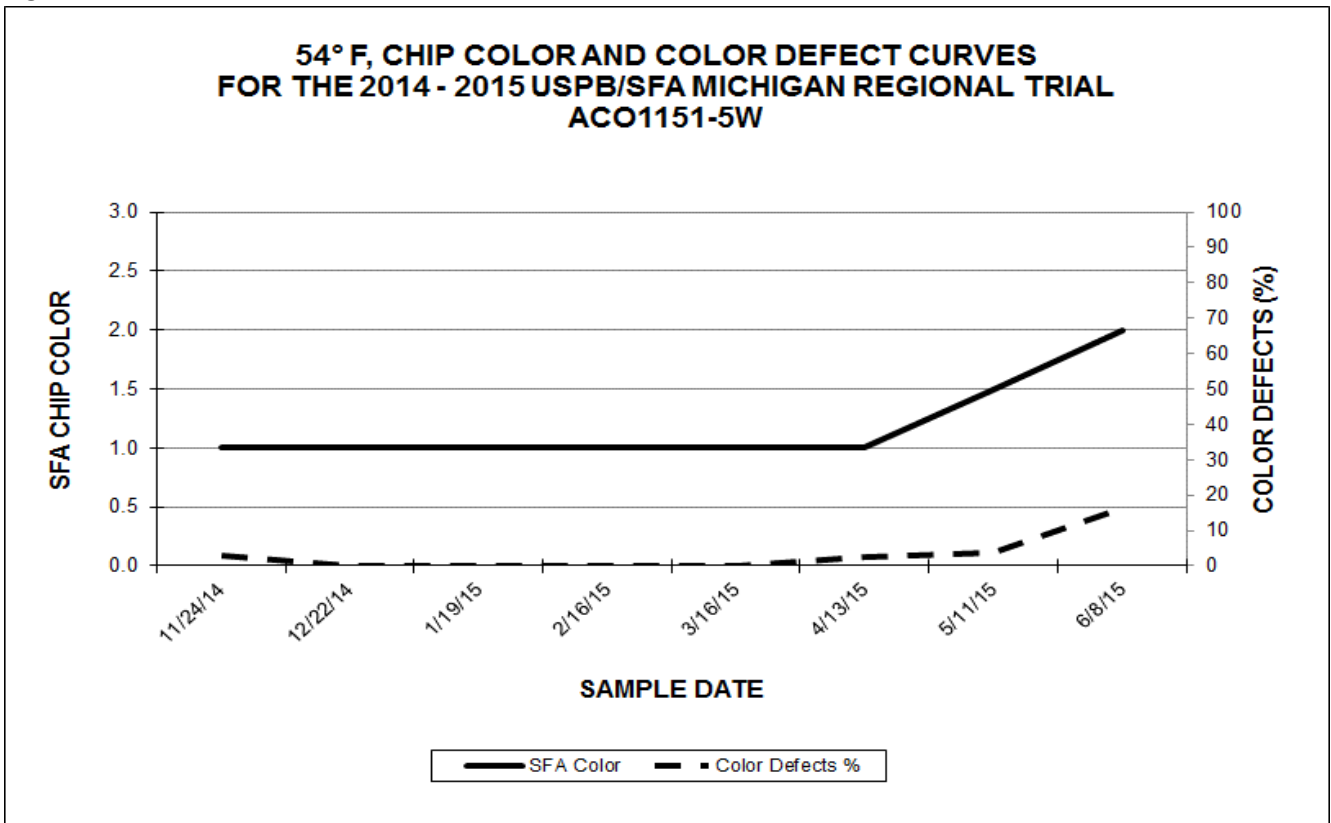


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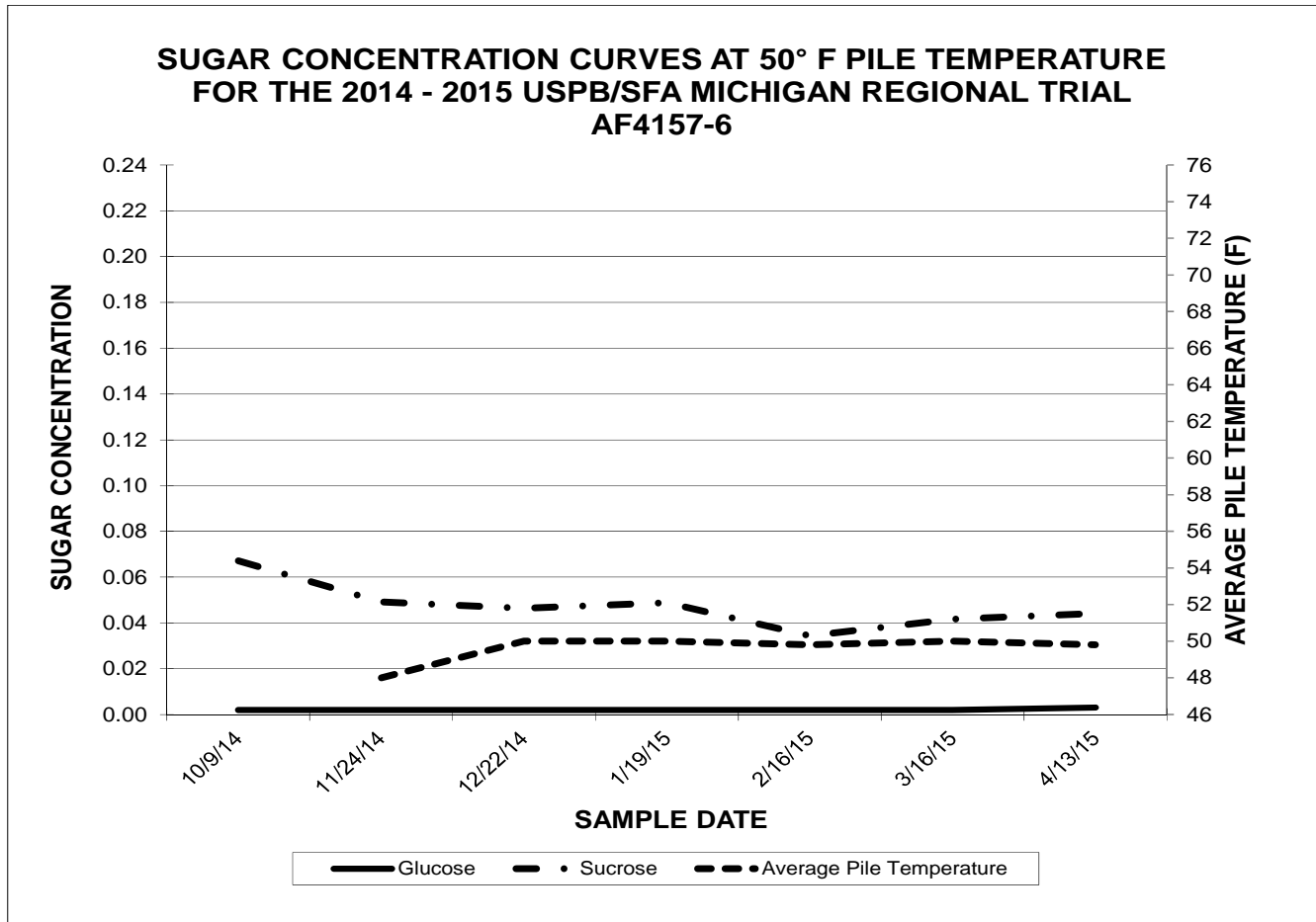


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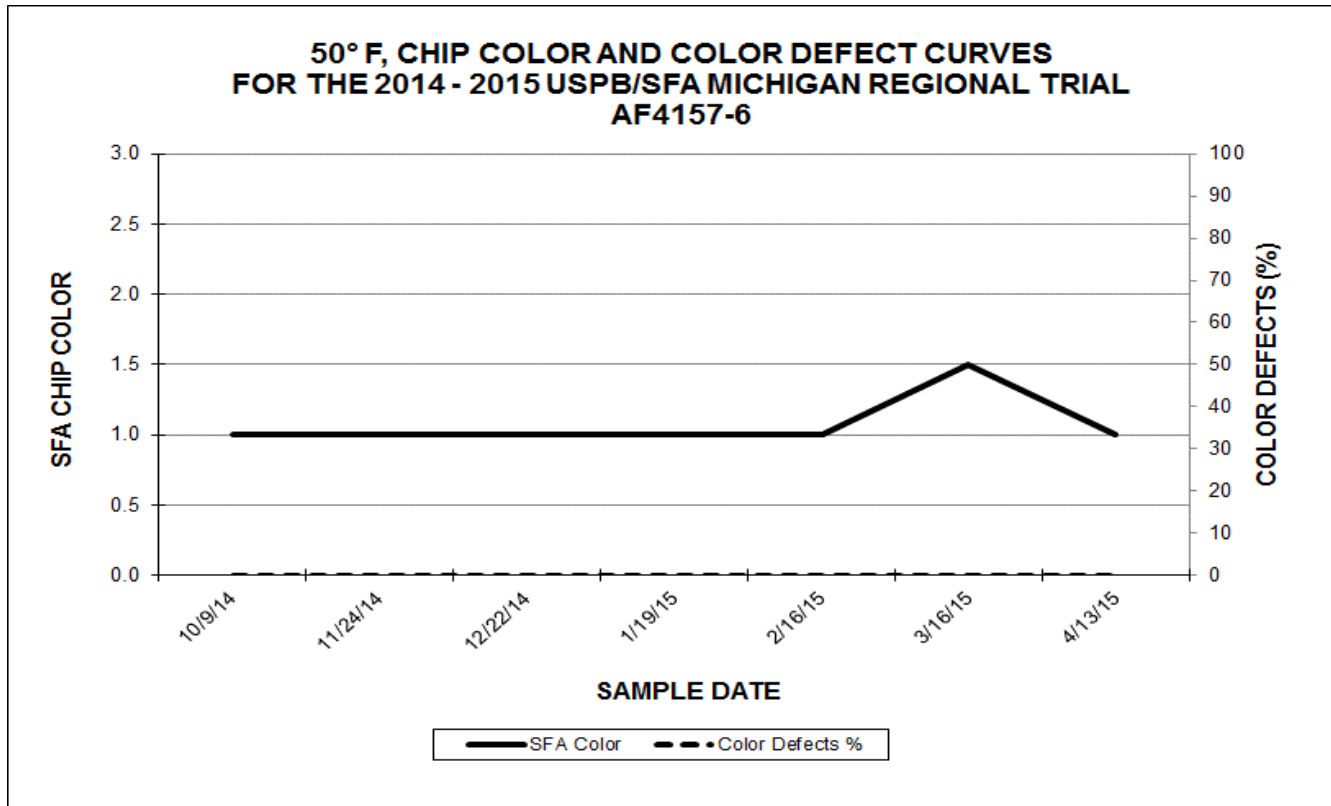


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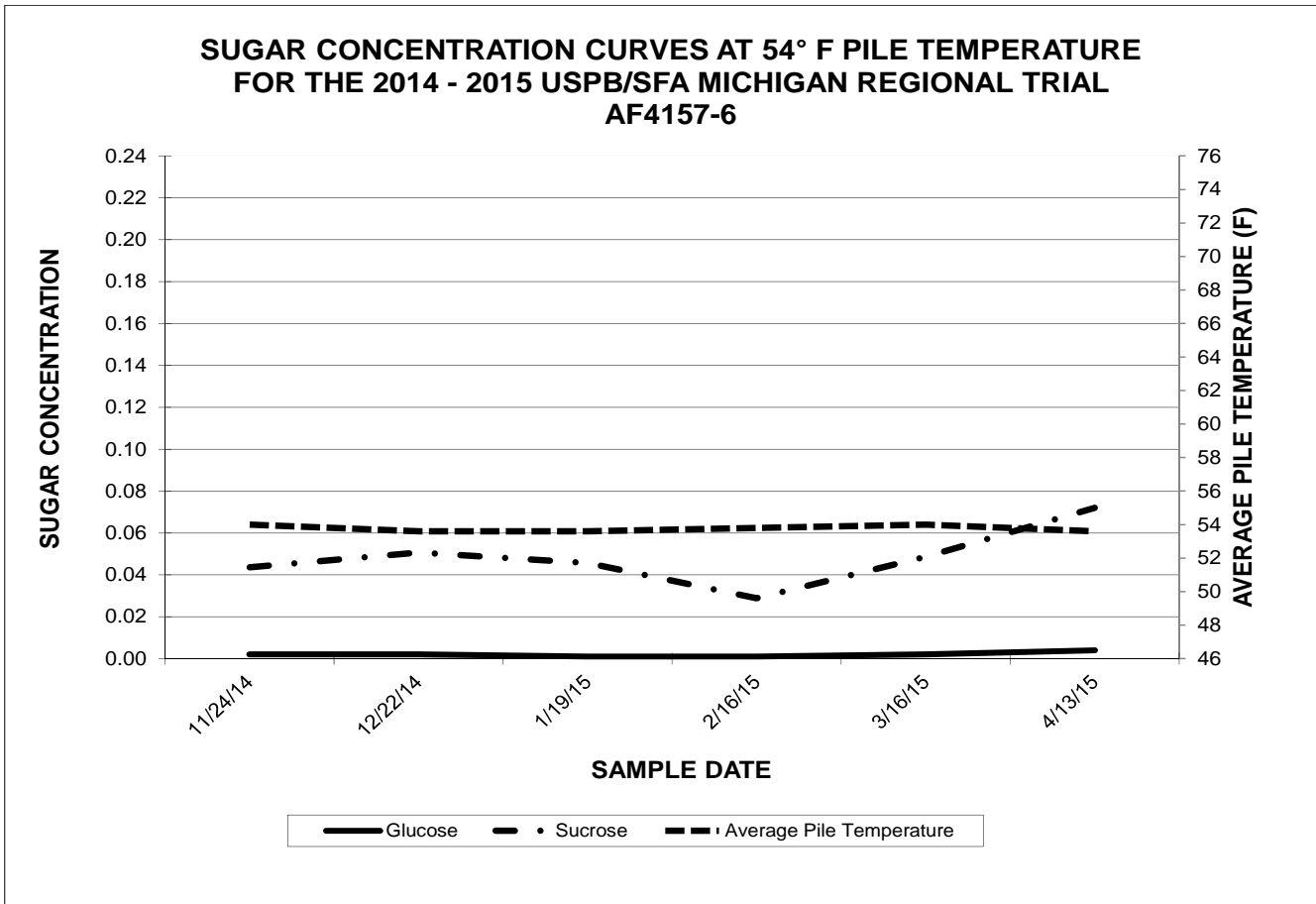


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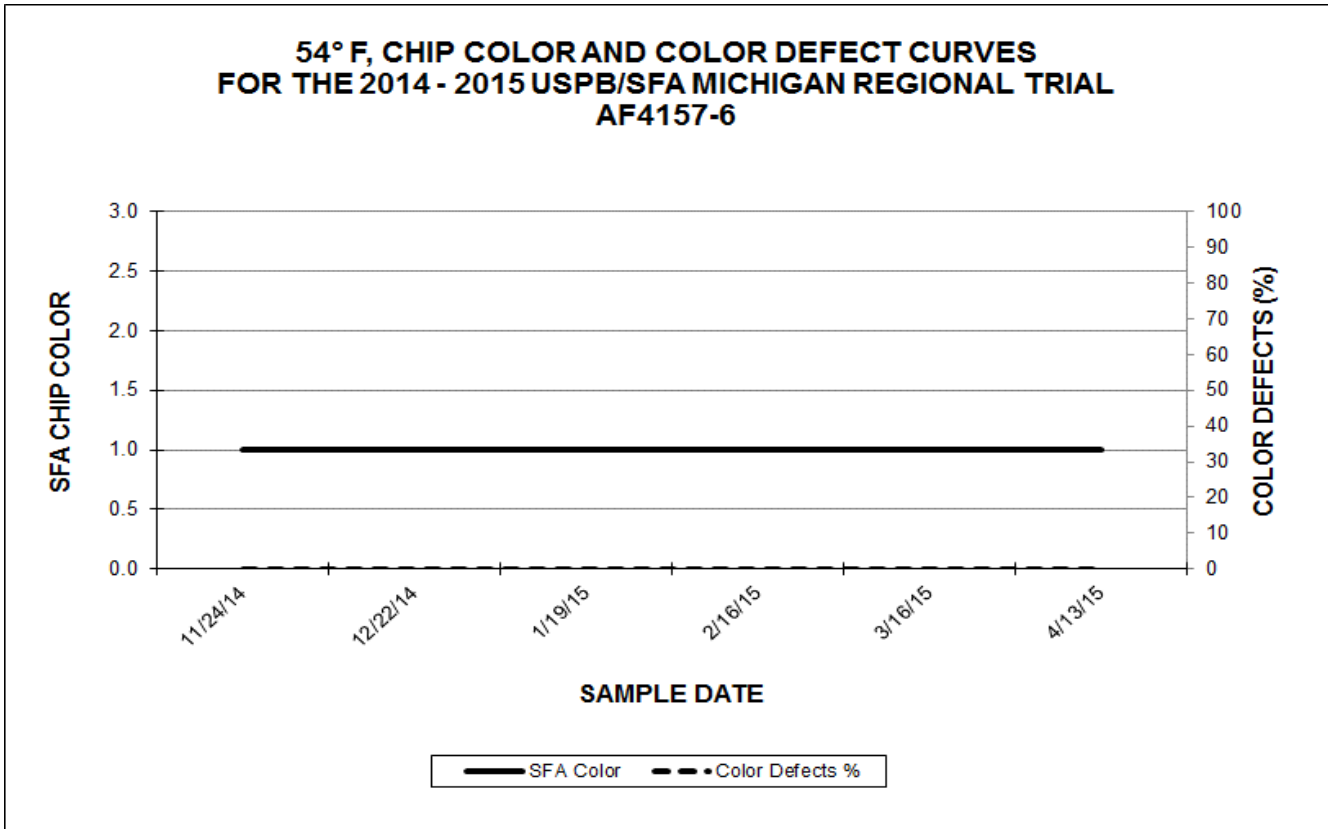


