# OUT-OF-STORAGE CHIP QUALITY
# 2007-2008 MICHIGAN REGIONAL REPORT

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## Procedure:

The 2007 USPB / SFA Chip Trial was harvested on October 4, 2007 at Sandyland Farms LLC, Howard City, MI. Several chip storage samples were collected from each variety at harvest. Two 40 pound samples were collected from each entry and placed in the cooperating grower's commercial storage for evaluation in January and March of 2008 at Herr Foods, Nottingham PA. The 40 pound tuber samples placed in the grower's commercial storage were removed from storage in late January 2008 with a pile temperature of 54 ºF and in March 2008 with a pile temperature of 48 ºF. For sprout control, CIPC was applied in the storage in November 2007.

Eighteen, 30 tuber samples were also collected from each trial entry at harvest and stored in two cold storages at the Michigan Potato Industry Commission's (MPIC), Cargill Potato Demonstration Storage Facility. One set of nine samples were stored at approximately 54ºF for monthly evaluation, October through June. The remaining nine, 30 tuber samples were stored at approximately 48ºF to be evaluated during this same time period. 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 X10), an SFA color score and an undesirable chip color score. The undesirable chip color score is reported as a percentage, by weight, of the total chips that were evaluated. For sprout control, CIPC was applied in the MPIC storages in late October 2007.

## Results:

Tables 1 and 2 summarize the chip quality of the 40 pound samples after being processed at Herr Foods, Inc. on January 30$^{th}$ and March 26$^{th}$, 2008. The varieties are listed in yield order high to low, top to bottom based on the 2007 field trial data. As seen in Table 1, Herr Foods rated Beacon Chipper as having the best all around chip quality from these storage samples on this date. MSJ147-1 exhibited the least amount of tuber defects and the highest specific gravity of any line in the group.

From Table 2, W2133-1 appears to have the best overall chip quality appearance and highest specific gravity at this point in storage. Some concerns have been raised that this variety masks PVY expression. MSJ147-1 and CO95051-7W both appeared to have excellent Agtron numbers, as well as, low internal defect scores. Yield and overall agronomic productivity of these lines needs to be weighed with the benefit of the late season chip quality exhibited here.

Tables 3-38 summarize the 30 tuber chip quality samples collected at harvest from each entry and stored at the MPIC demonstration storage in the fall of 2007 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 varieties are again reviewed in yield order, high to low, top to bottom.

Beacon Chipper: Table 3 indicates that Beacon Chipper at 54 ºF lost its dormancy quickly and consequently its chip quality declined after three months in storage. Sucrose rose quickly at the end of January, followed by an increase in glucose in mid-February. This rise in sugar levels was observed in the decline in chip quality (Table 4). This line appeared to store longer at 48 ºF with no negative impact to sugar concentration as a result of being cooled (Table 5). The storage life of this potato was more than doubled by storing the variety at 48 ºF. The chip quality of Beacon Chipper, when stored at 48 ºF, appeared to be good into early May (Table 6).

W2324-1: This line selection, when stored at 54 ºF, appeared to be stable until mid-February at which time the variety began to lose dormancy (Table 7). In early March, chip quality began to change as sugar related defects increased to almost 10 percent (Table 8). The colder storage temperature (48 ºF) did delay the rise in sucrose, but it was apparent that some physiological changes were beginning to occur in late March that brought about a rise in glucose (Table 9). This rise in glucose did not drastically impact the SFA color score, but can be seen in the increase in sugar related defects (Table 10).

Snowden: Snowden had a predictable response, as it stored to late February when held at 54 ºF (Tables 11-12). When subjected to it's standard storage protocol of being stored at 48 ºF, this variety was able to be stored acceptably into mid-April (Tables 13-14).

Atlantic: The objective of this sugar profiling study was to look for long term storage performance in new varieties. Atlantic, not being a storage potato, was only sampled for a few months to save money on sampling costs.

W2133-1: This line, when stored at 54 ºF, maintained relativly low sucrose and glucose values until early May at which point the SFA and sugar related defect levels rose to unacceptable levels (Tables 19-20). When W2133-1 was stored at 48 ºF the sugar quality and subsequent chip quality remained excellent into early June (Tables 21-22). This data is consistent with that from Herr Foods in Table 2 which ranked W2133-1 the best overall for chip quality in March of 2008.

CO96141-4W: Table 23 shows CO96141-4W increasing sucrose levels steadily from mid February to late May. Sugar levels began to negatively impact chip quality in early June (Table 24). The 48 ºF storage temperature kept the sucrose levels lower throughout the storage season resulting in a slight improvement in chip quality (Tables 25-26). Overall, this variety stored quite well based on this set of sugar data.

MSJ316-A: This line did not handle the warmer storage temperature of 54 ºF well. The sucrose level rose quickly after the first of February, resulting in a high level of sugar related defects accumulating in the finished chips, beginning in early March and lasting for the remainder of the storage season (Tables 27-28). The cooler storage temperature helped slow the physiological aging of the potatoes and stabilized glucose accumulation (Table 29). Table 30 shows that the variety maintained a good SFA color overall through the storage season, but there appeared to be some variability in the sugar related defects of MSJ316-A.

CO95051-7W: This variety, at both 54 ºF and 48 ºF, steadily increased sucrose levels from early March to early June with little or no impact on increasing glucose levels (Tables 31 and 33). Tables 32 and 34 show little, if any, sugar related chip defects for this variety throughout the storage season. This variety was not a top agronomic performer based on large scale commercial trials, but has excellent chip quality late out of cold storage.

MSJ147-1: This variety performed very well in storage at both 54 ºF and 48 ºF into June. At 54 ºF the sucrose levels rose steadily from March through June, but had little impact on glucose concentration (Table 35). Table 36 depicts the excellent chip quality that was evident from this line. The cooler storage, once again, reduced the aging process while having no negative impact on glucose levels (Table 37). MSJ147-1 exhibited a little higher level of sugar related defects being noted in the finished chips (Table 38). Overall, this variety had very nice chip quality late out of storage.

**Table 1.** 2007-2008 Out-of-Storage Chip Quality, 1/30/08, Sandyland Farms, LLC [1].

| Entry | Agtron Color | SFA[2] Color | Specific Gravity | Percent Chip Defects[3] Internal | External | Total | Comments |
|---|---|---|---|---|---|---|---|
| Beacon Chipper | 65 | 1.0 | 1.078 | 1.5 | 9.7 | 11.2 | nice chip color, a few shaded, externals good overall, a few pitted and surface scab, nice grade, some oversize |
| W2324-1 | 61.3 | 2.0 | 1.079 | 5.6 | 14.4 | 20.0 | light shading, light pitted scab, nice size |
| **Snowden** | **61.8** | **1.0** | **1.078** | **0.8** | **17.5** | **18.3** | **nice chip color, pitted scab, a few stem end browning, nice size** |
| **Atlantic** | **60.5** | **2.5** | **1.078** | **23.1** | **12.5** | **35.6** | **hollow heart, poor chip color, pitted scab, oversize** |
| W2133-1 | 64.4 | 1.0 | 1.080 | 4.3 | 9.0 | 13.3 | nice chip color, pitted scab, light bruise, good size |
| CO96141-4W | 64.3 | 1.5 | 1.069 | 5.1 | 2.0 | 7.1 | nice chip color, a few stem end and vascular browning, light pitted scab, low gravity, oversize |
| MSJ316-A | 65.7 | 1.0 | 1.073 | 5.5 | 2.3 | 7.8 | nice chip color, a few surface scab, a few oversize, low gravity |
| CO95051-7W | 60.6 | 1.5 | 1.080 | 1.5 | 4.8 | 6.3 | a few shaded chips, nice externals, small grade |
| MSJ147-1 | 59.4 | 1.0 | 1.083 | 0.5 | 3.5 | 4.0 | nice chip color, nice externals, too small |

[1] Samples removed from 54 ºF storage and processed by Herr Foods Inc., Nottingham, PA on January 30, 2008.

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.** 2007-2008 Out-of-Storage Chip Quality, 3/26/08, Sandyland Farms, LLC[1]

| Entry | Agtron Color | SFA[2] Color | Specific Gravity | Percent Chip Defects[3] Internal | External | Total | Comments |
|---|---|---|---|---|---|---|---|
| Beacon Chipper | 55.5 | 4.0 | 1.081 | 62.2 | 0.0 | 62.2 | poor chip color, large grade 4"+, very nice externals |
| W2324-1 | 55.8 | 3.0 | 1.090 | 25.9 | 11.6 | 37.5 | poor chip color, light surface/pitted scab, nice grade |
| **Snowden** | **61.5** | **1.5** | **1.078** | **20.5** | **10.6** | **31.1** | **a few hollow heart, good chip color, light scab, 2 green, large grade, some 4"** |
| **Atlantic** | **56.9** | **3.5** | **1.089** | **31.1** | **14.5** | **45.6** | **poor chip color, surface & pitted scab, large grade to 4"** |
| W2133-1 | 60.4 | 1.0 | 1.091 | 3.6 | 10.3 | 13.9 | nice chip color, a few light scab, nice grade |
| CO96141-4W | 58 | 2.5 | 1.078 | 15.7 | 8.4 | 24.1 | shading in some chips, light scab, 4 green, large grade 4" |
| MSJ316-A | 59.5 | 1.0 | 1.085 | 7.8 | 6.0 | 13.8 | nice chip color, a few hollow heart, nice externals, nice grade |
| CO95051-7W | 60.5 | 1.0 | 1.086 | 2.2 | 6.3 | 8.5 | nice chip color, light surface scab, small grade |
| MSJ147-1 | 60.7 | 1.0 | 1.089 | 2.9 | 3.0 | 5.9 | nice chip color, nice externals, too many 2" and under |