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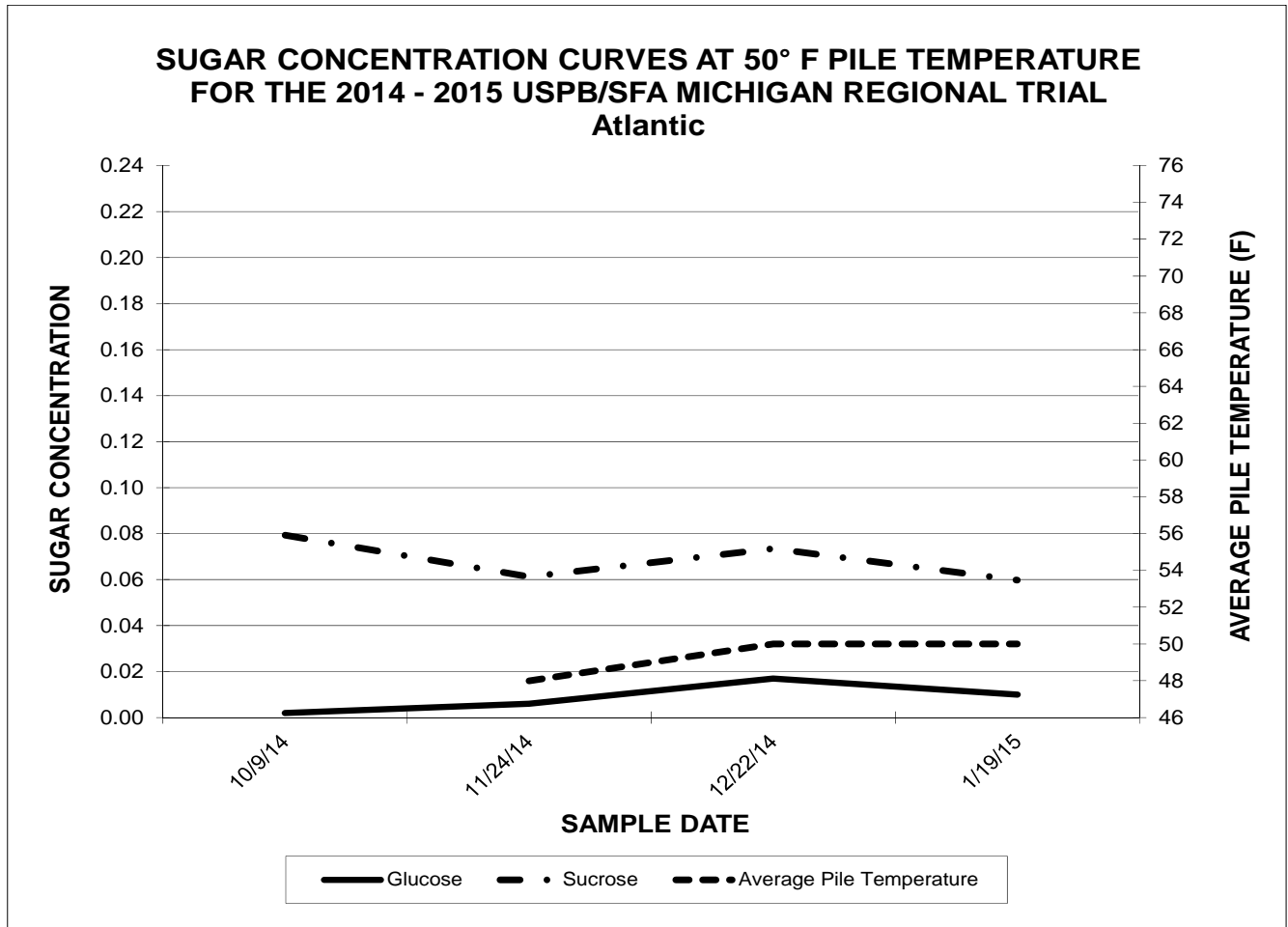


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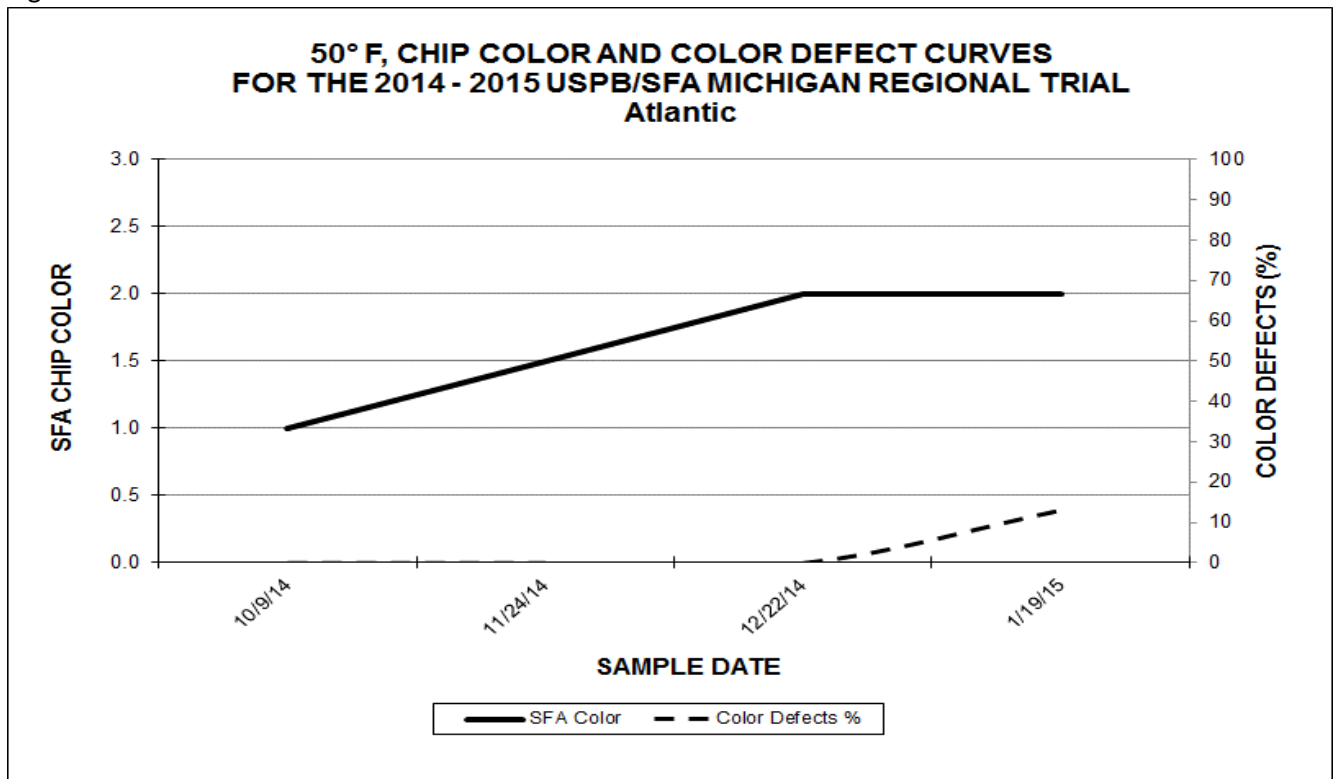


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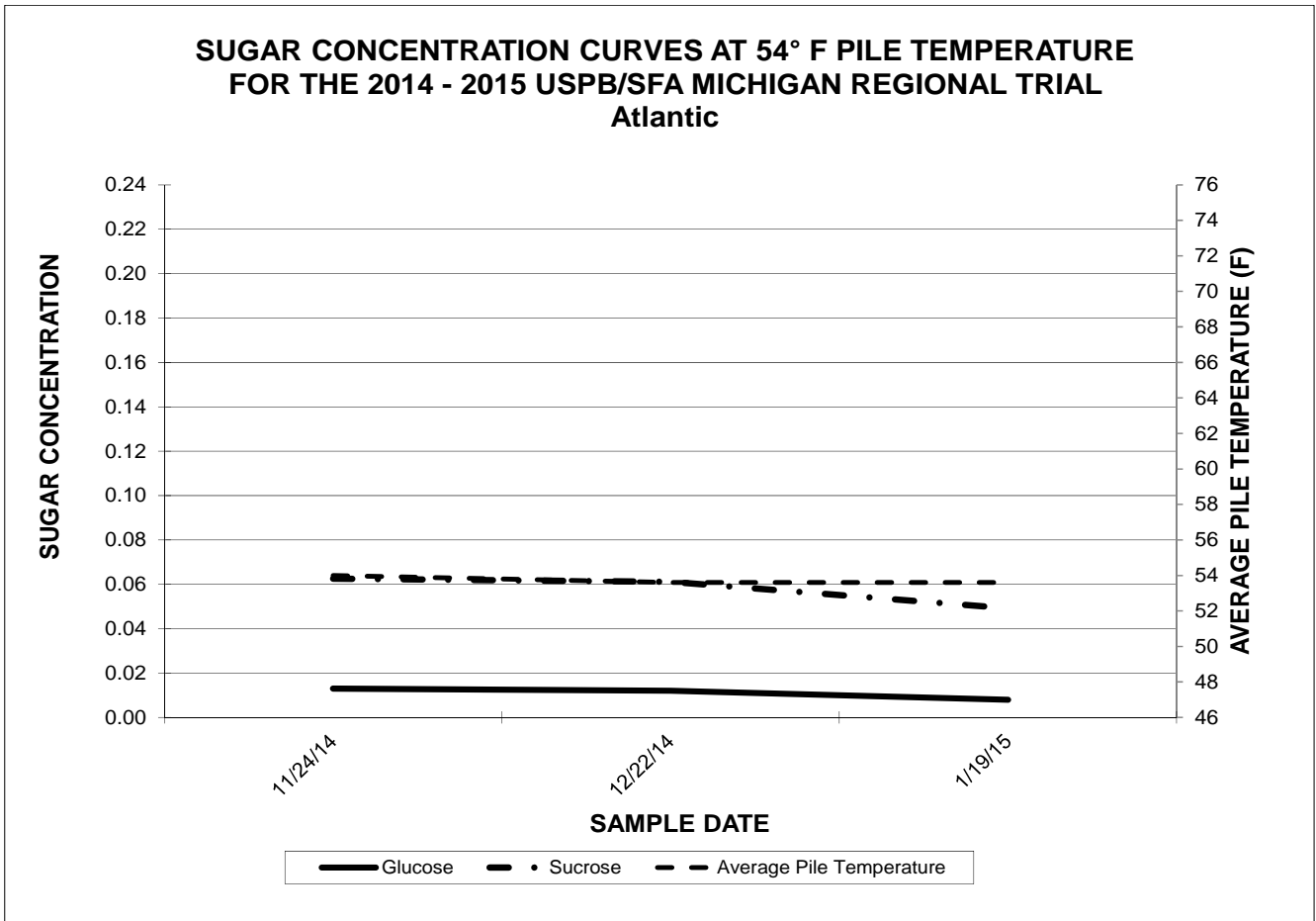


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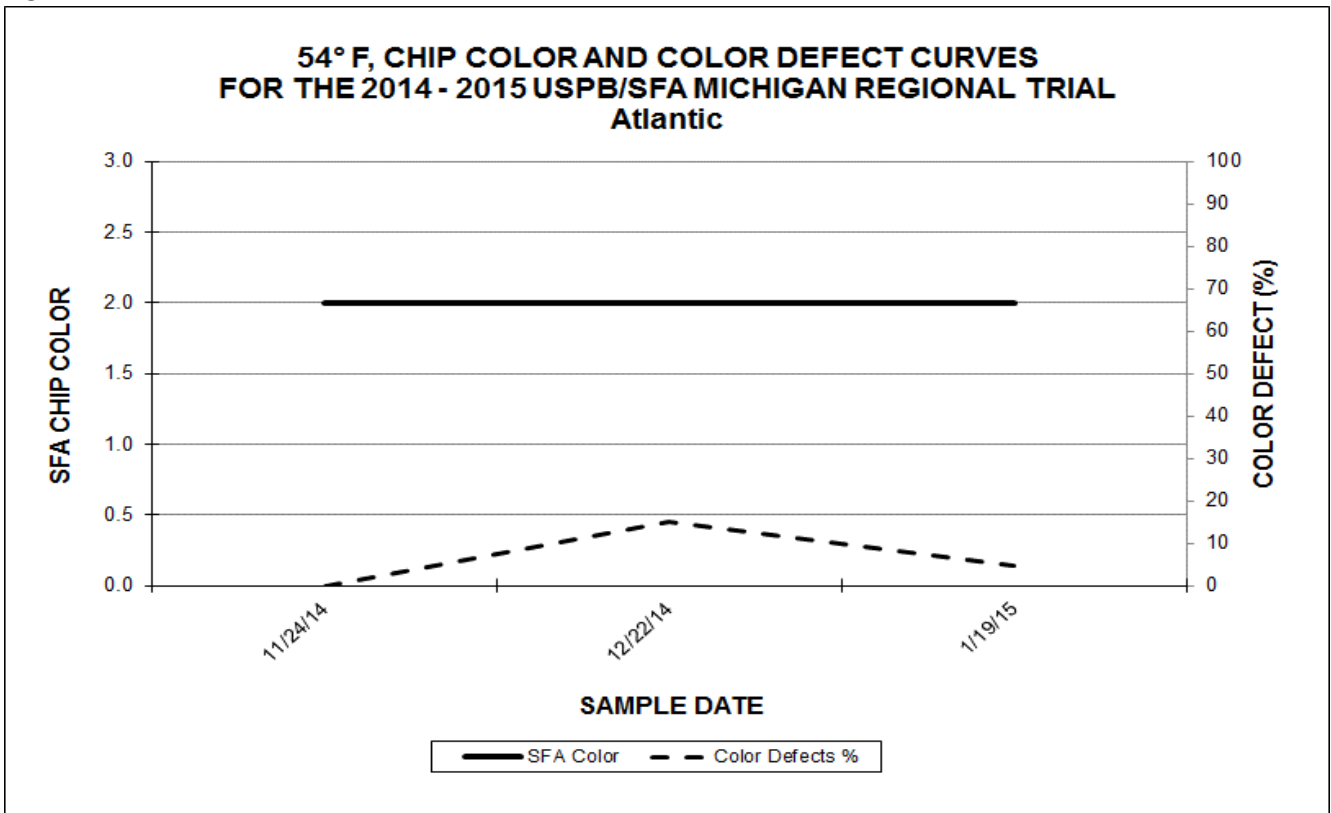


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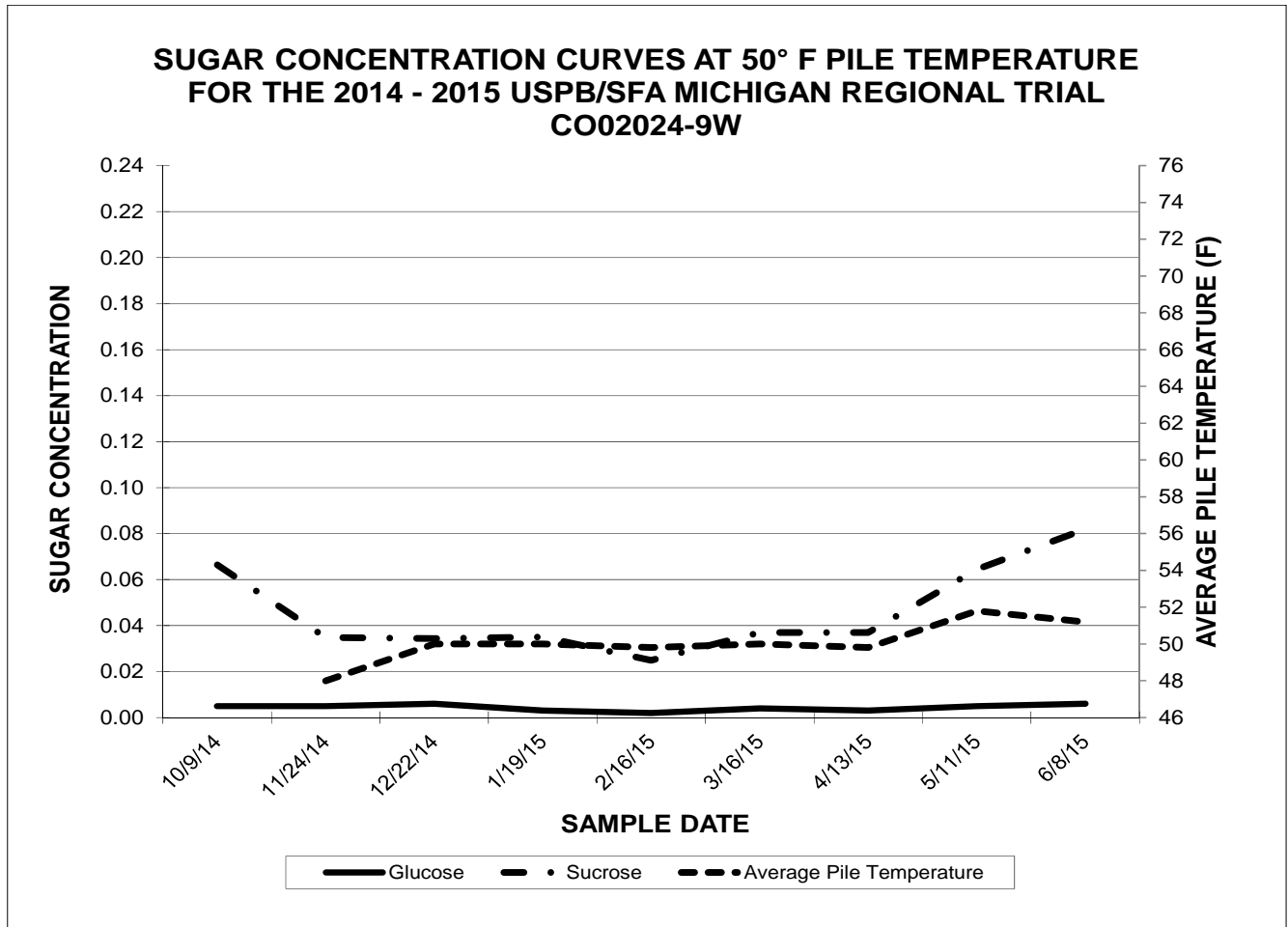


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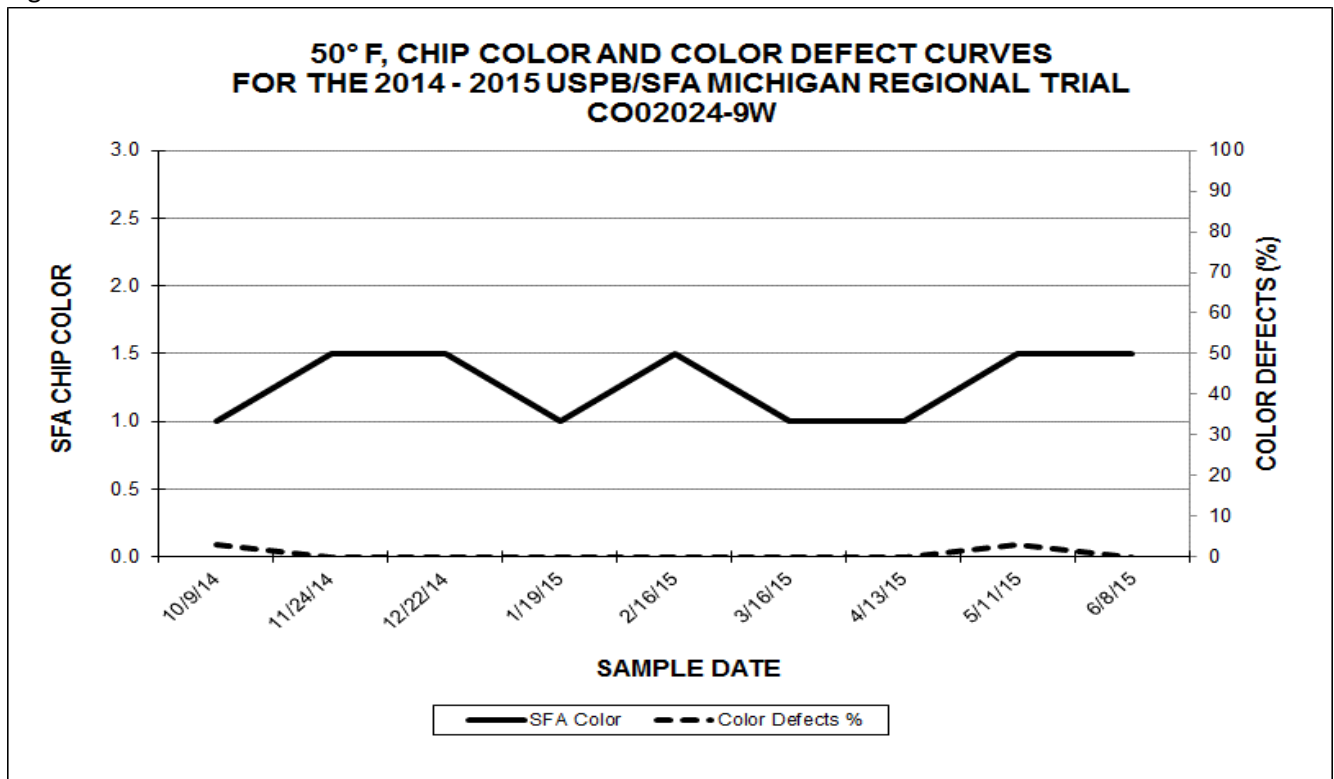


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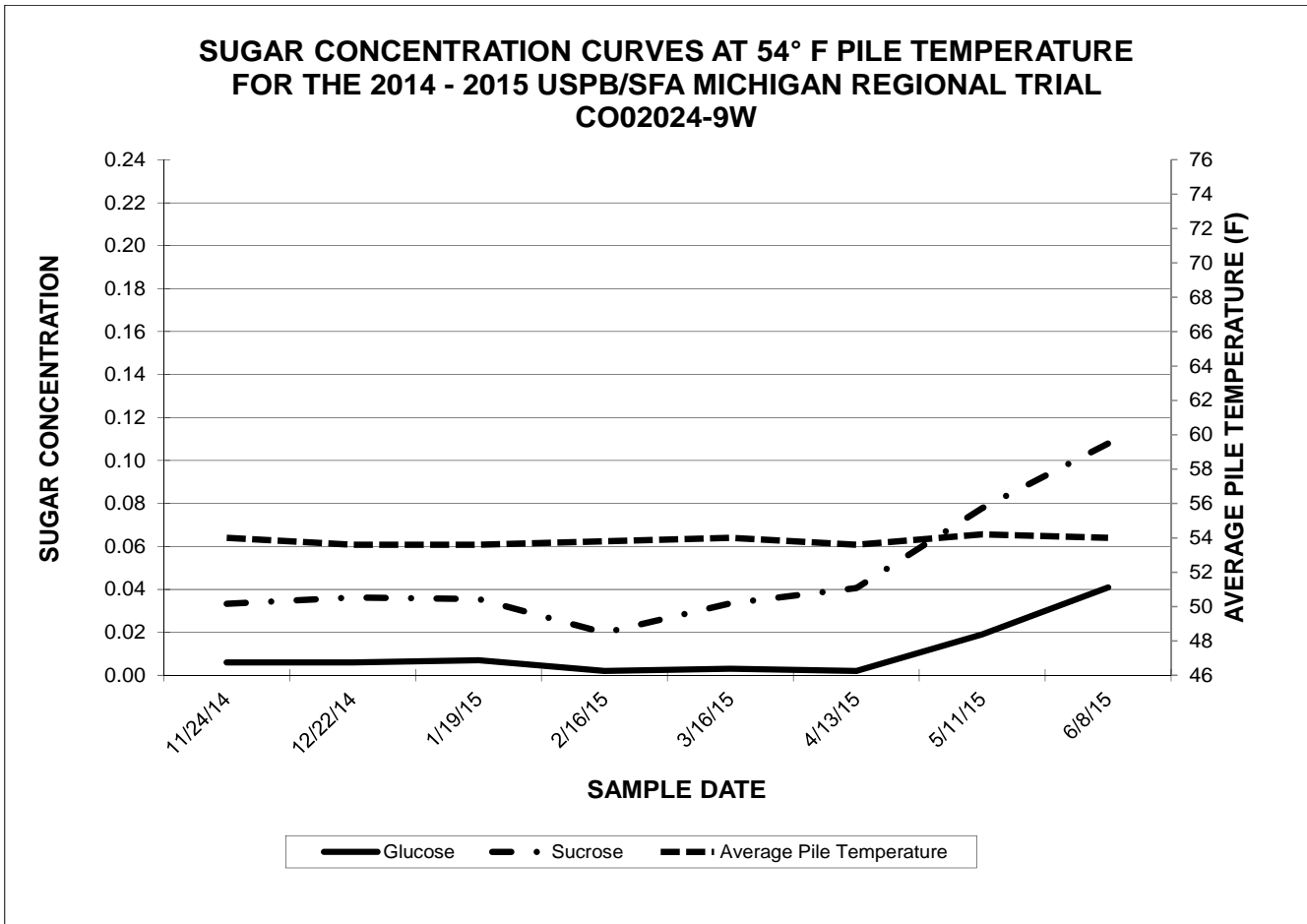


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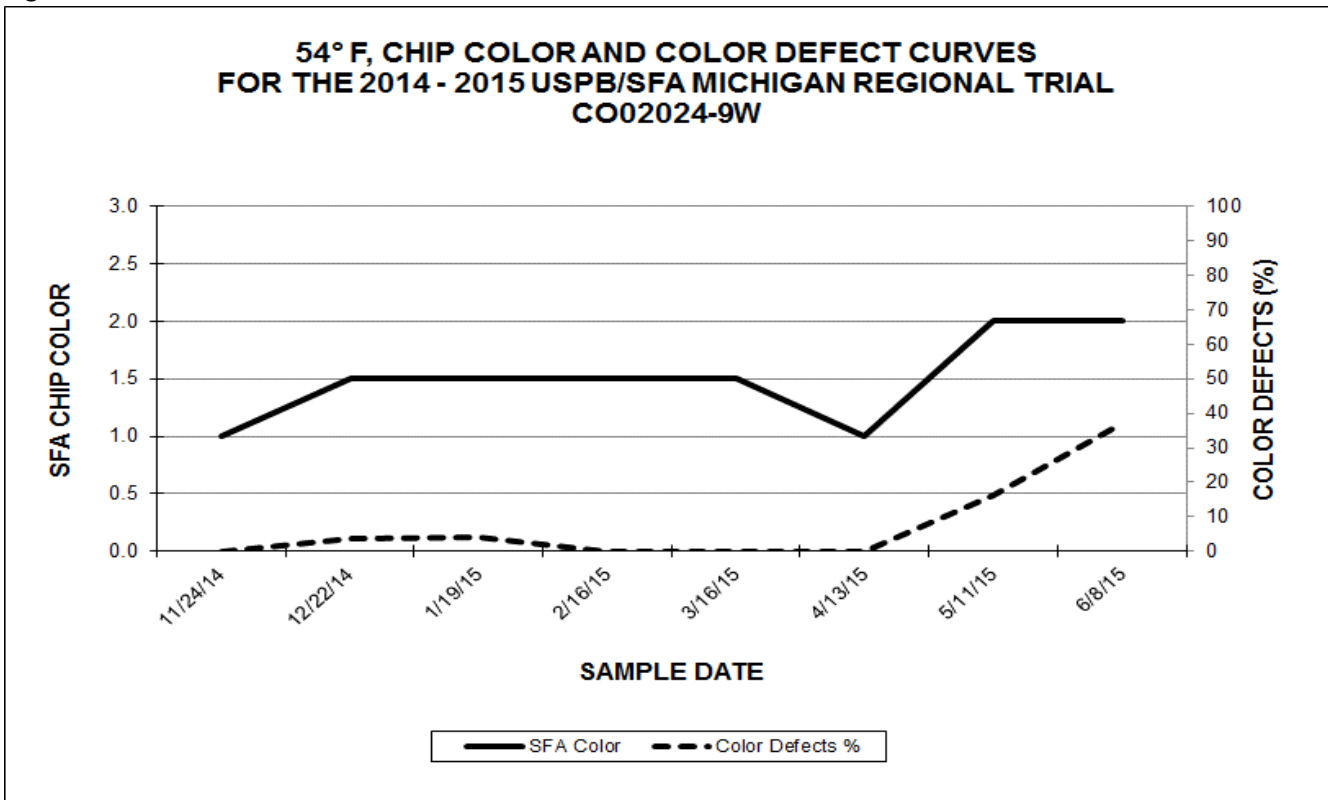


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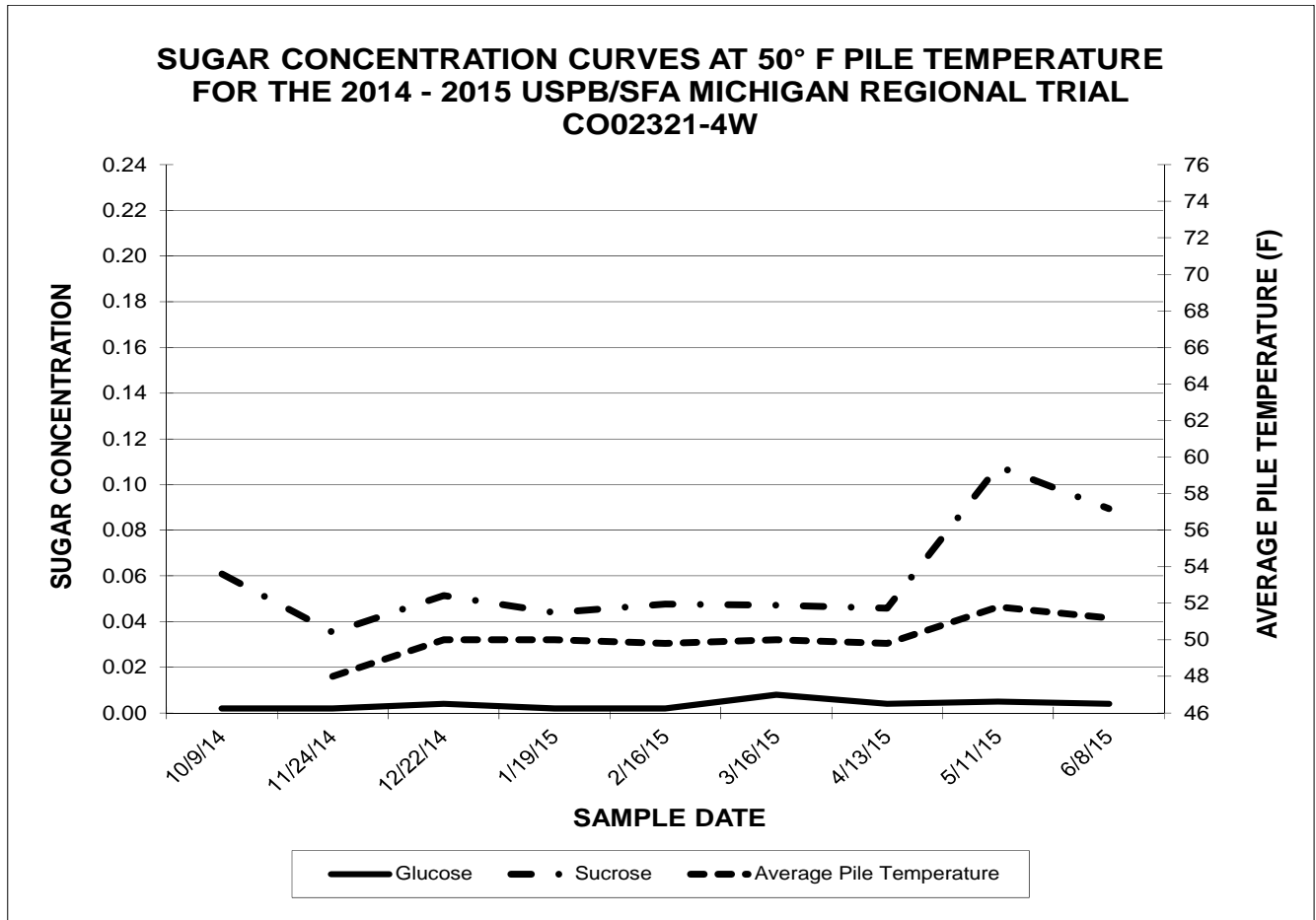