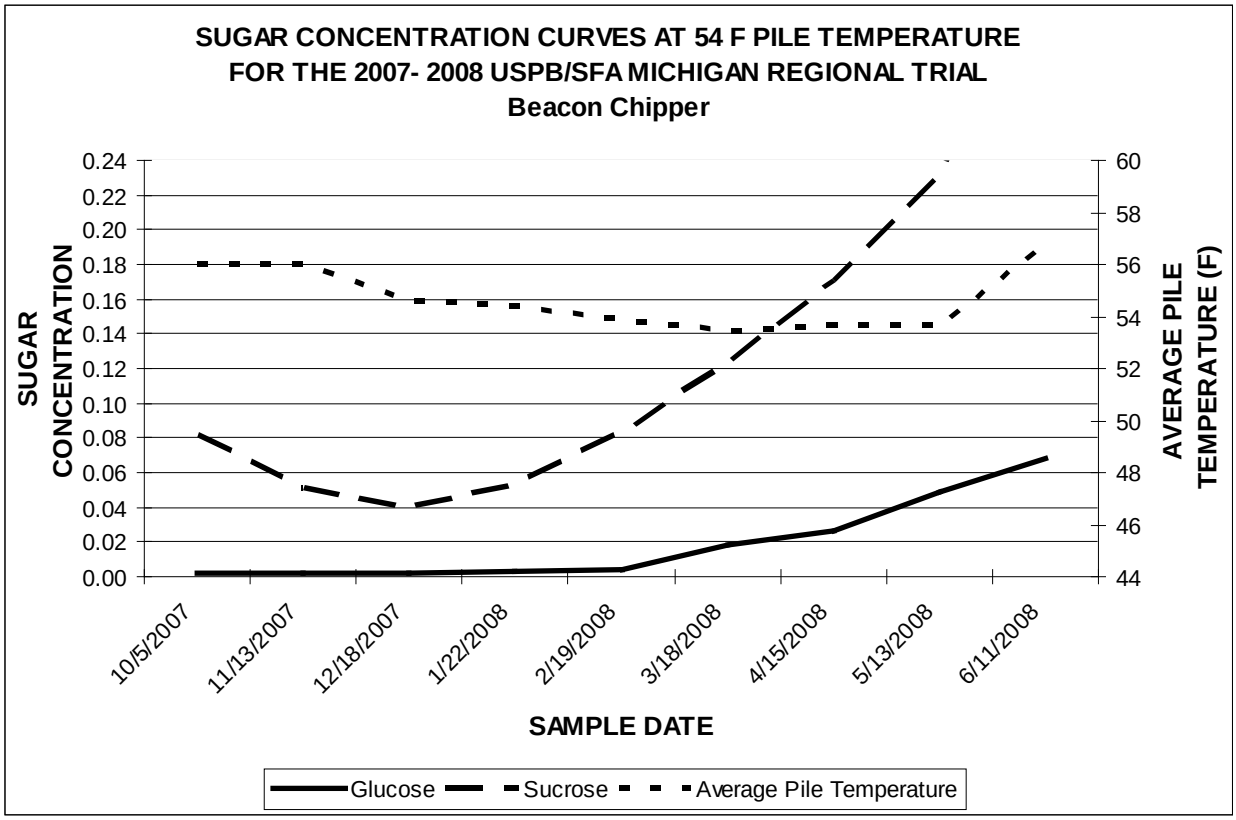
[1] Samples removed from 48 ºF storage and processed by Herr Foods Inc., Nottingham, PA on March 26, 2008.

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 3.

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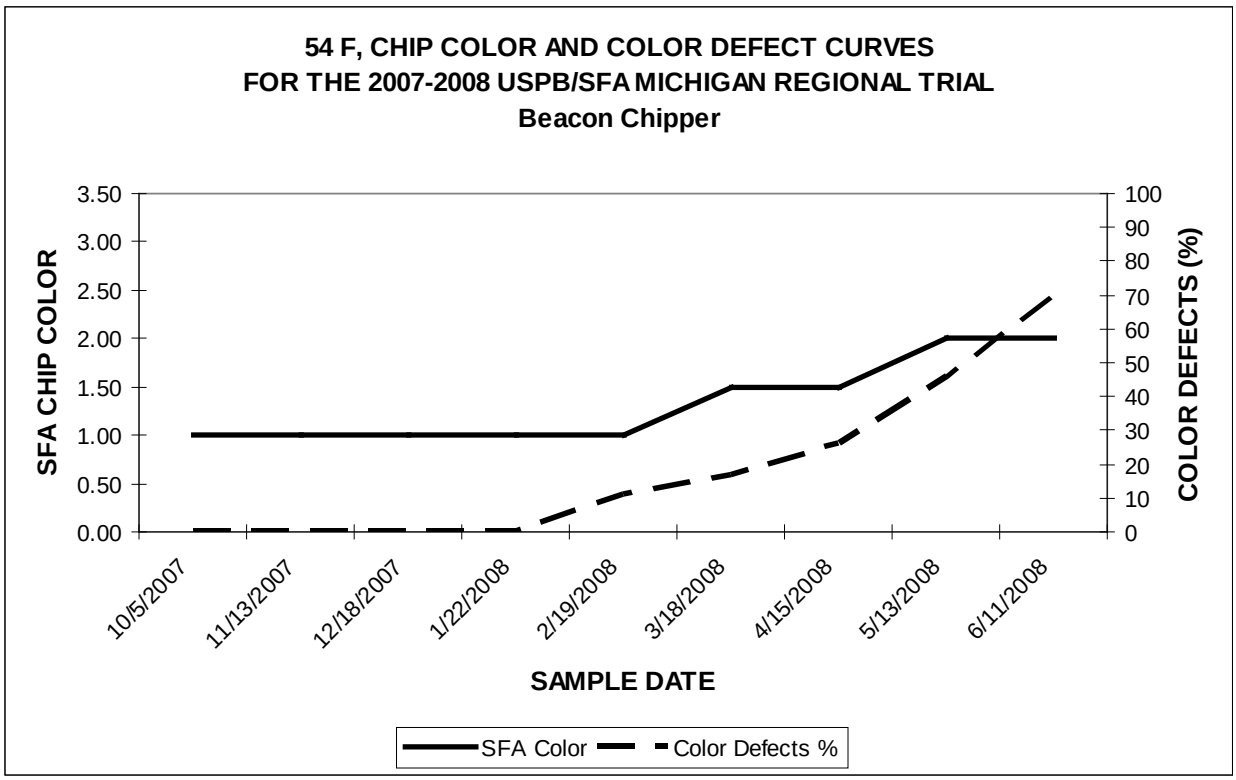

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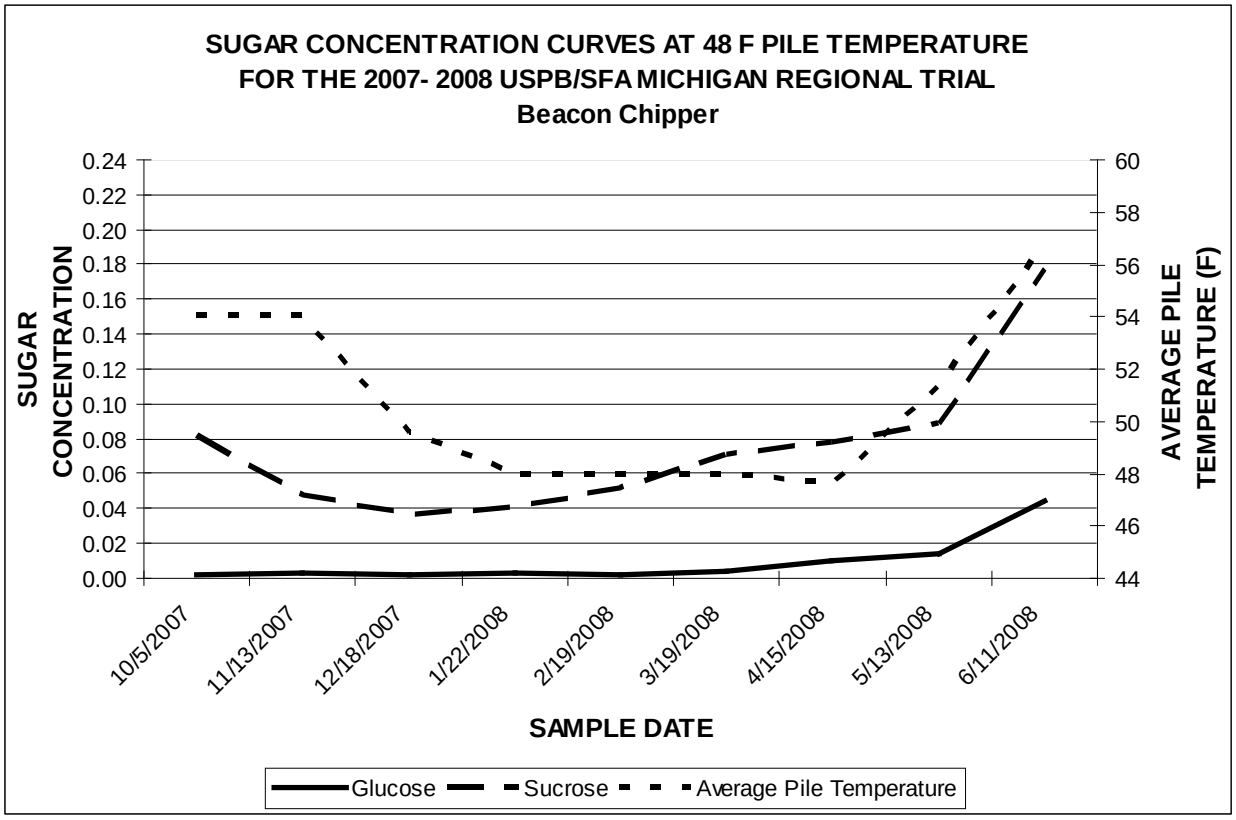


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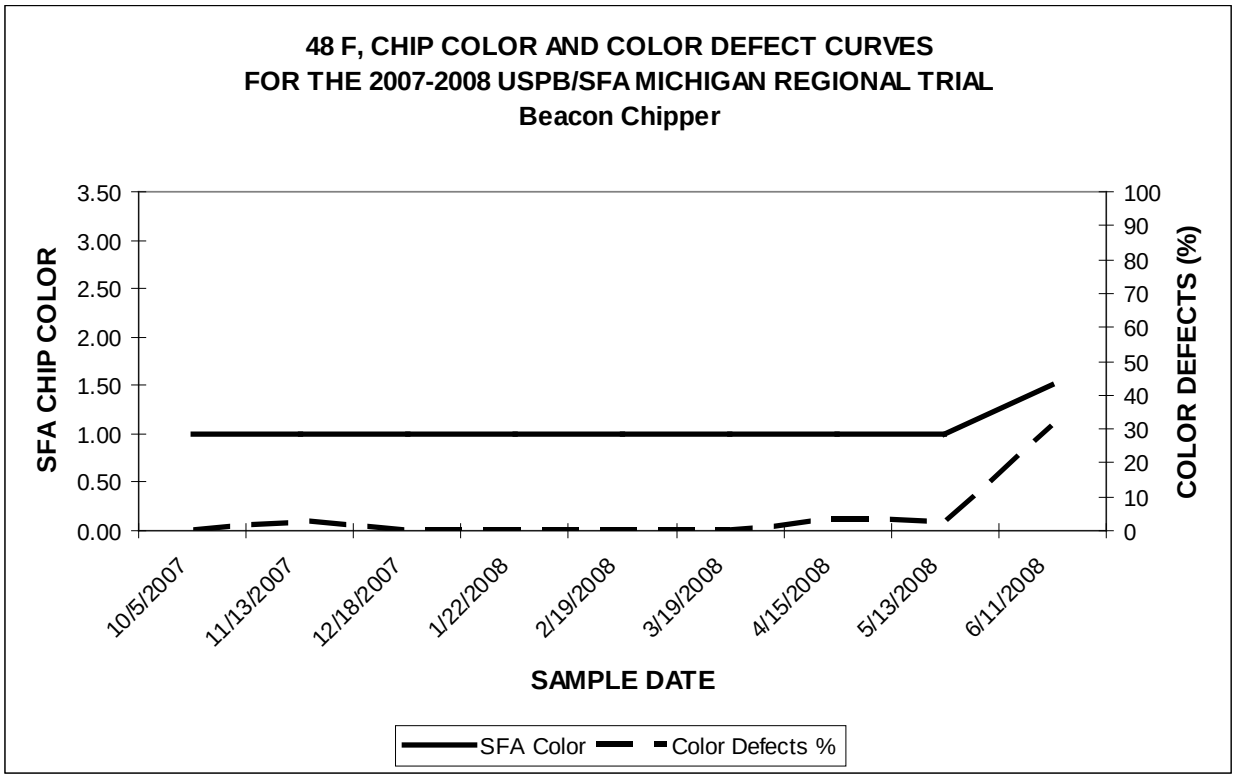

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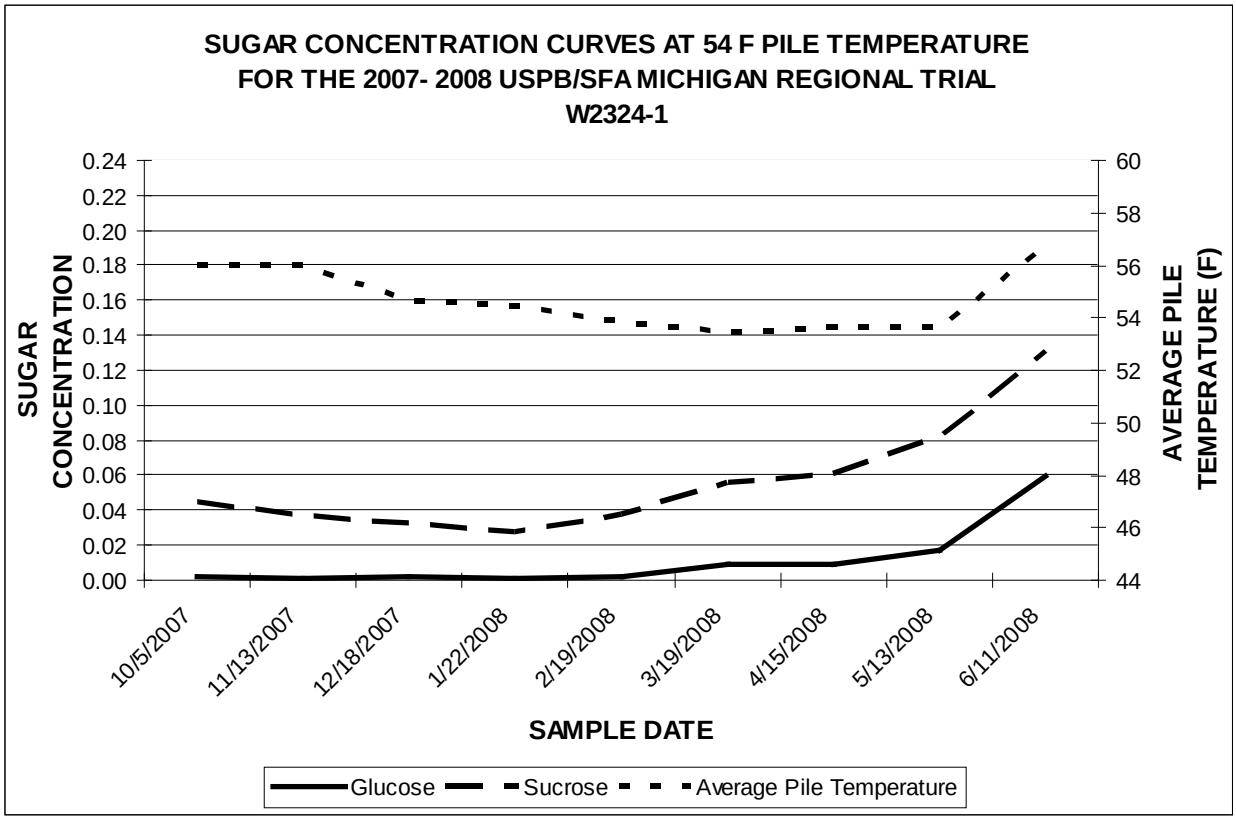


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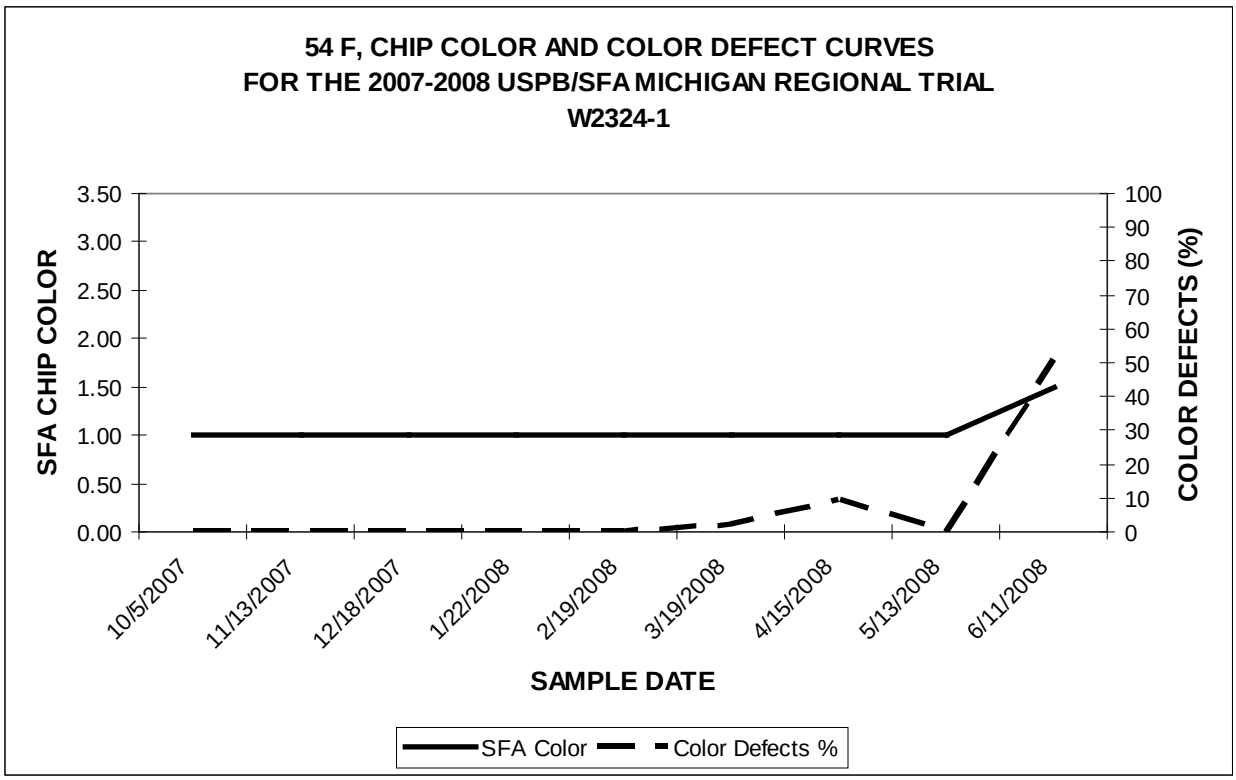

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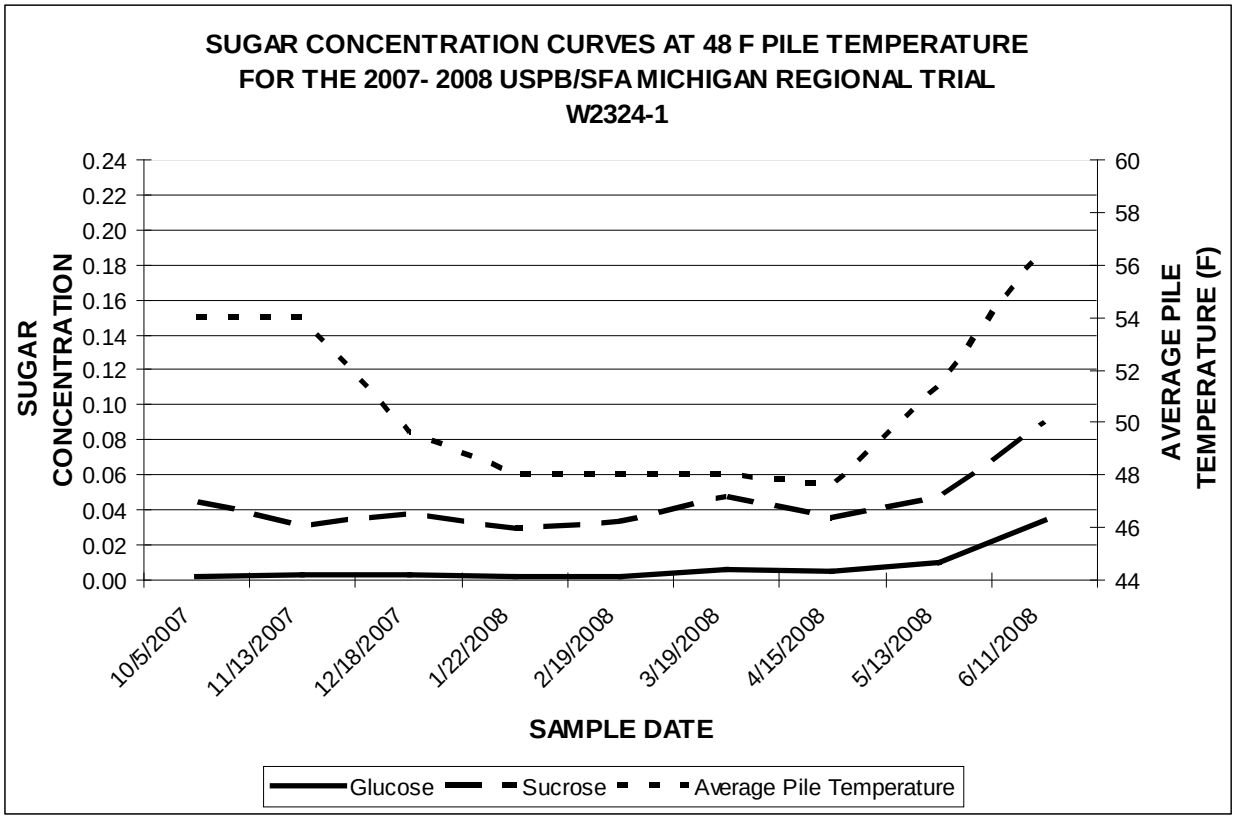