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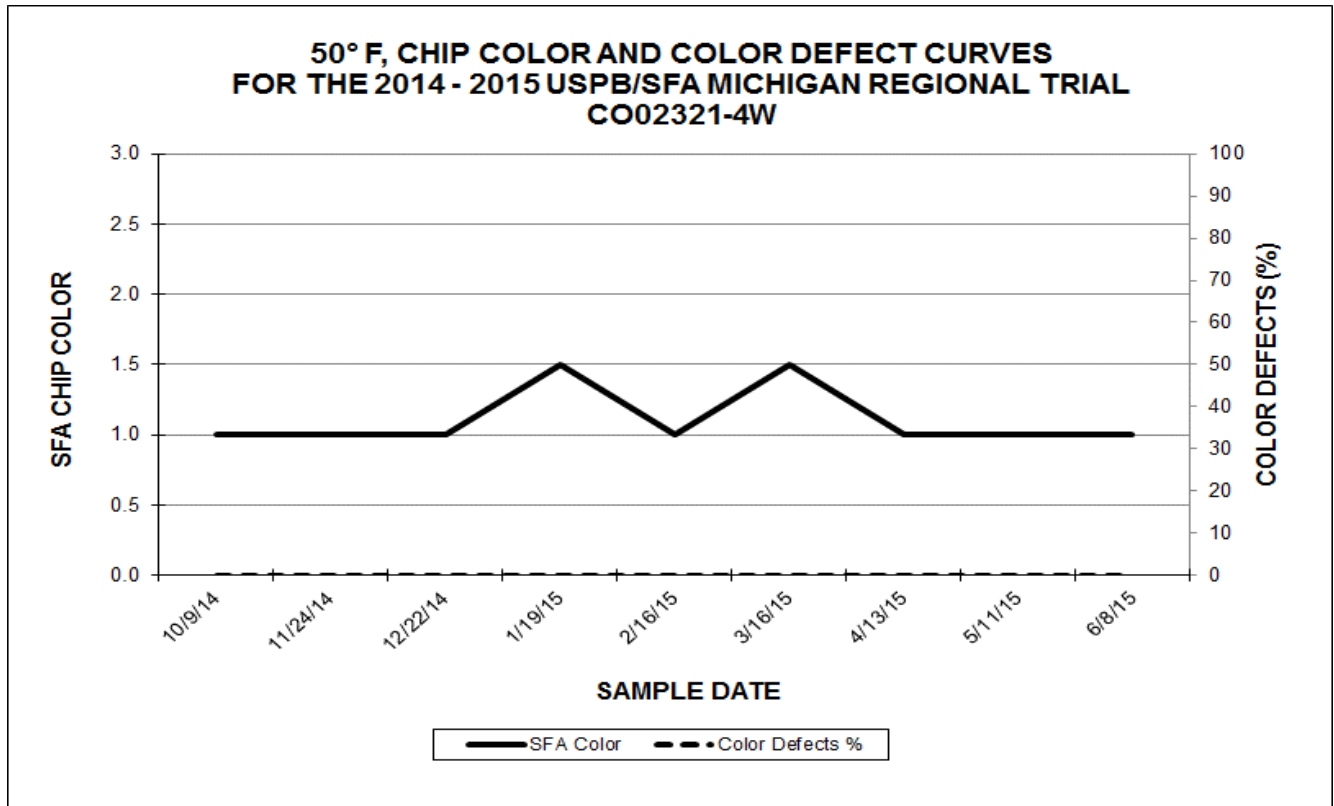


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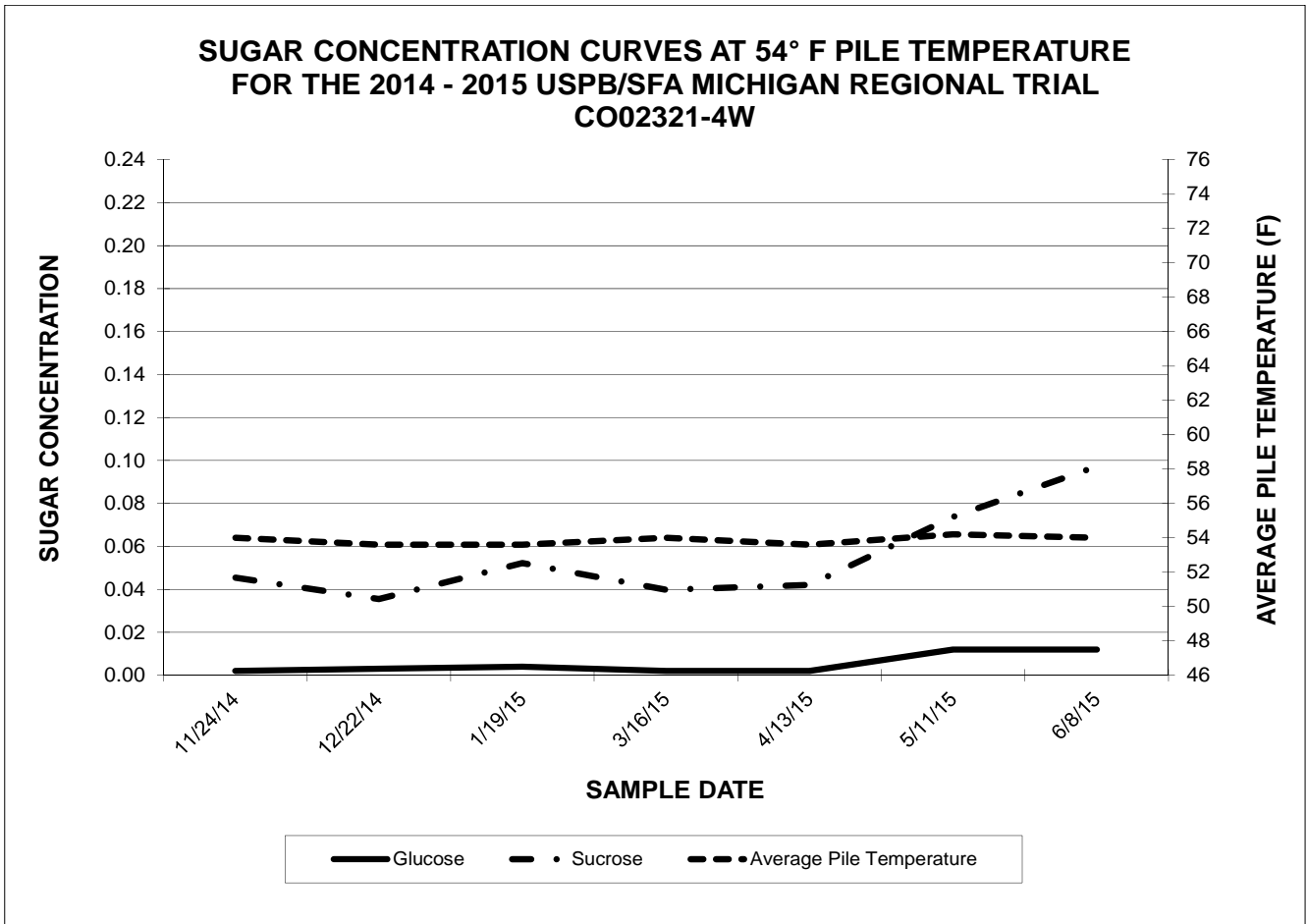


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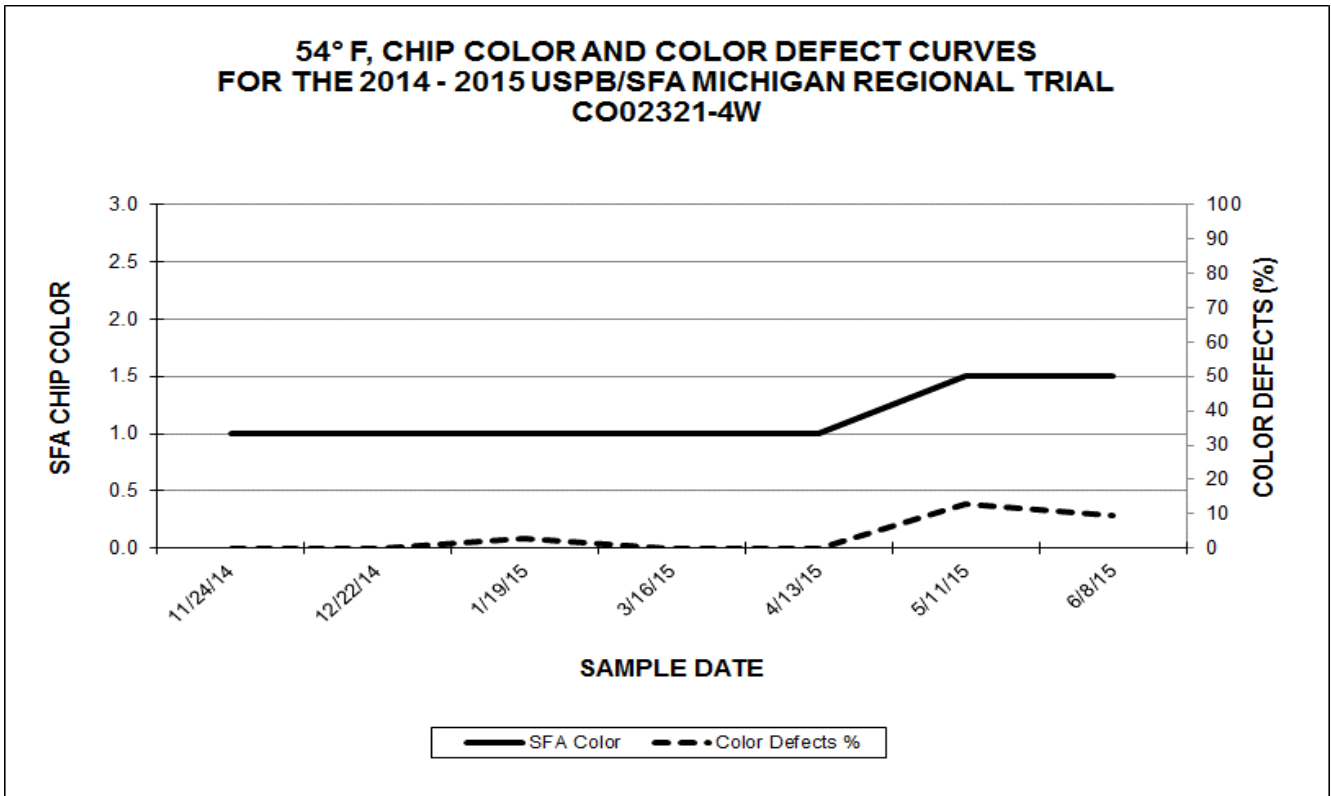


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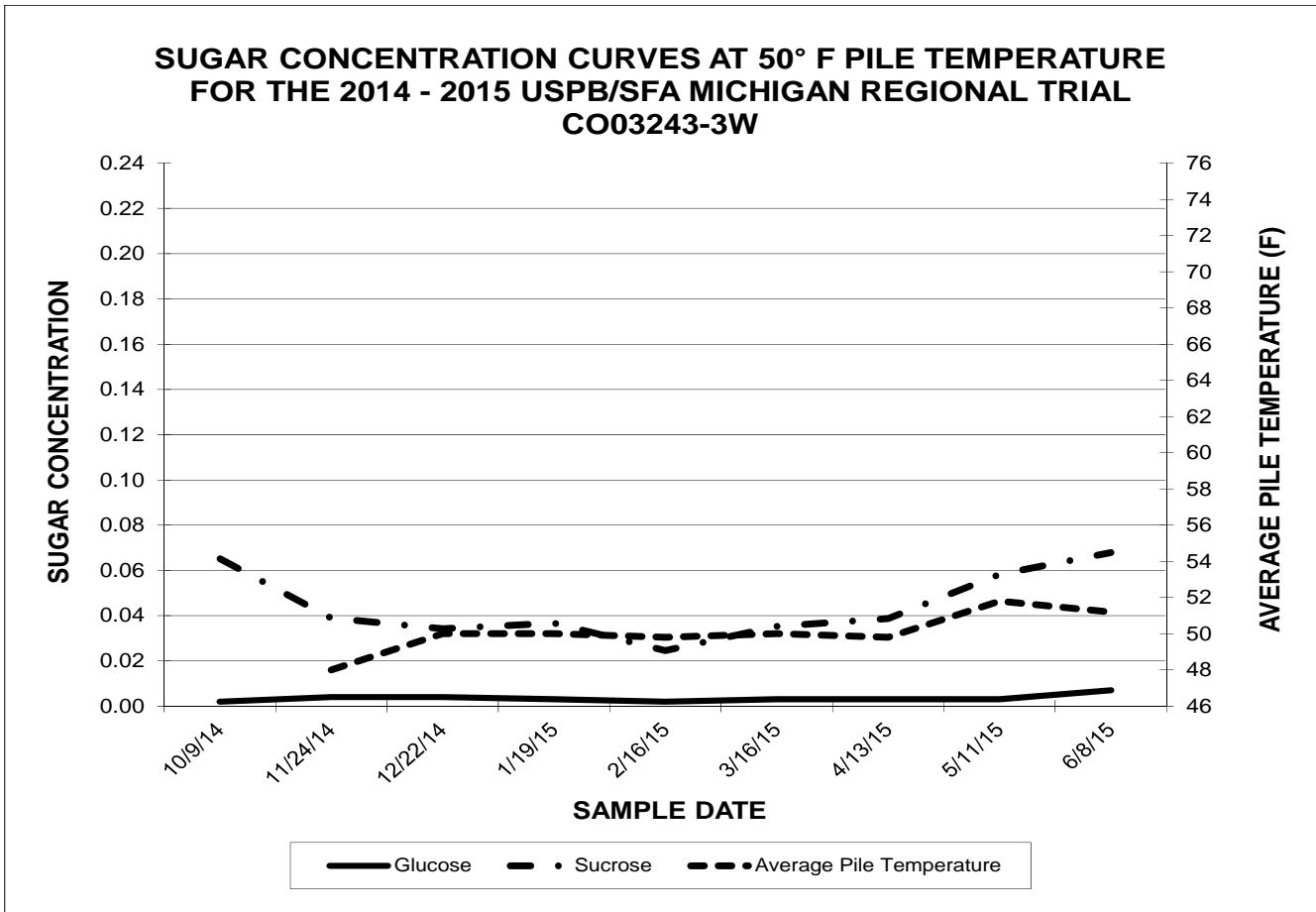