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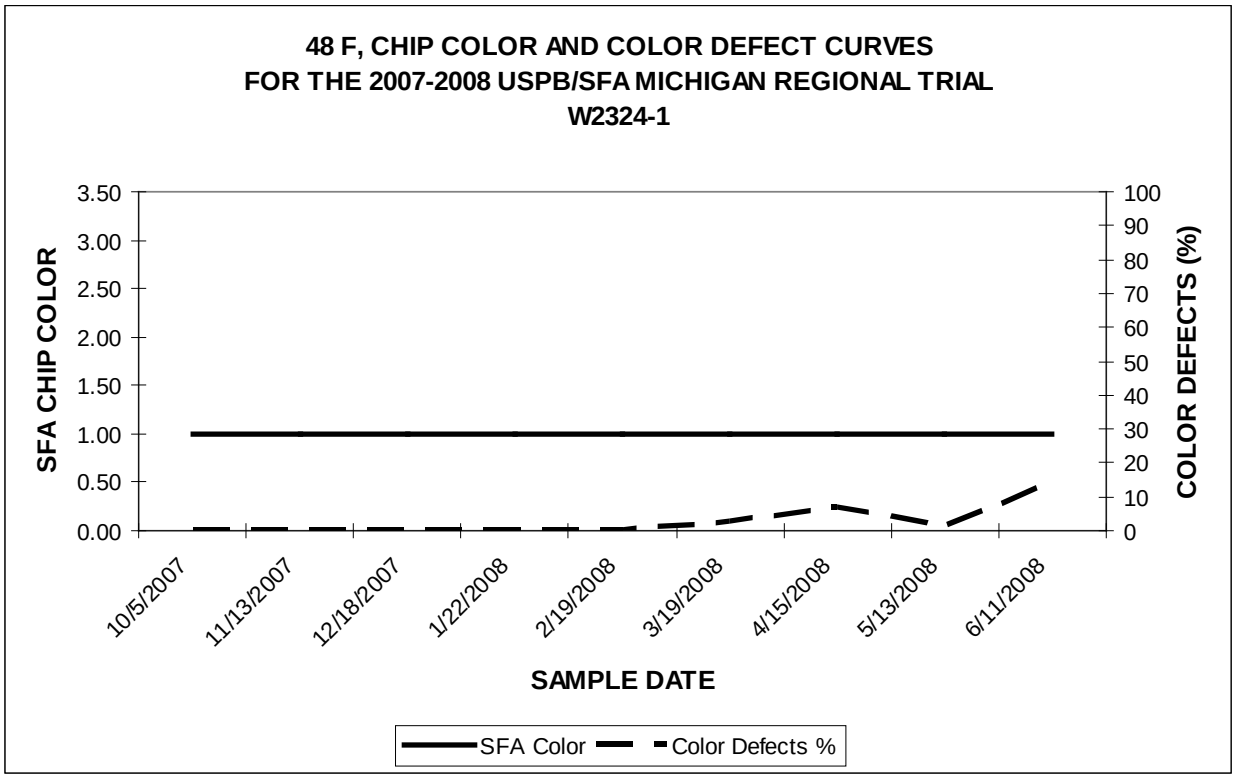

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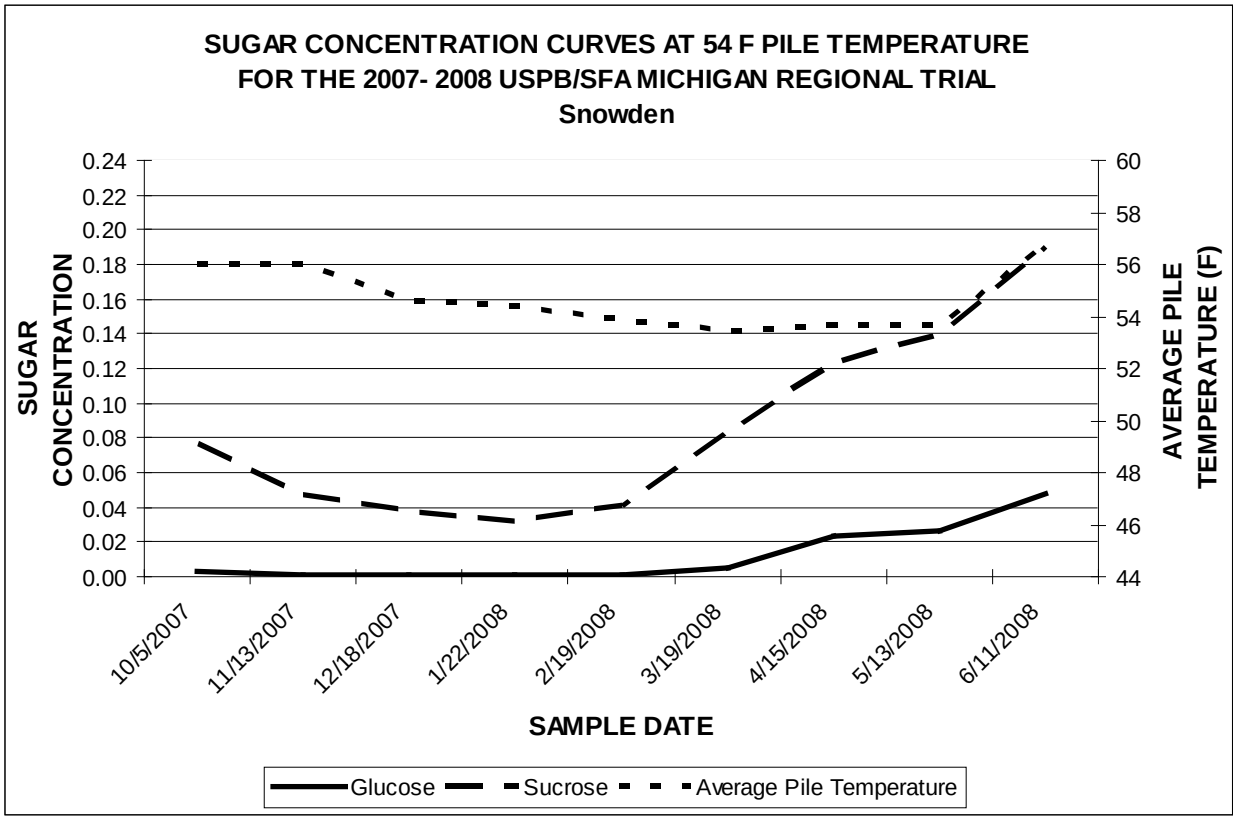


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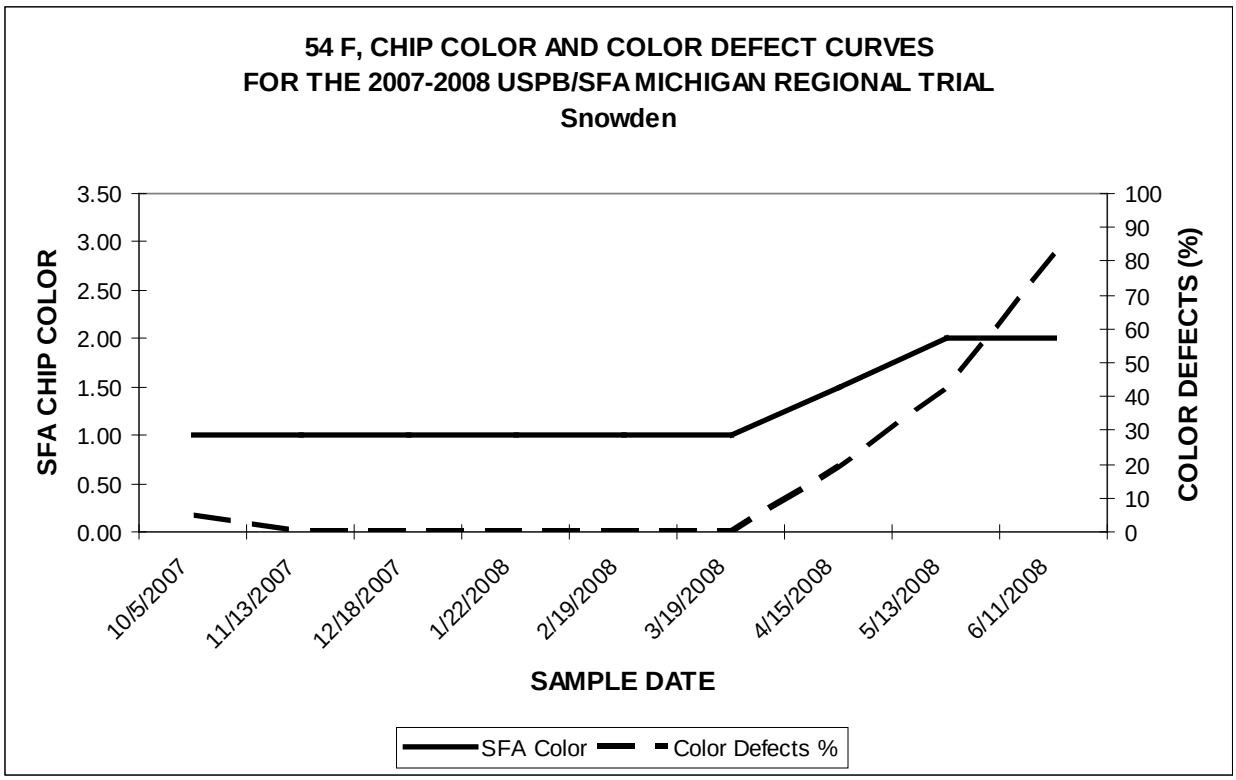

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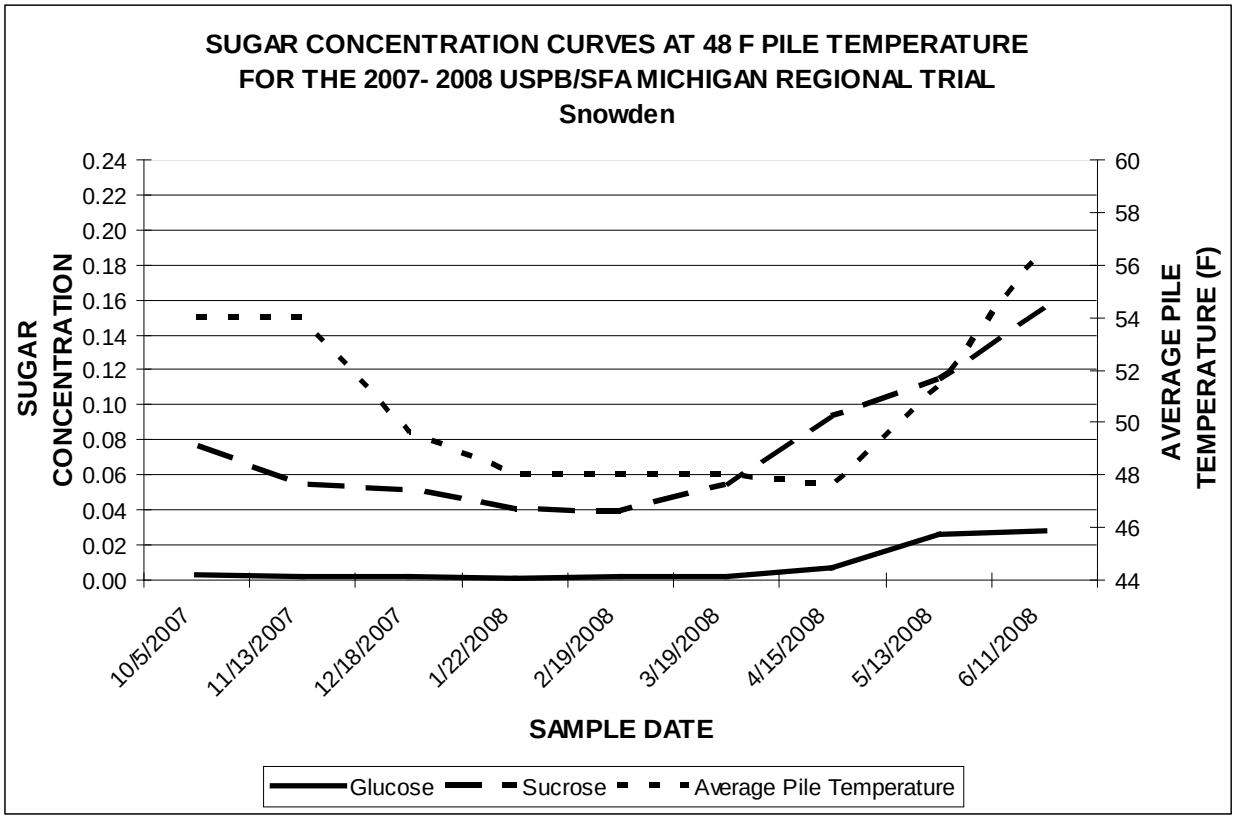


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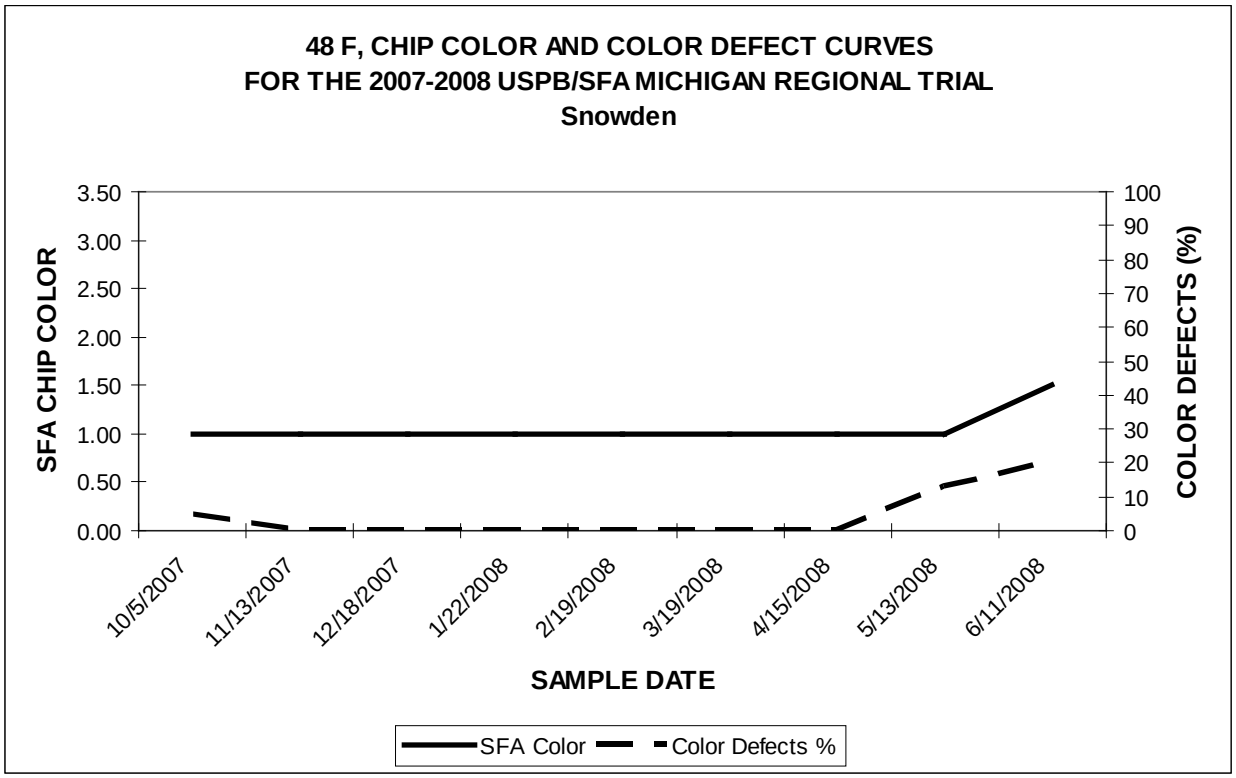

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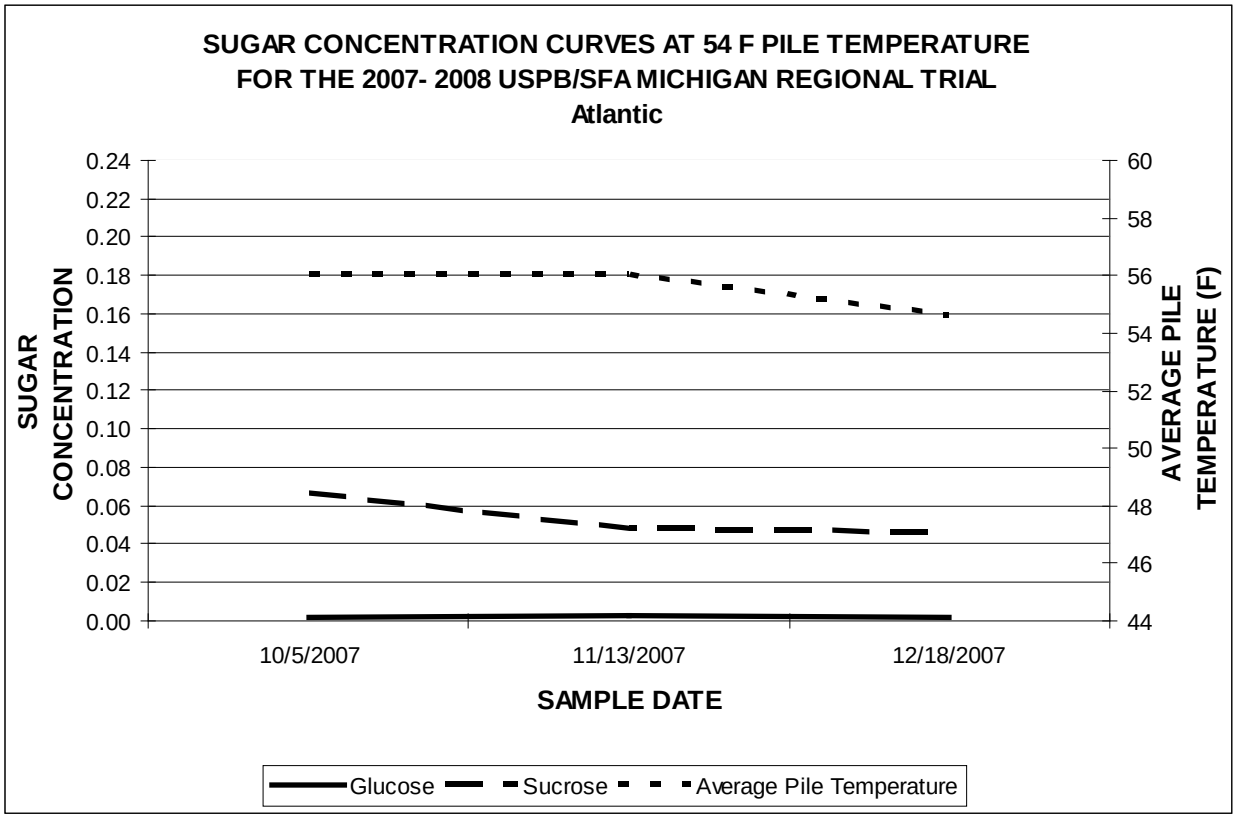


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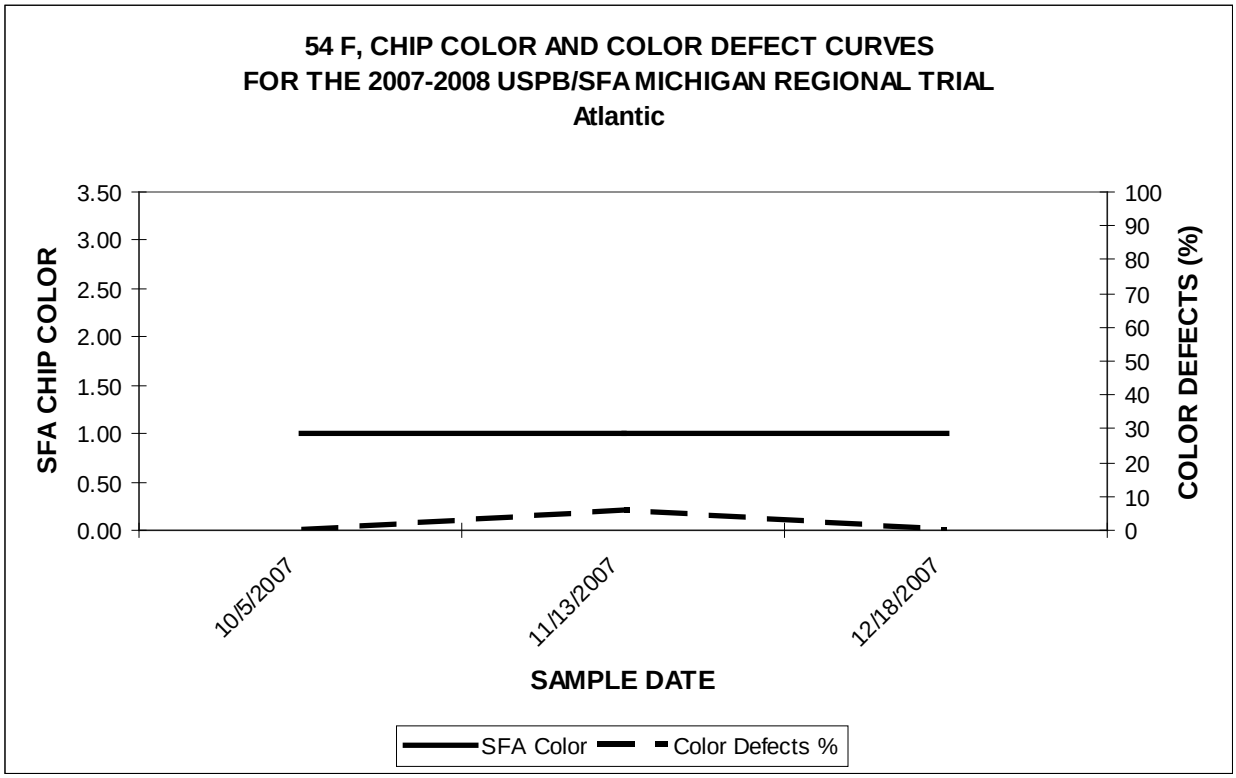