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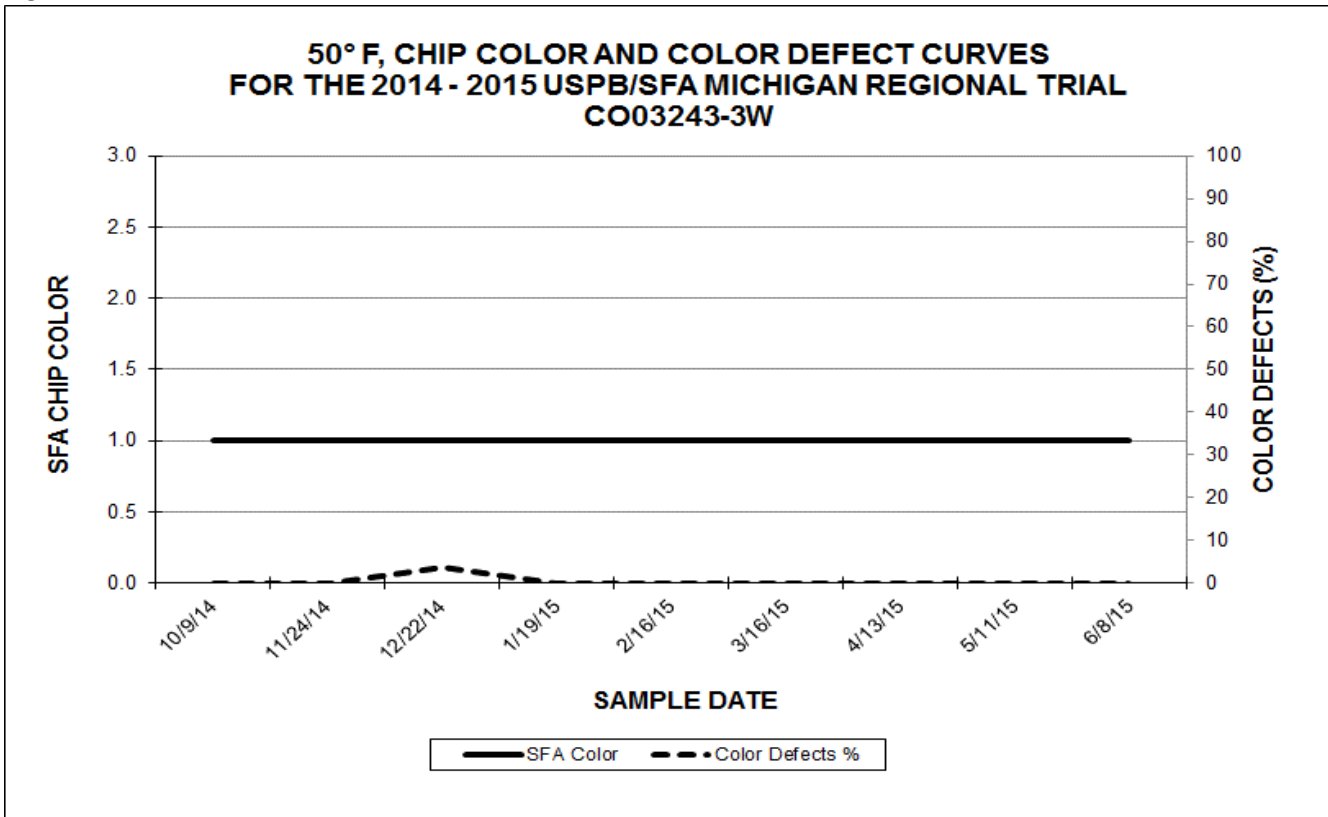


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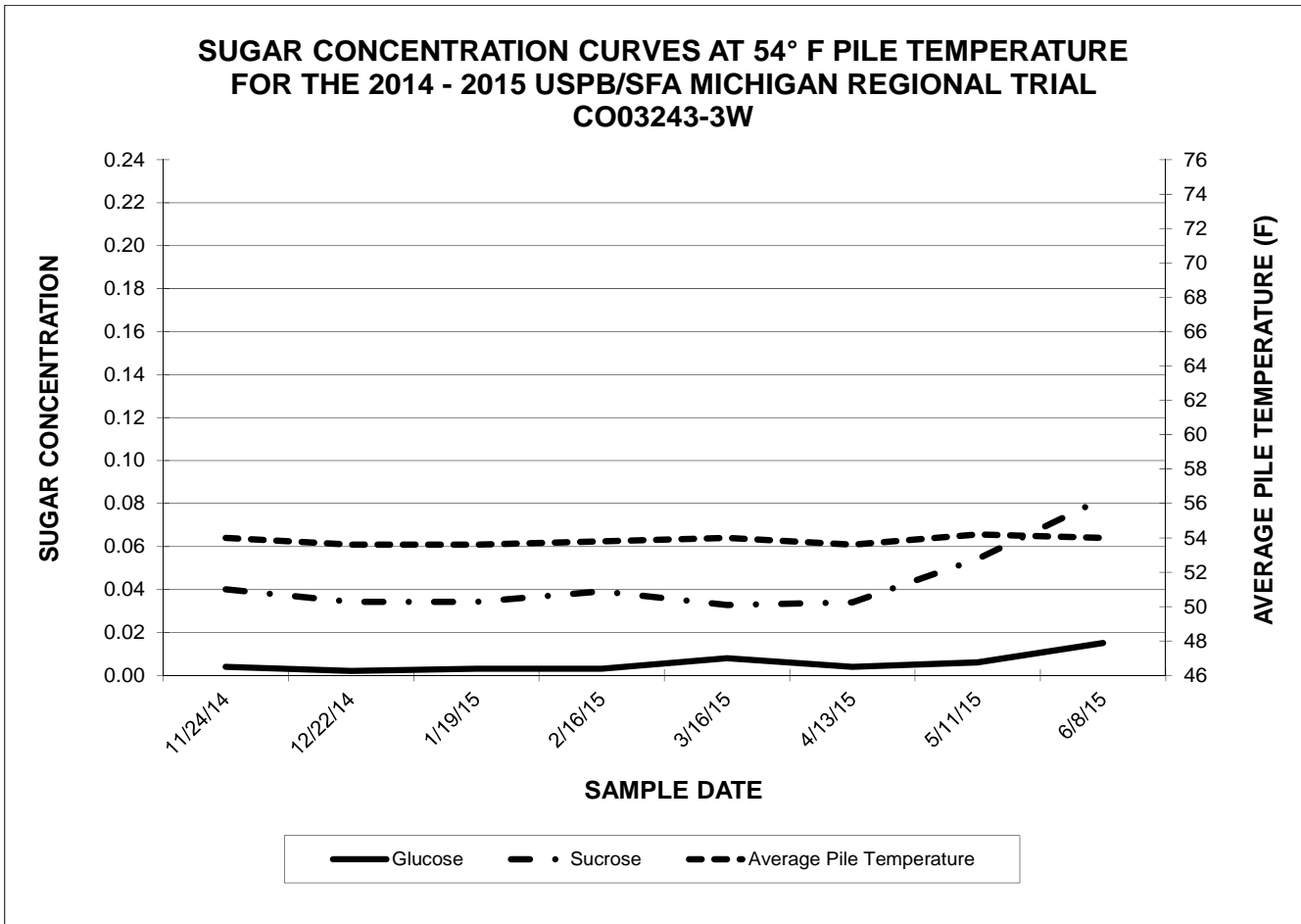


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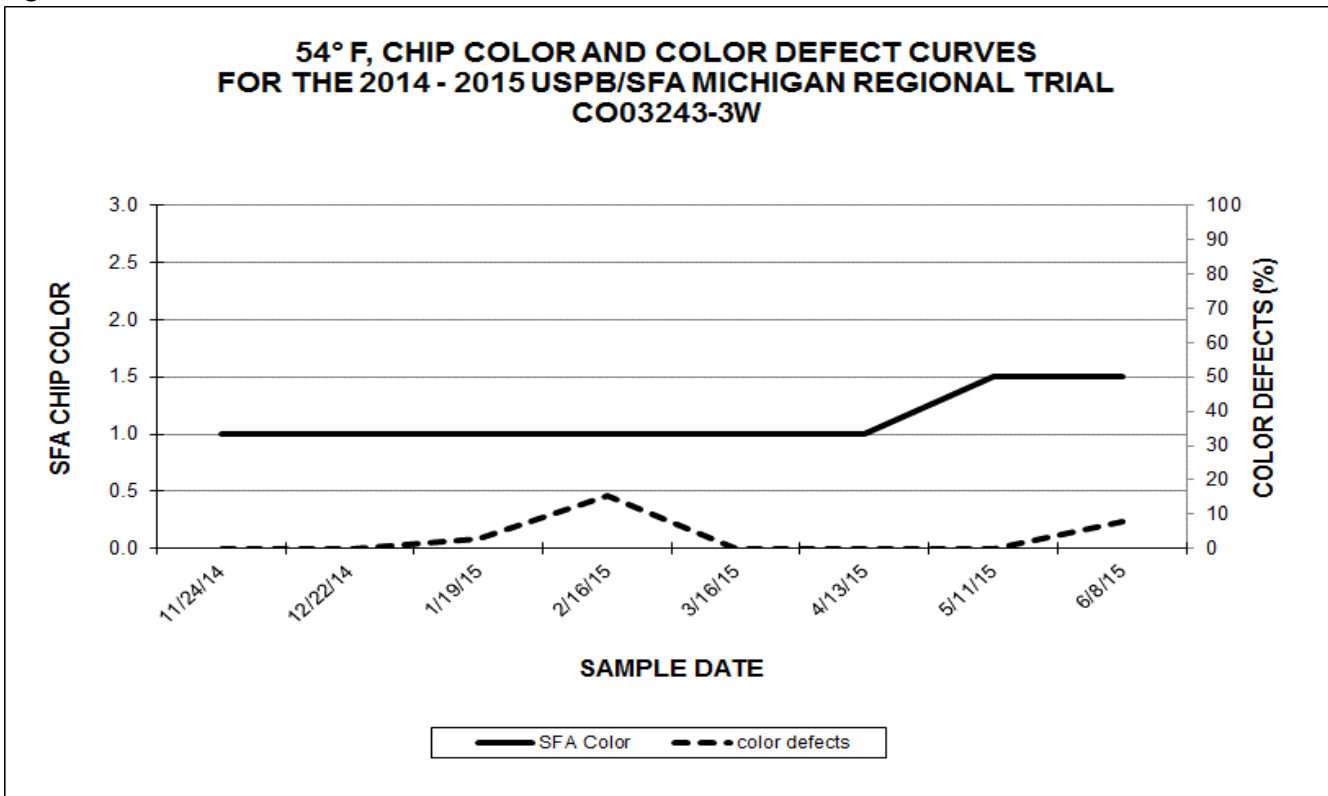


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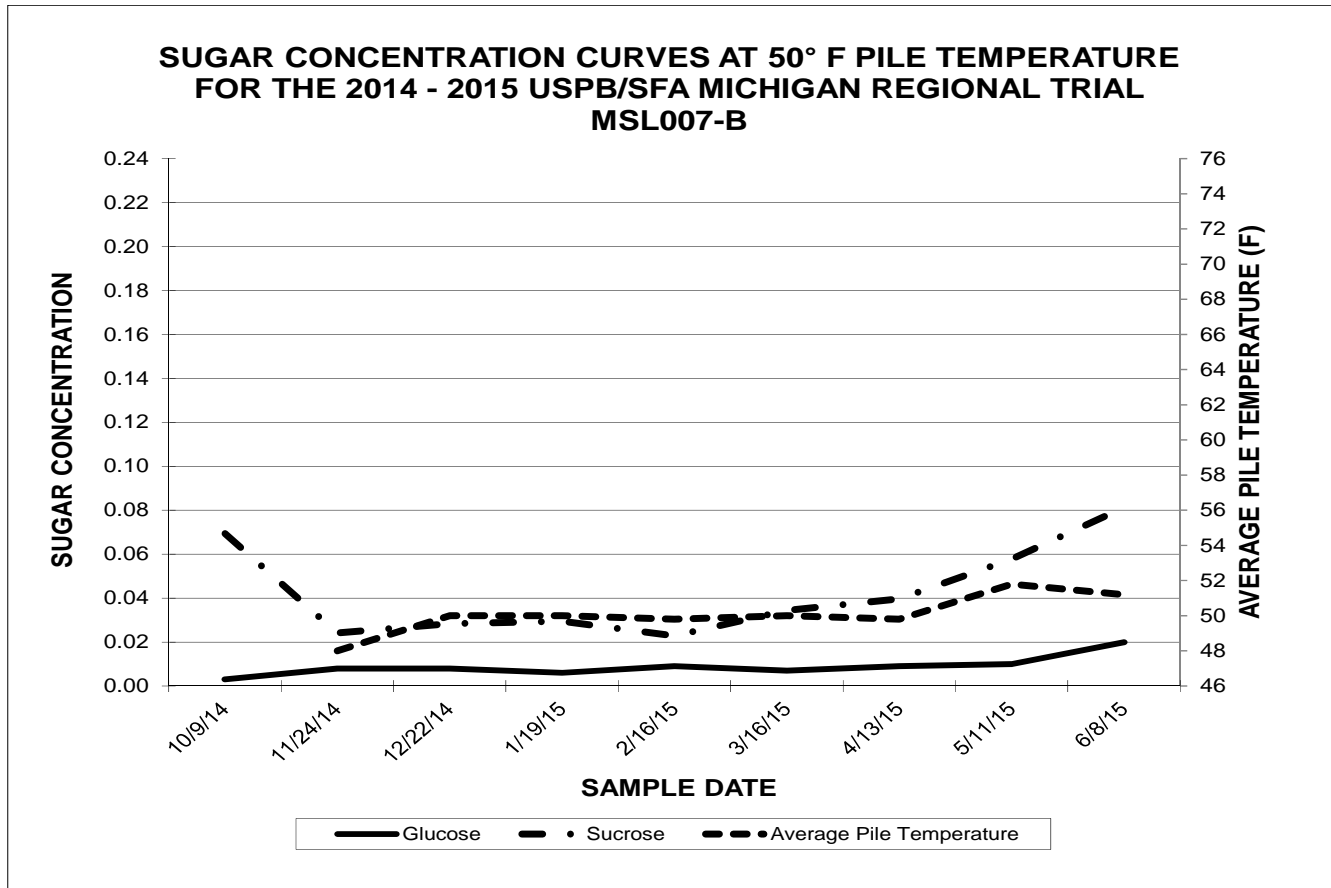


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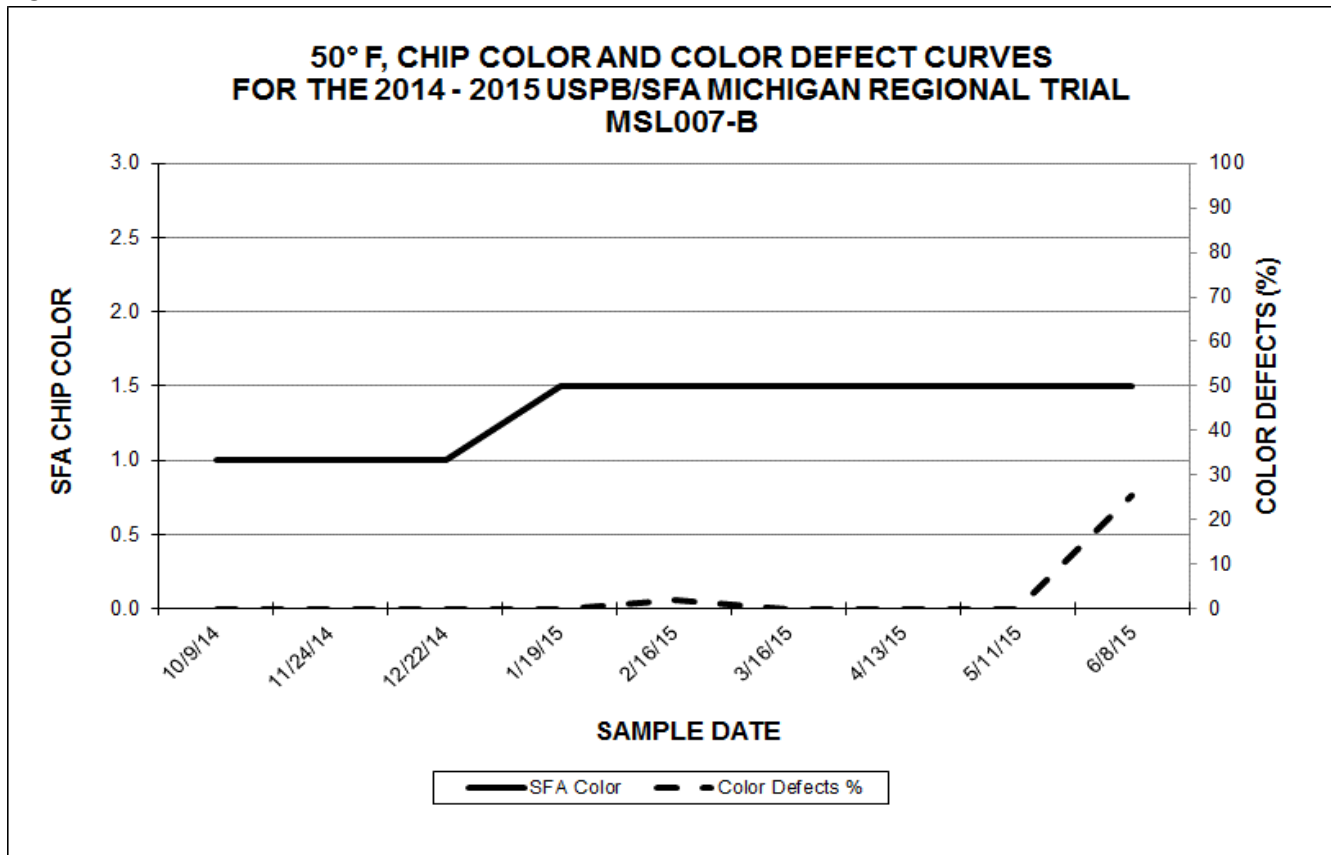