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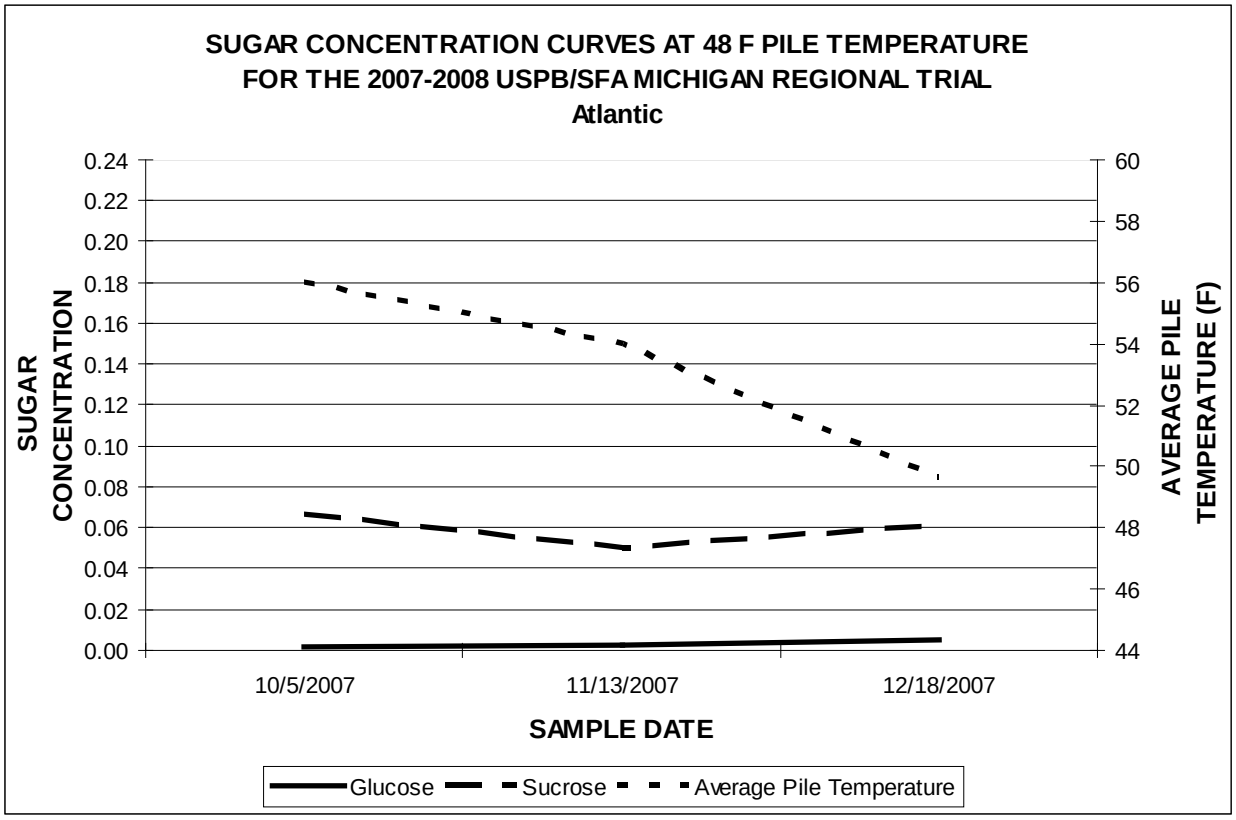


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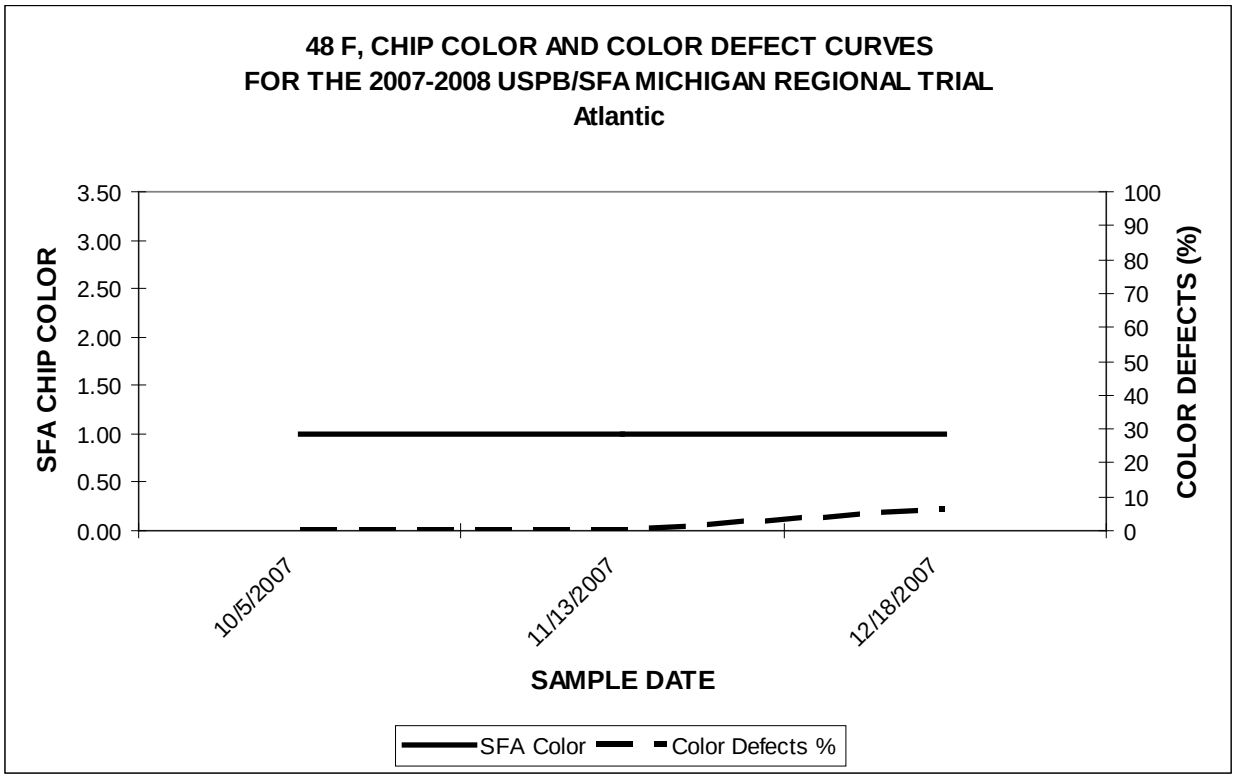

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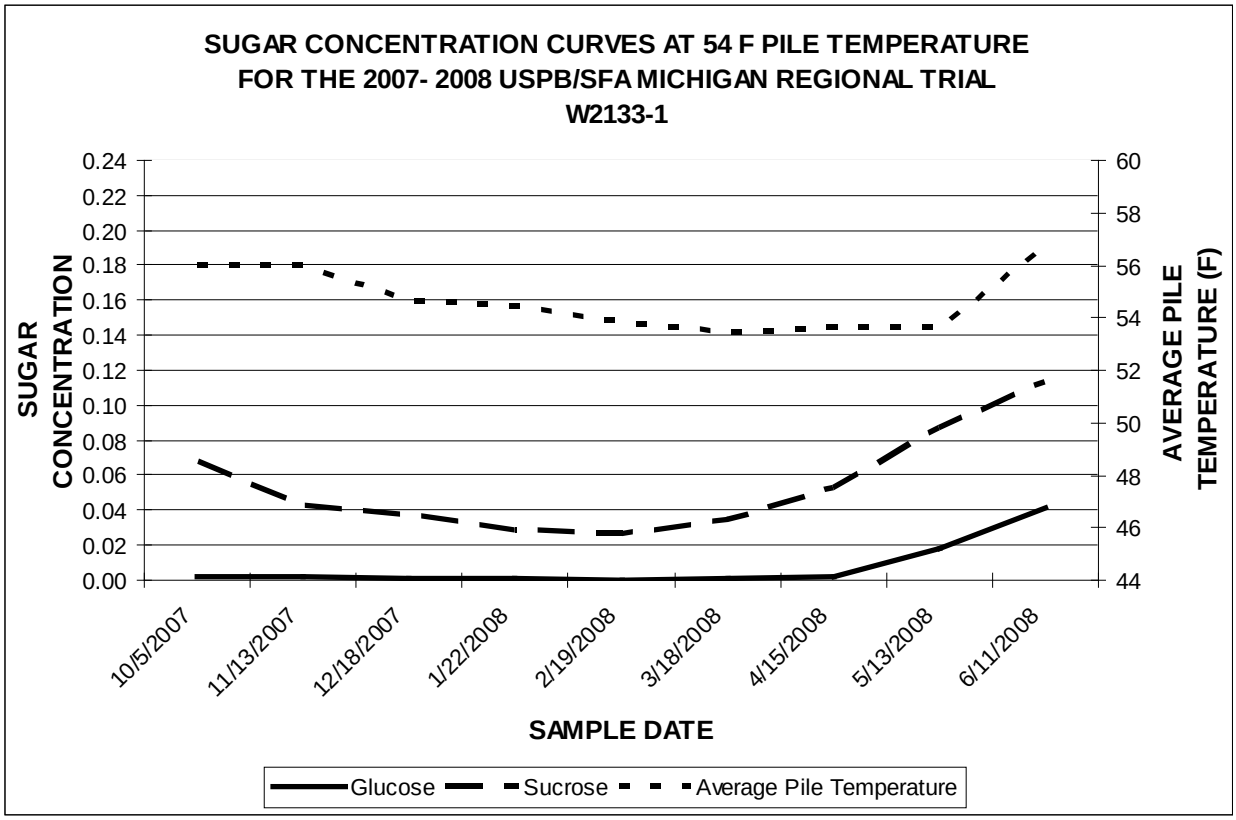


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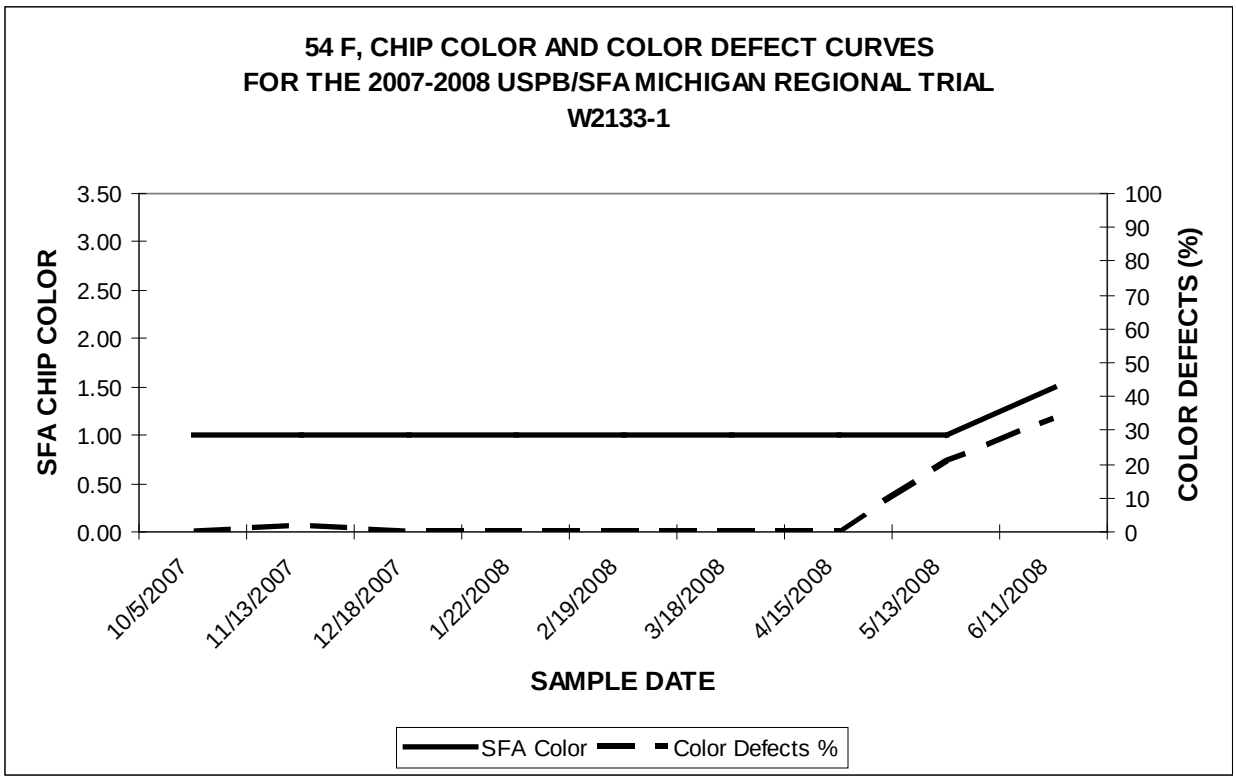

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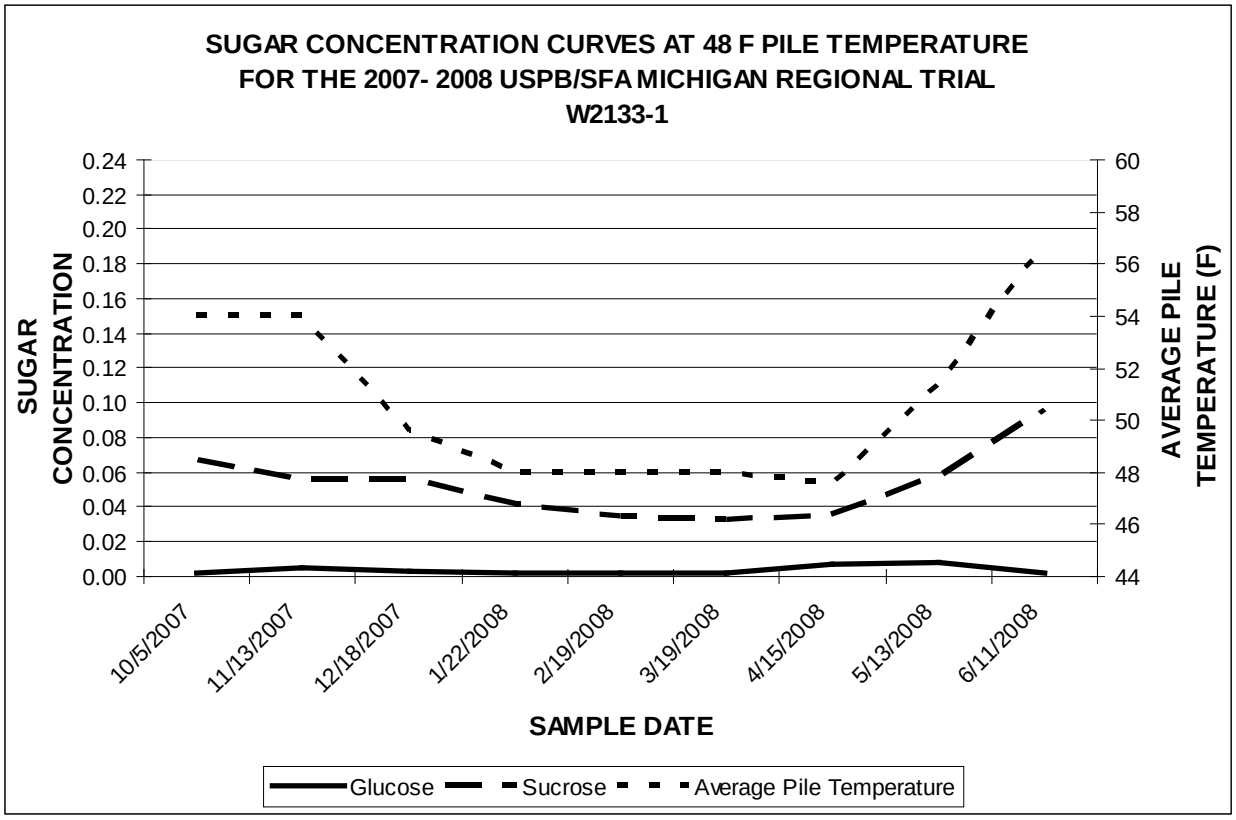


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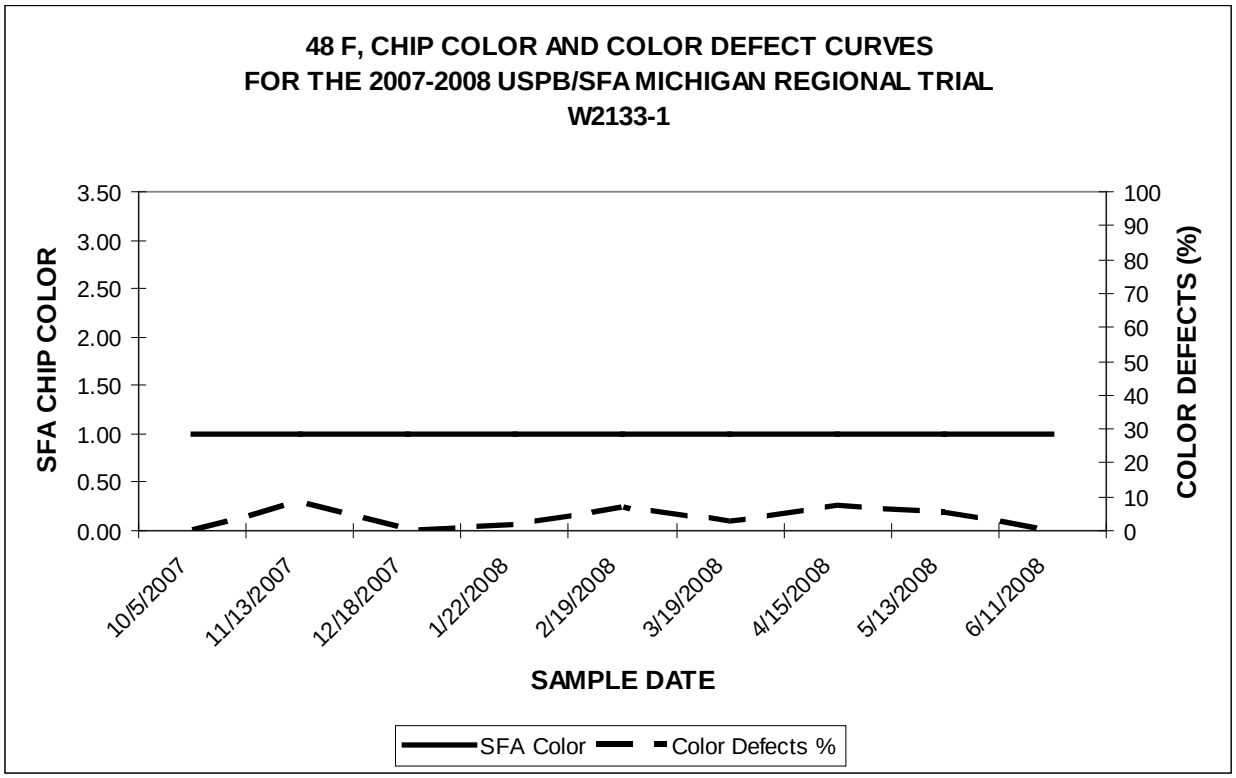

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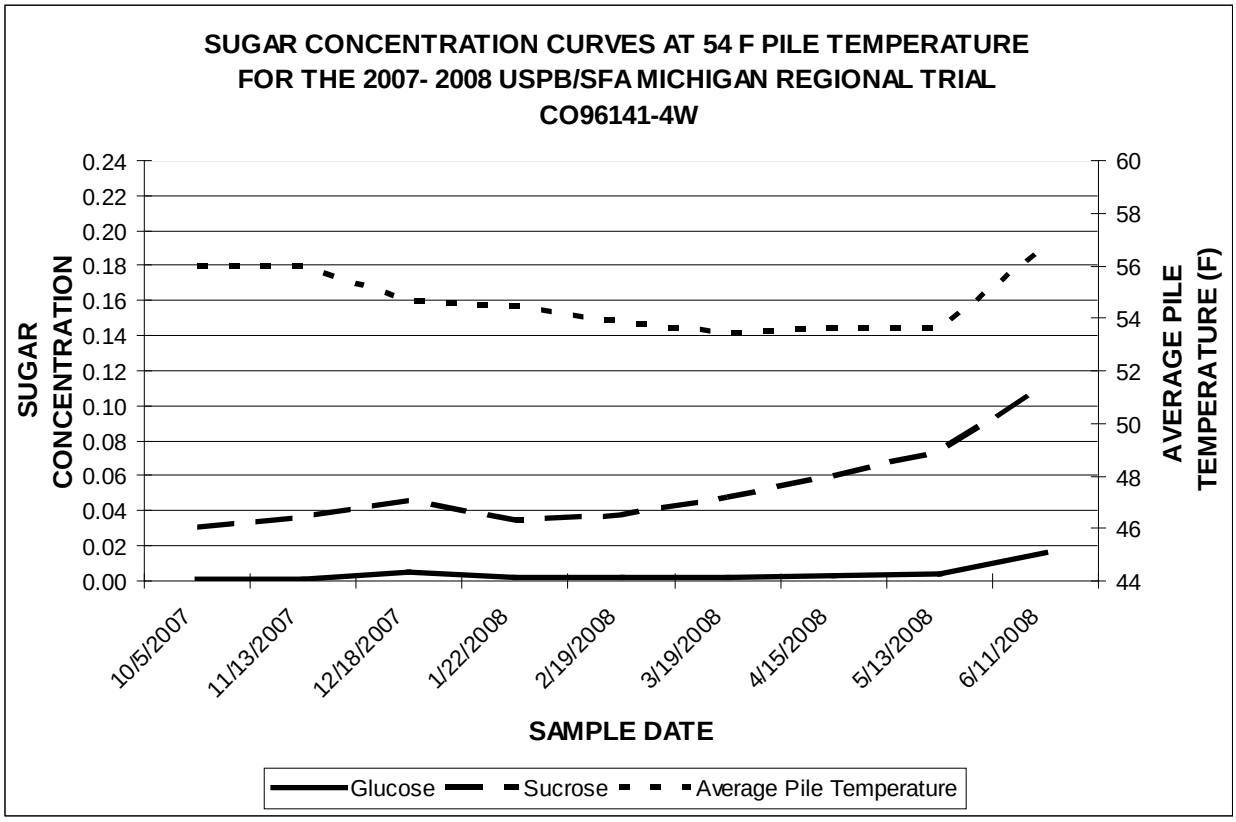