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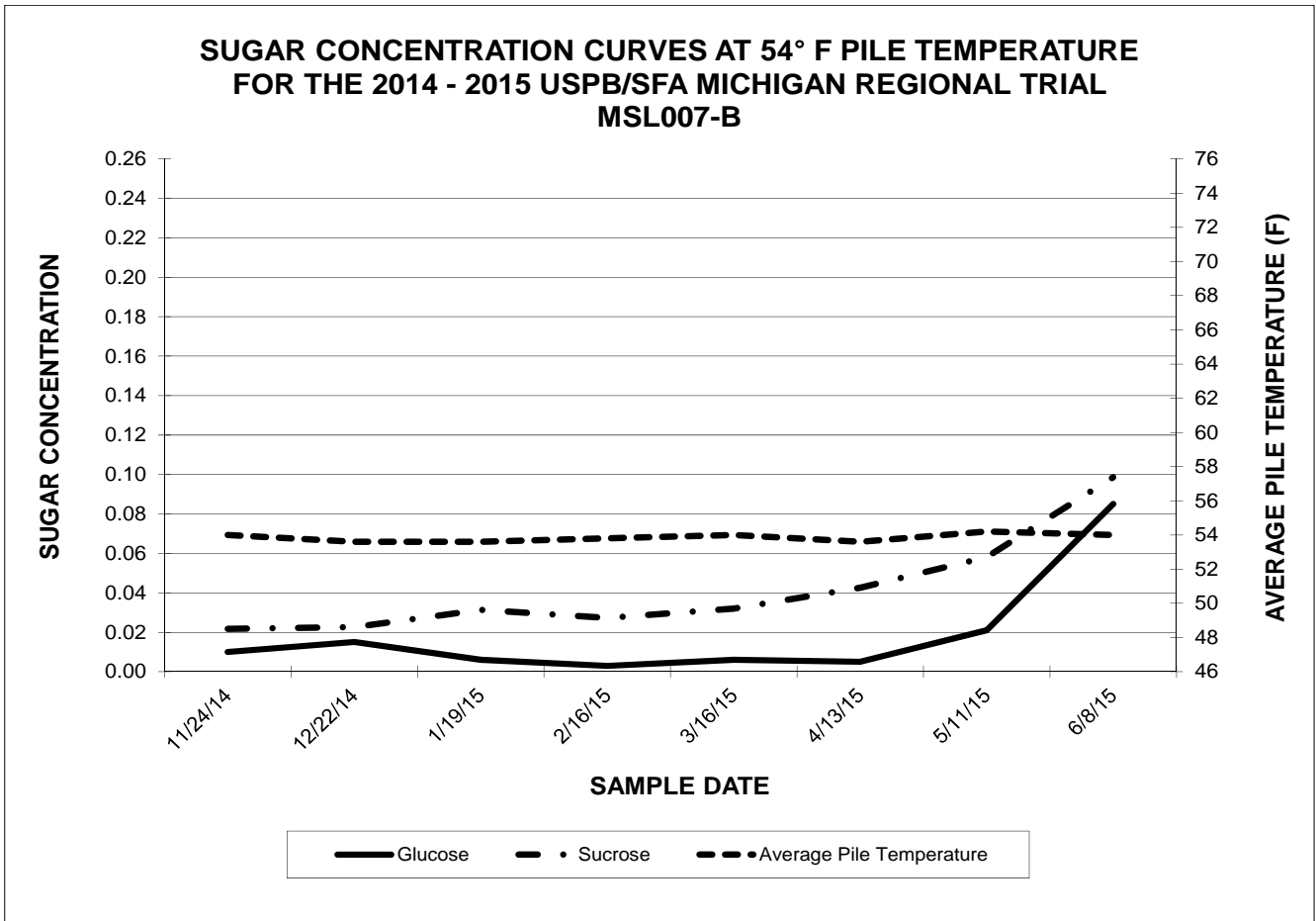


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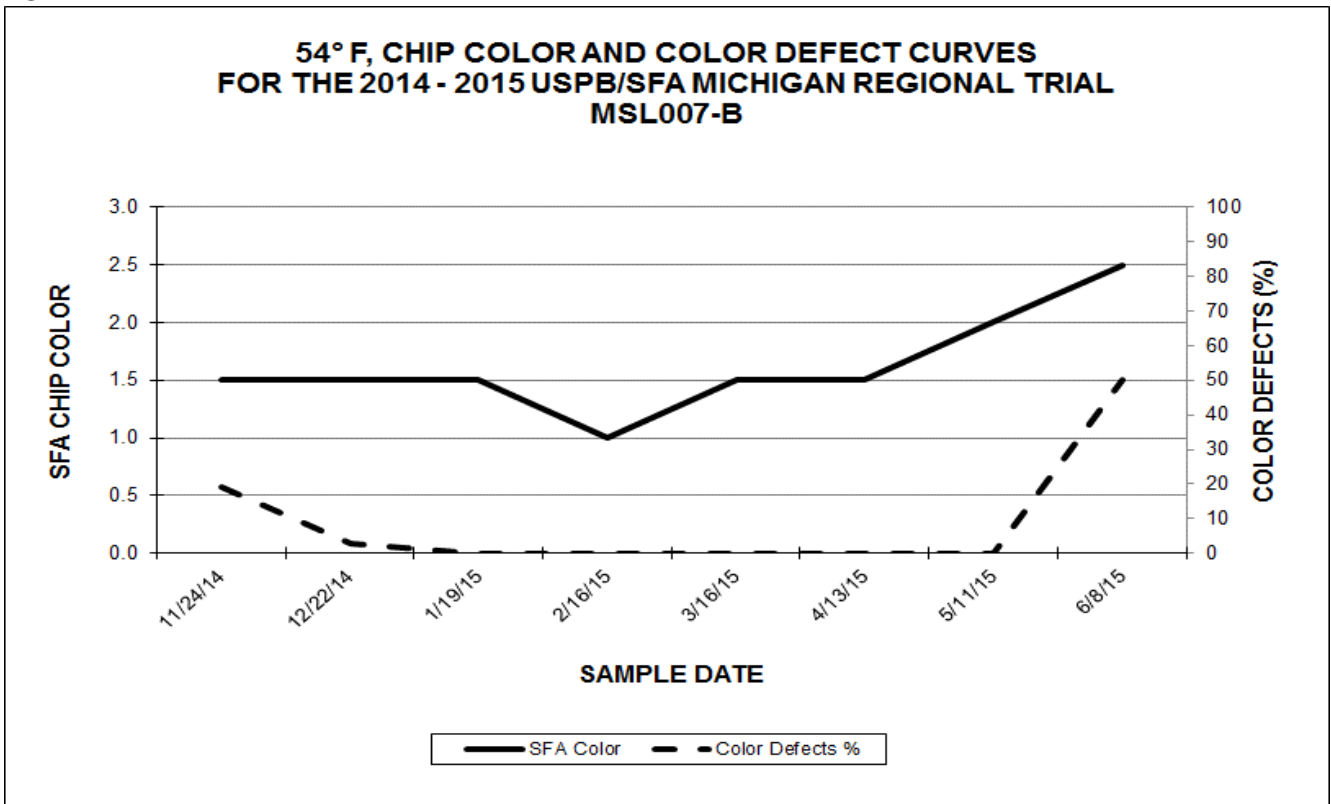


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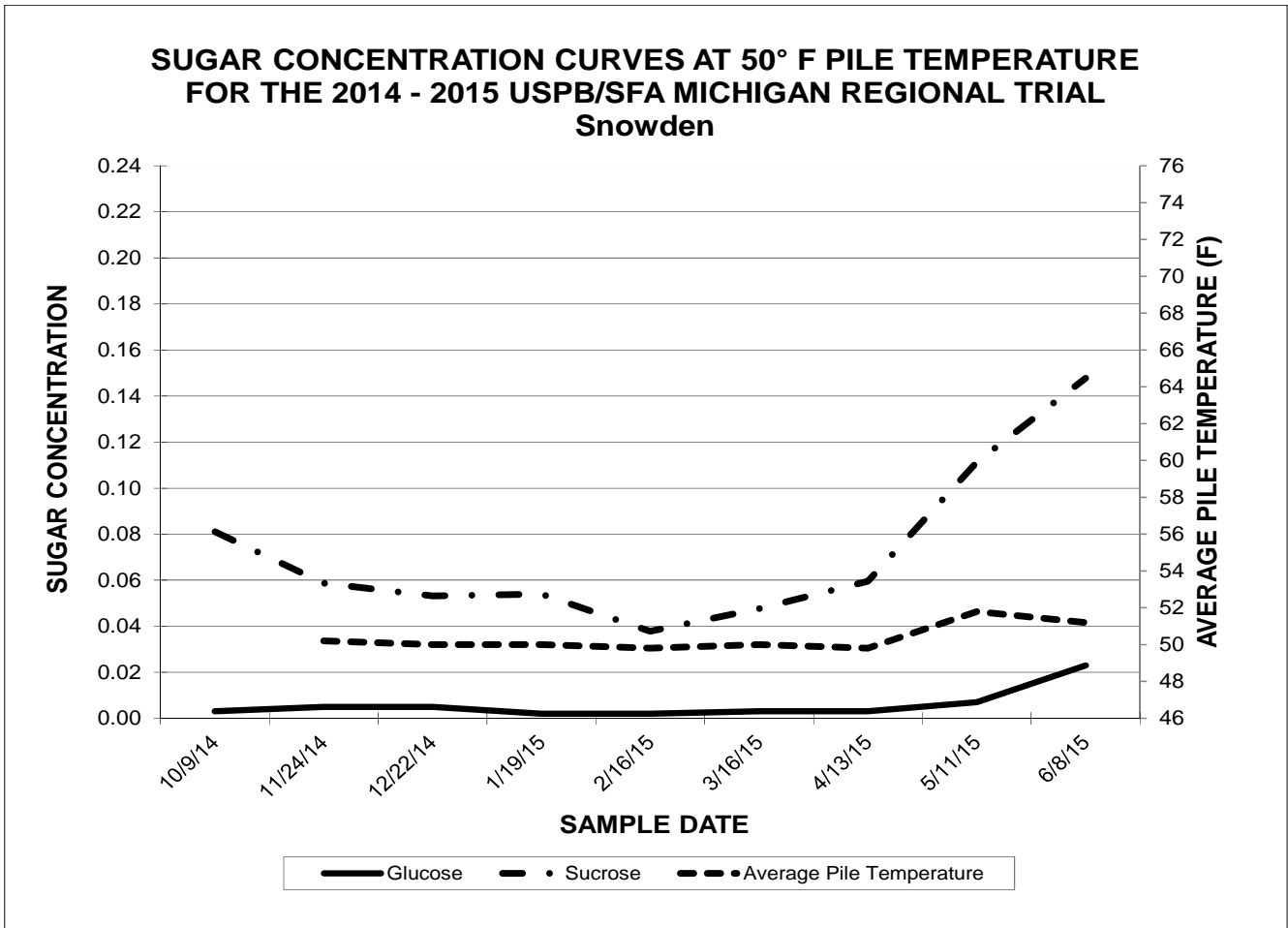


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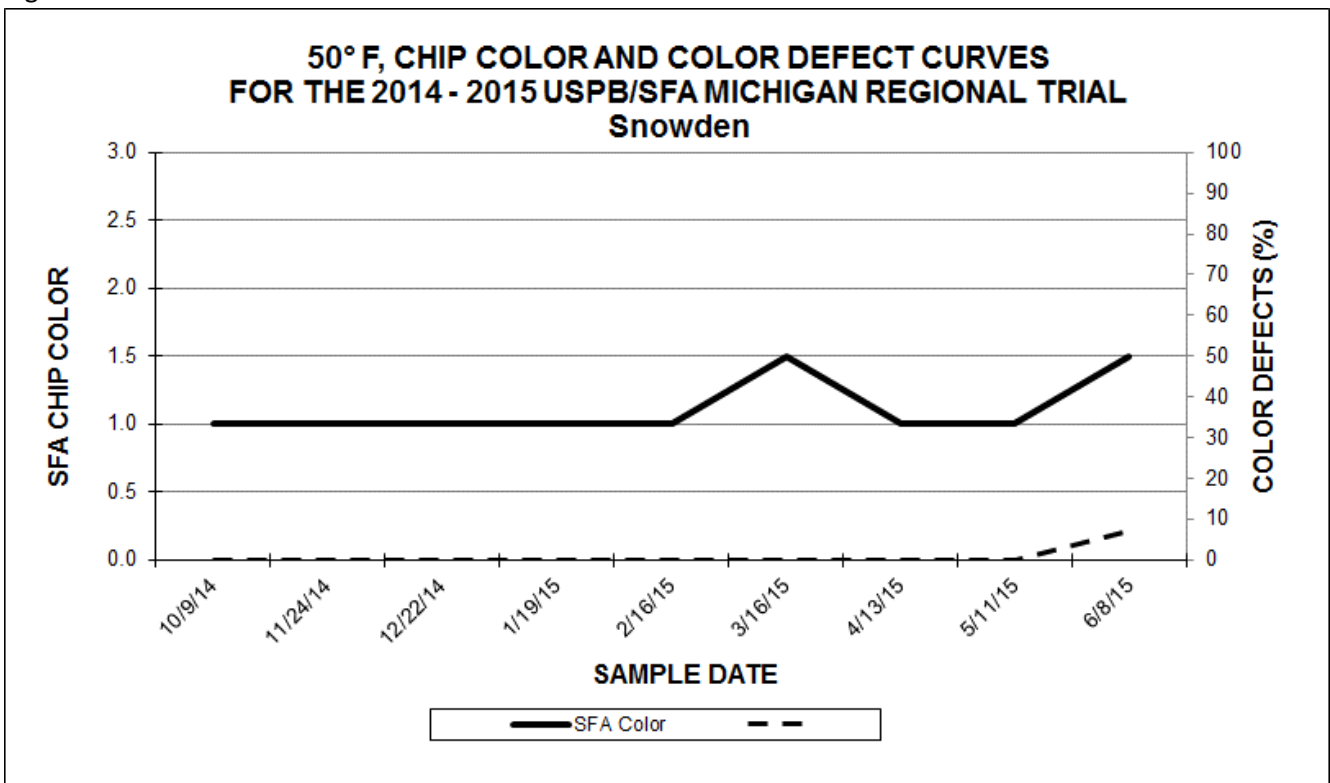


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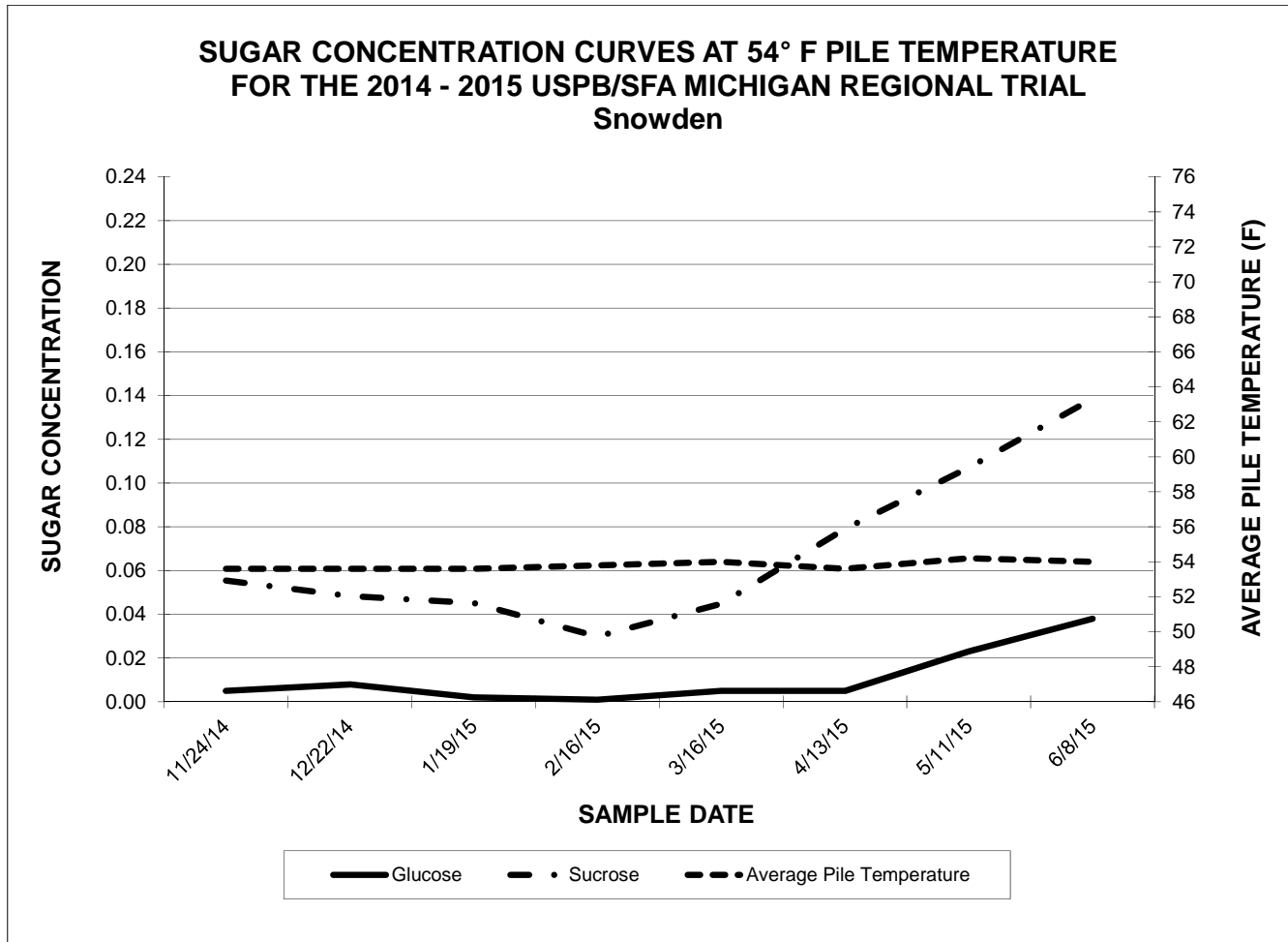


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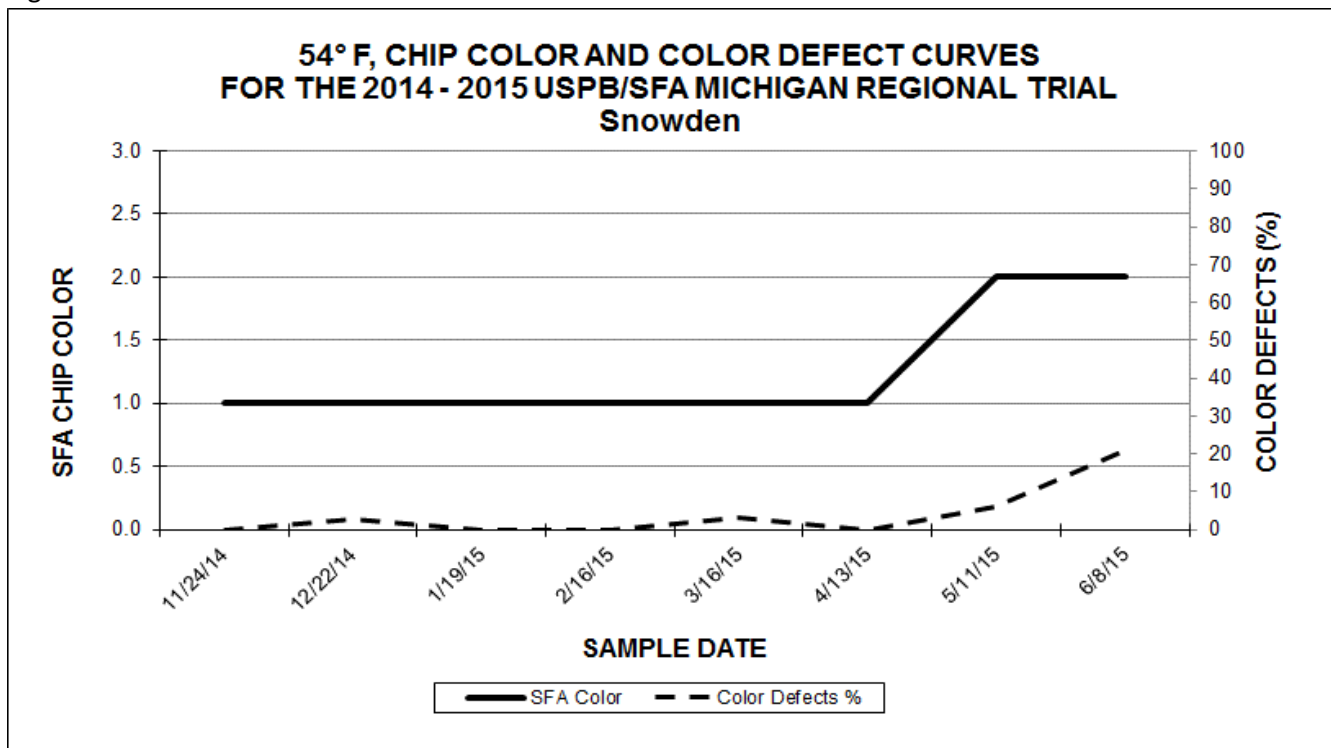


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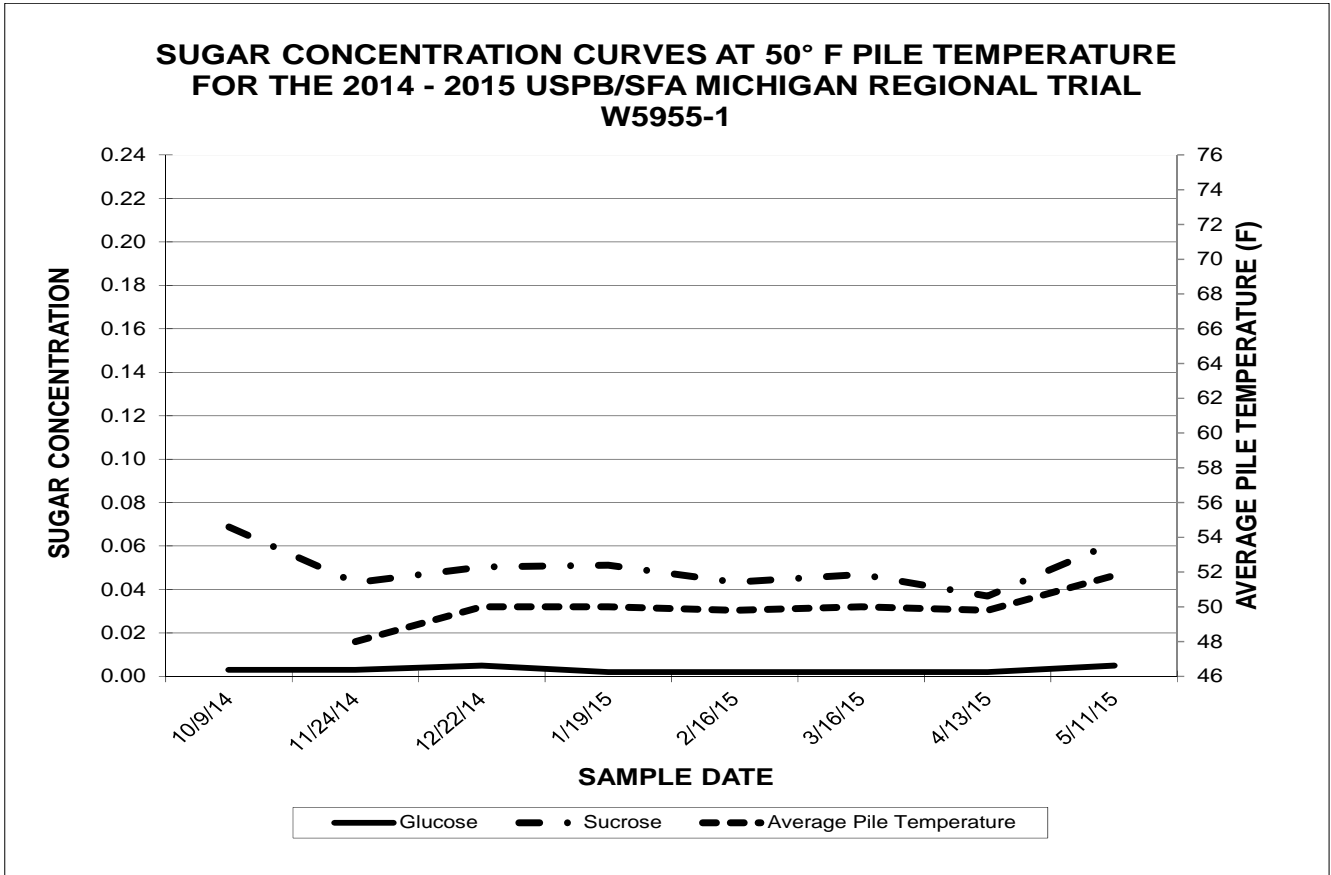


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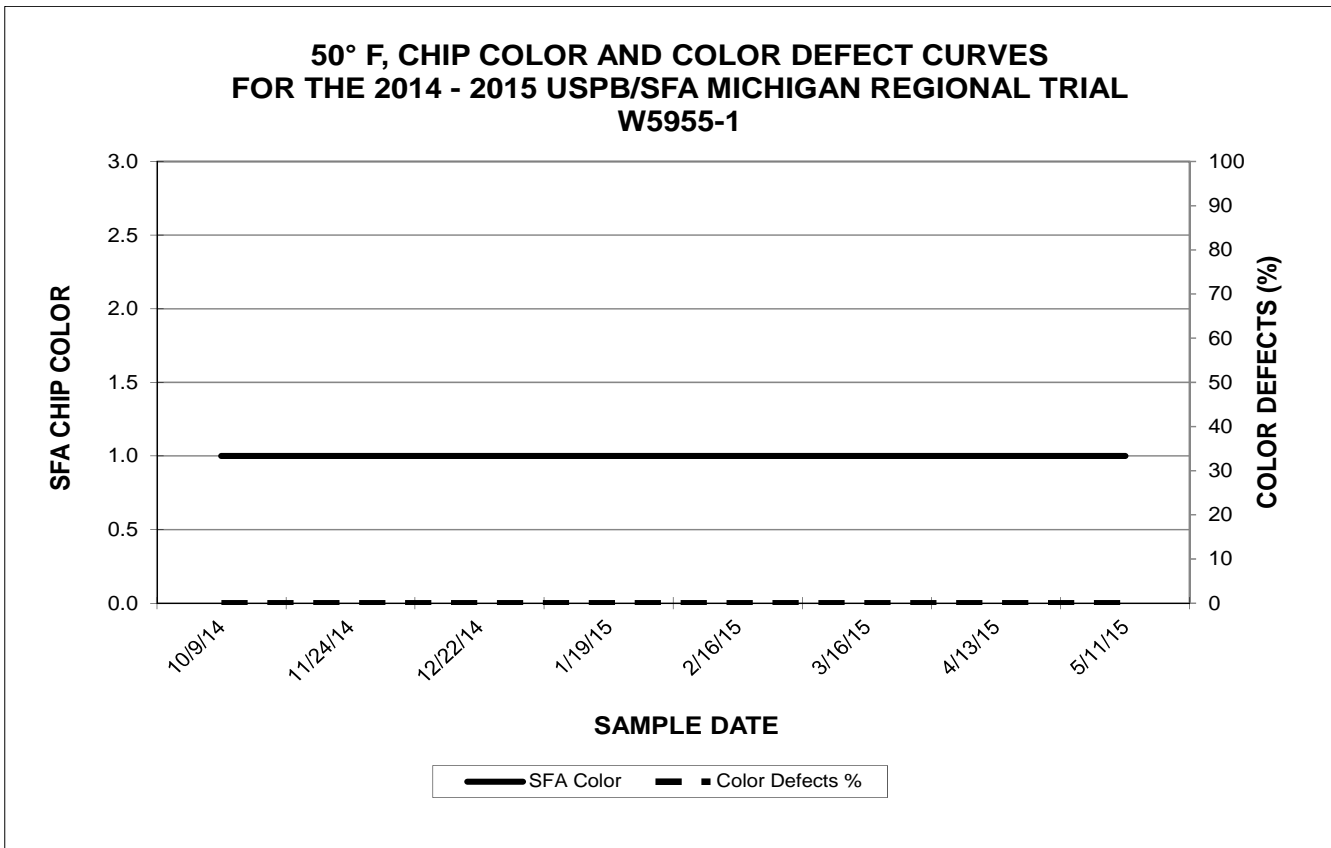


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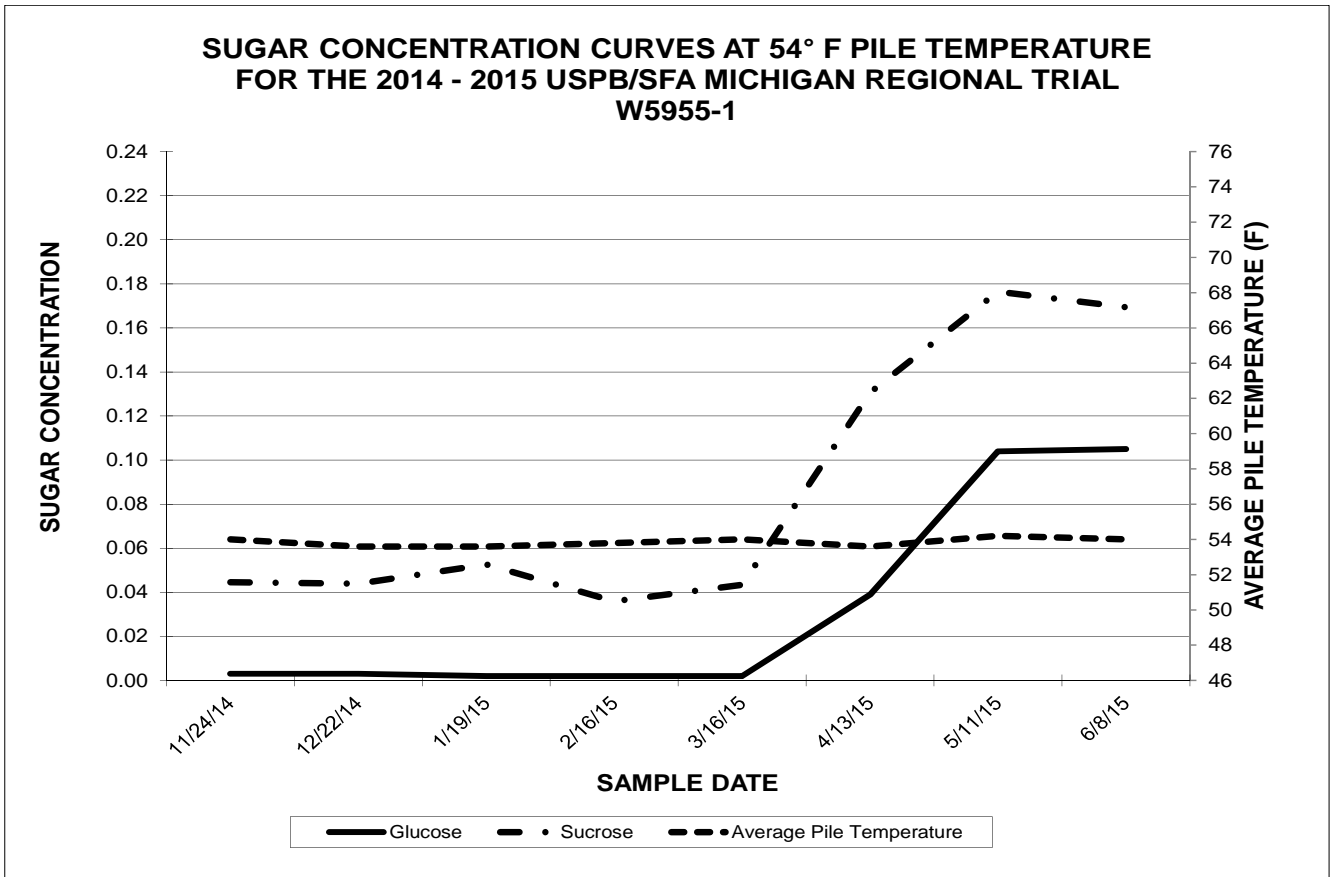


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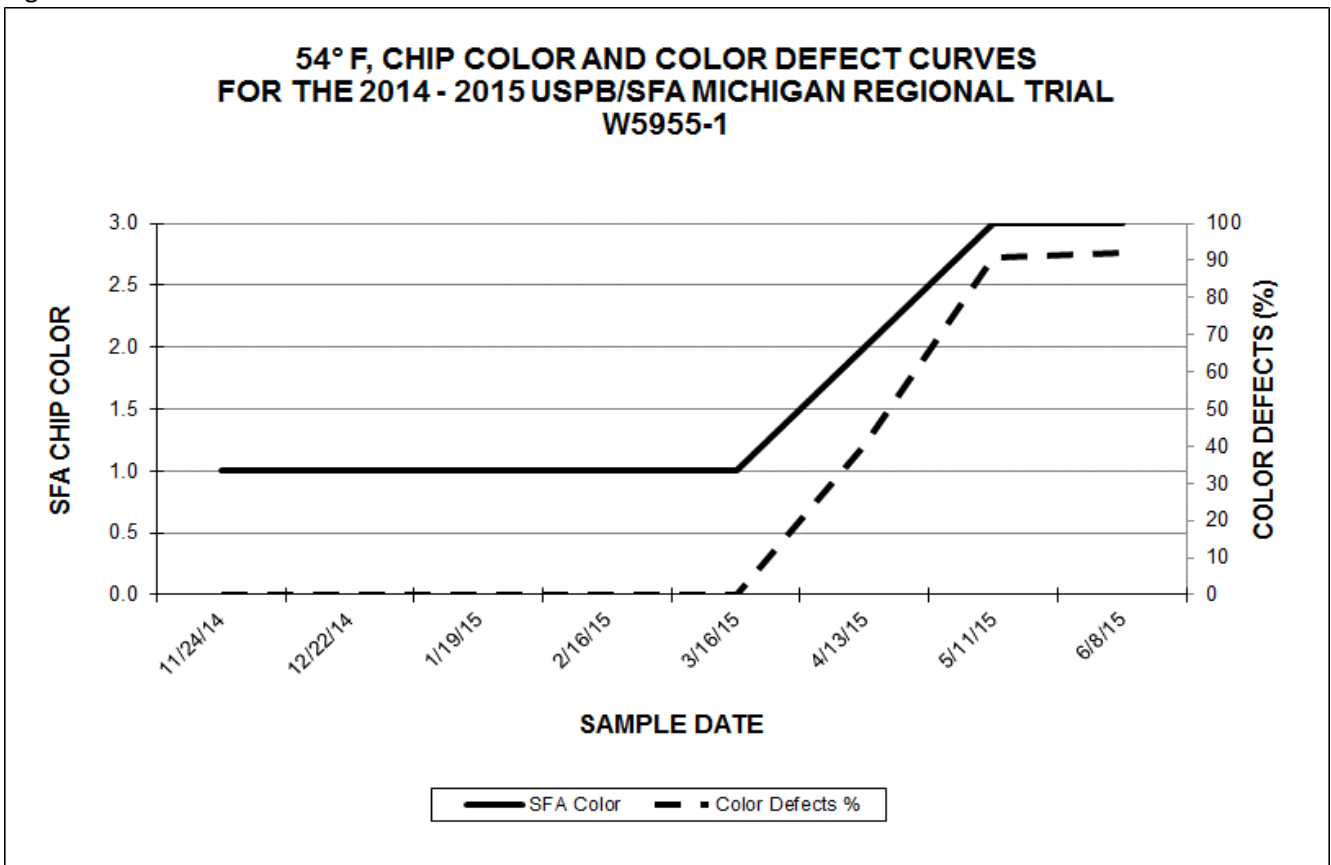


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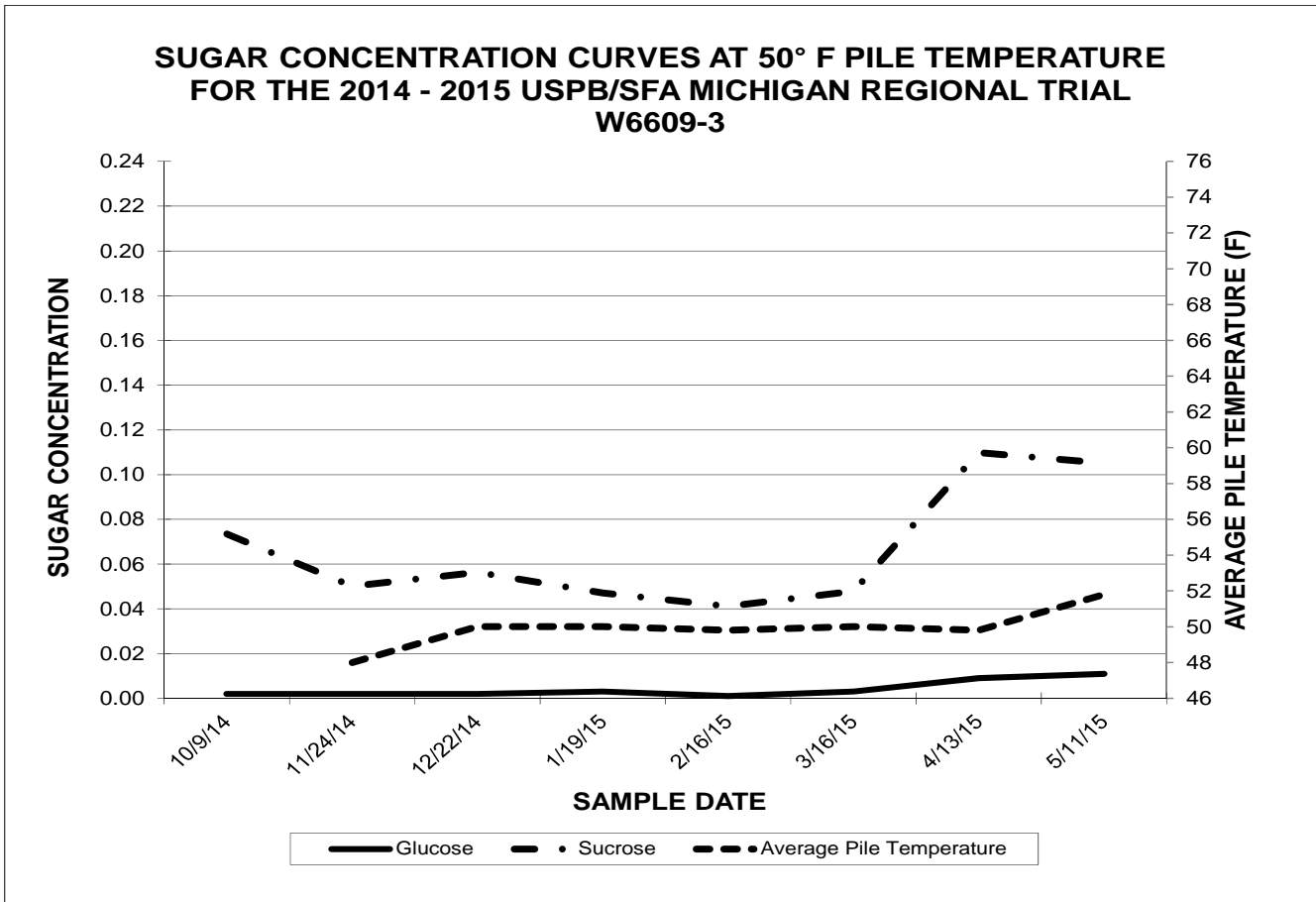


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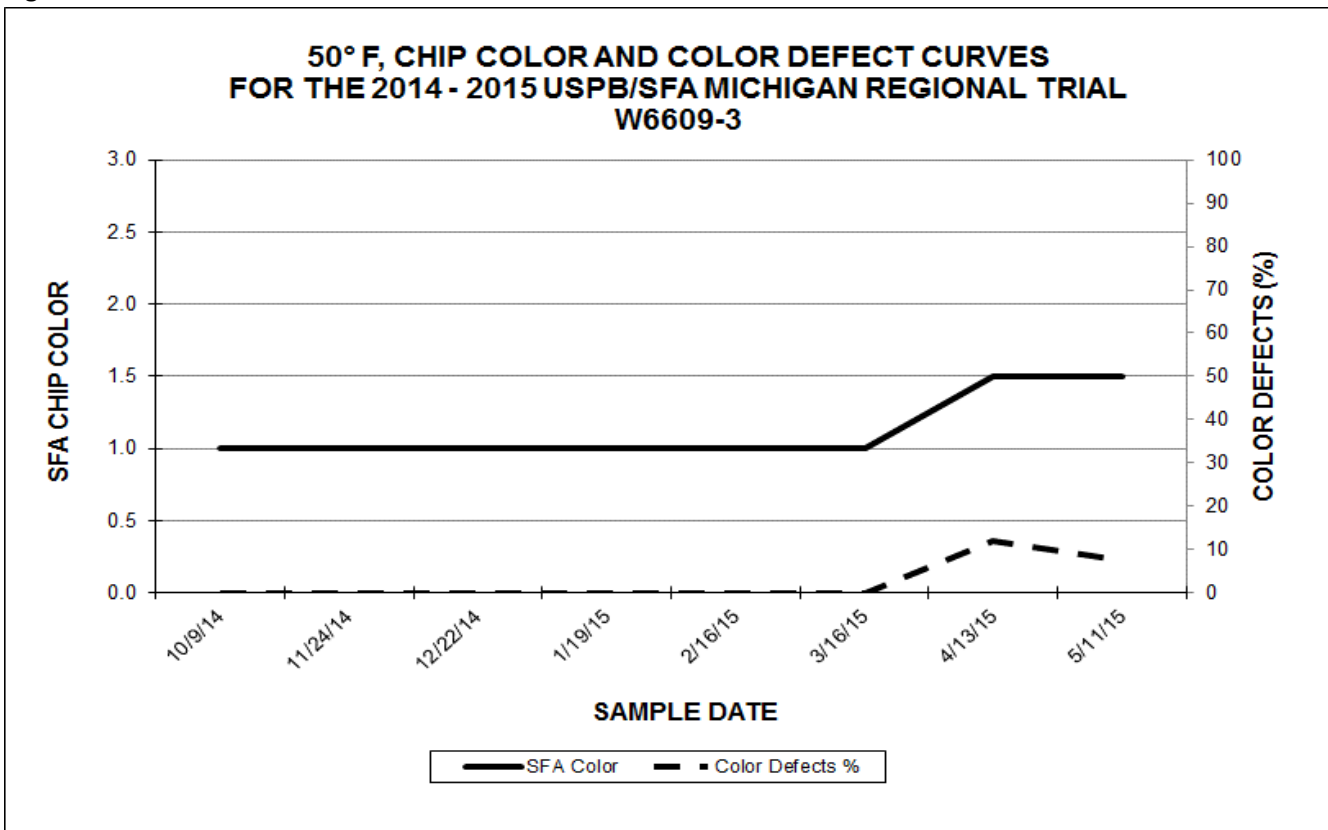


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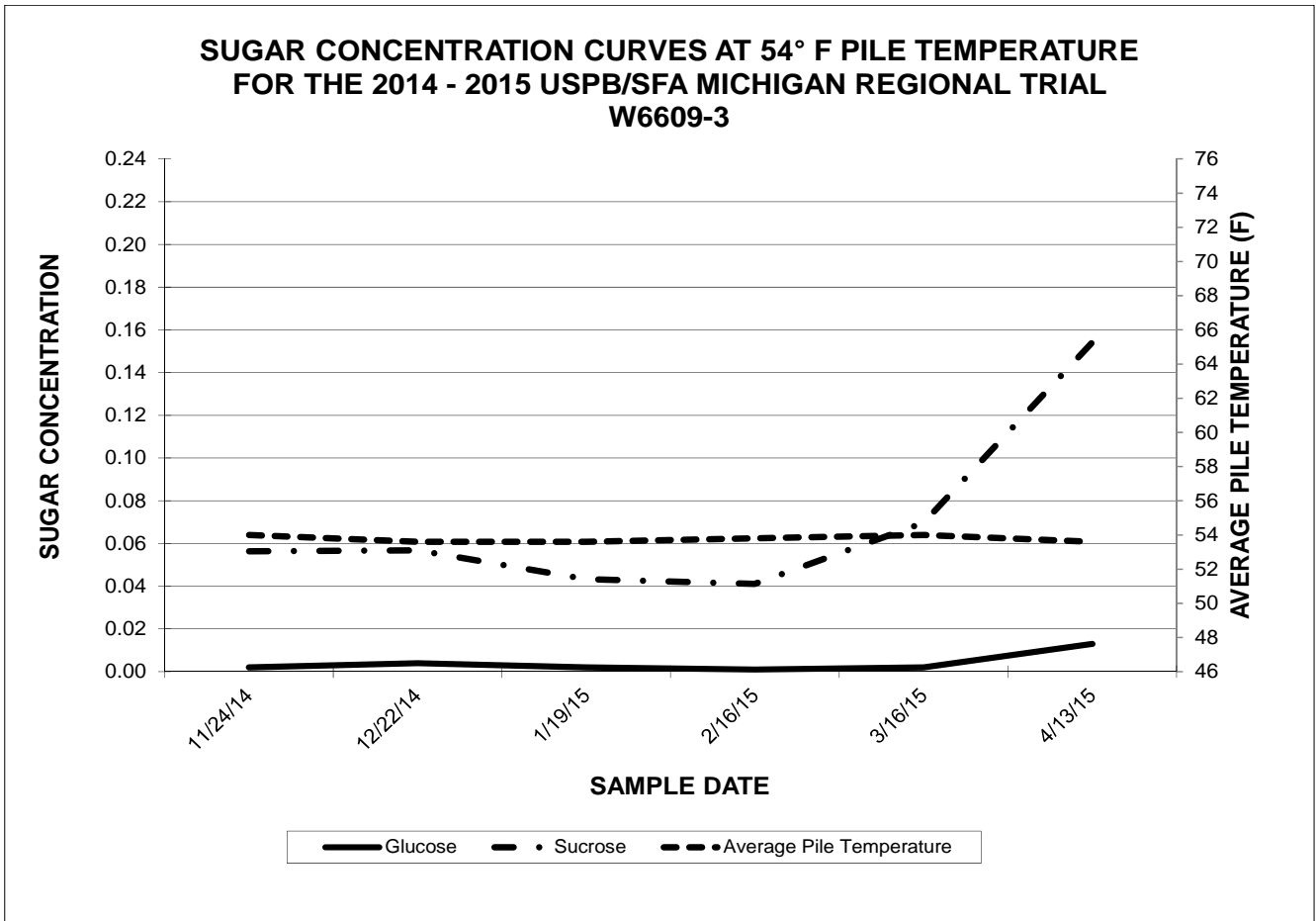


Figure 48.