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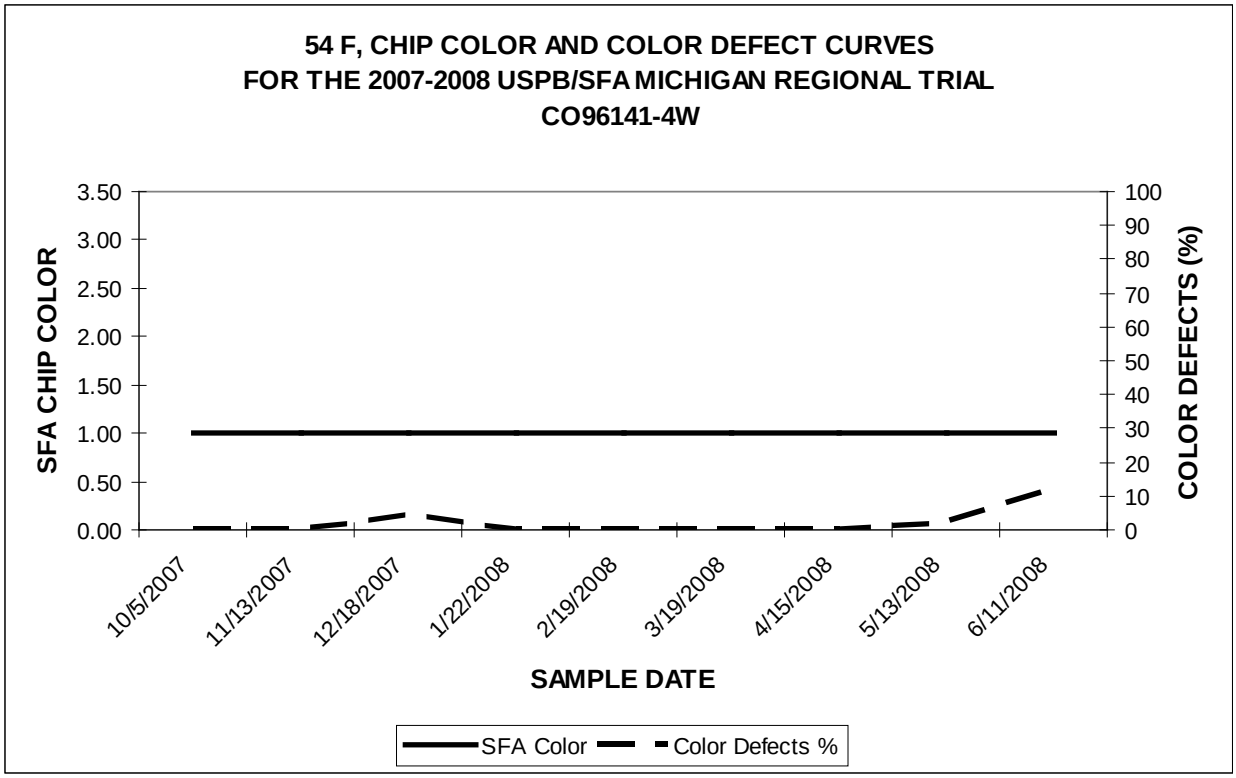

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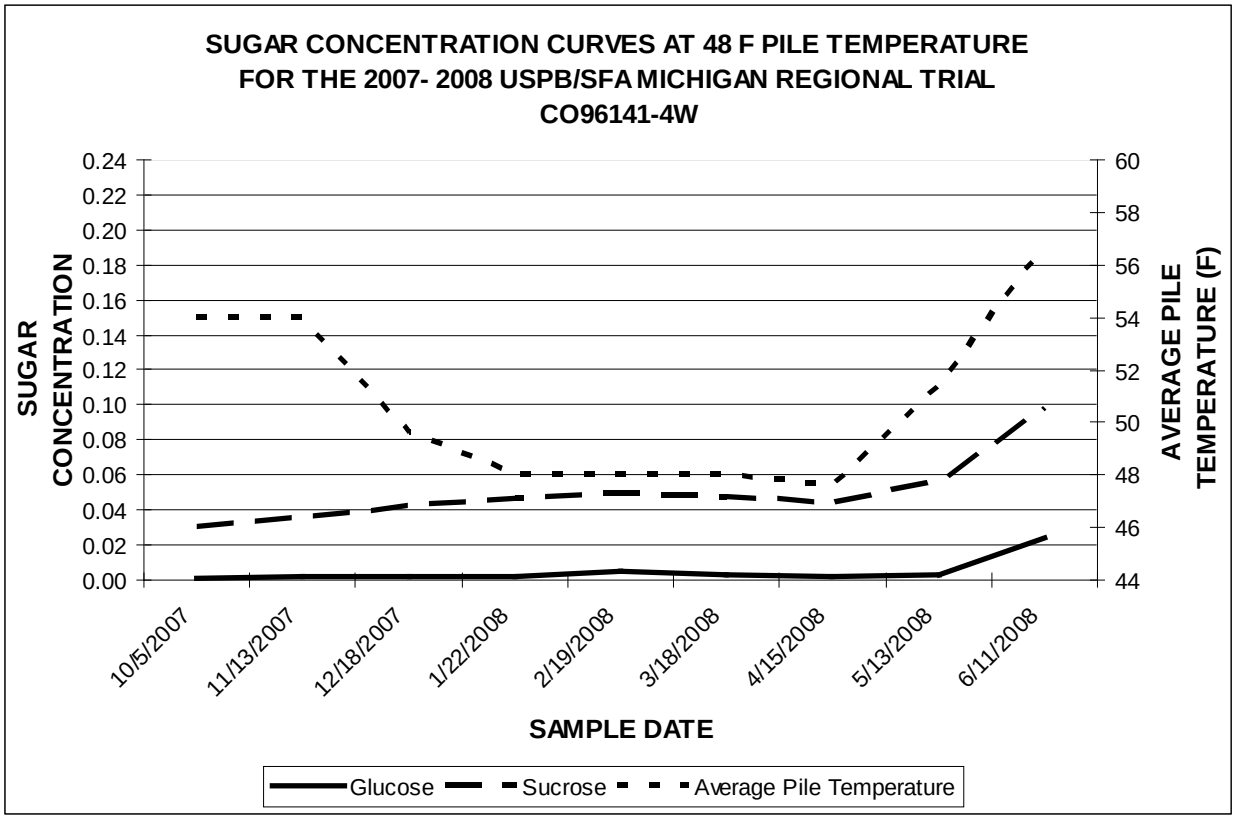


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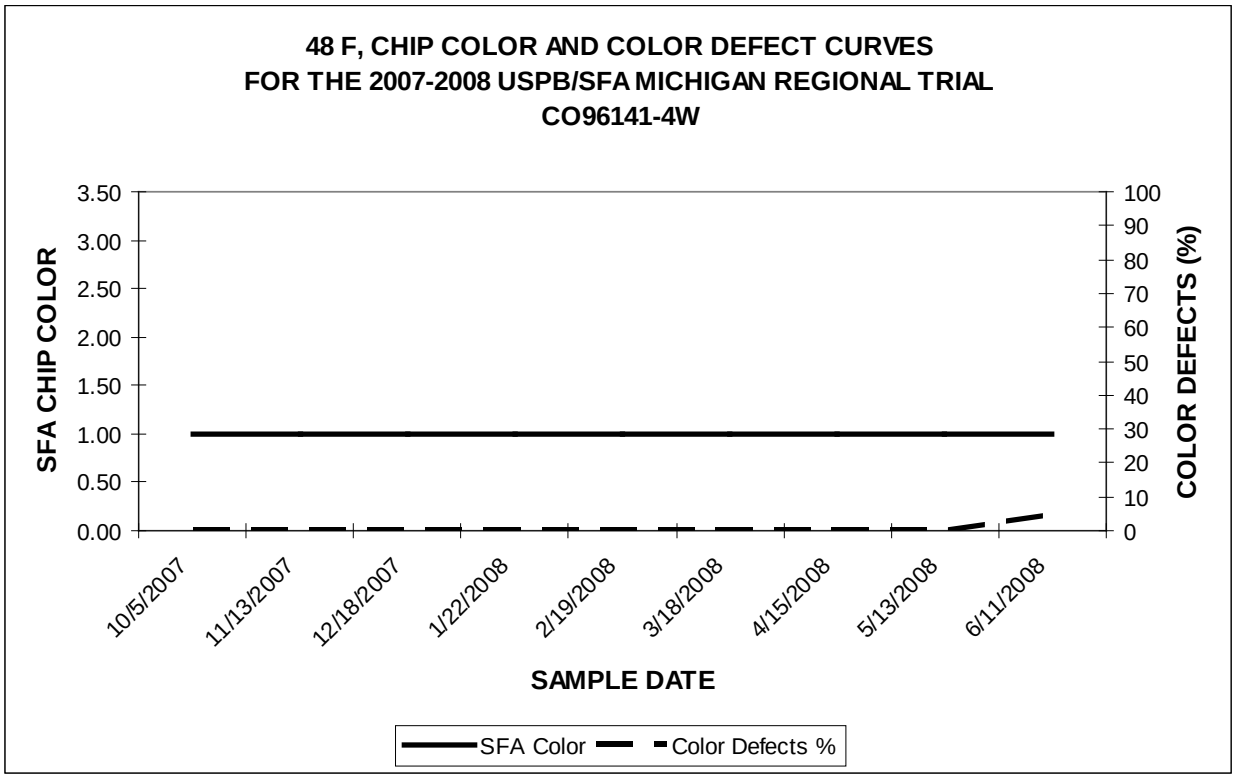

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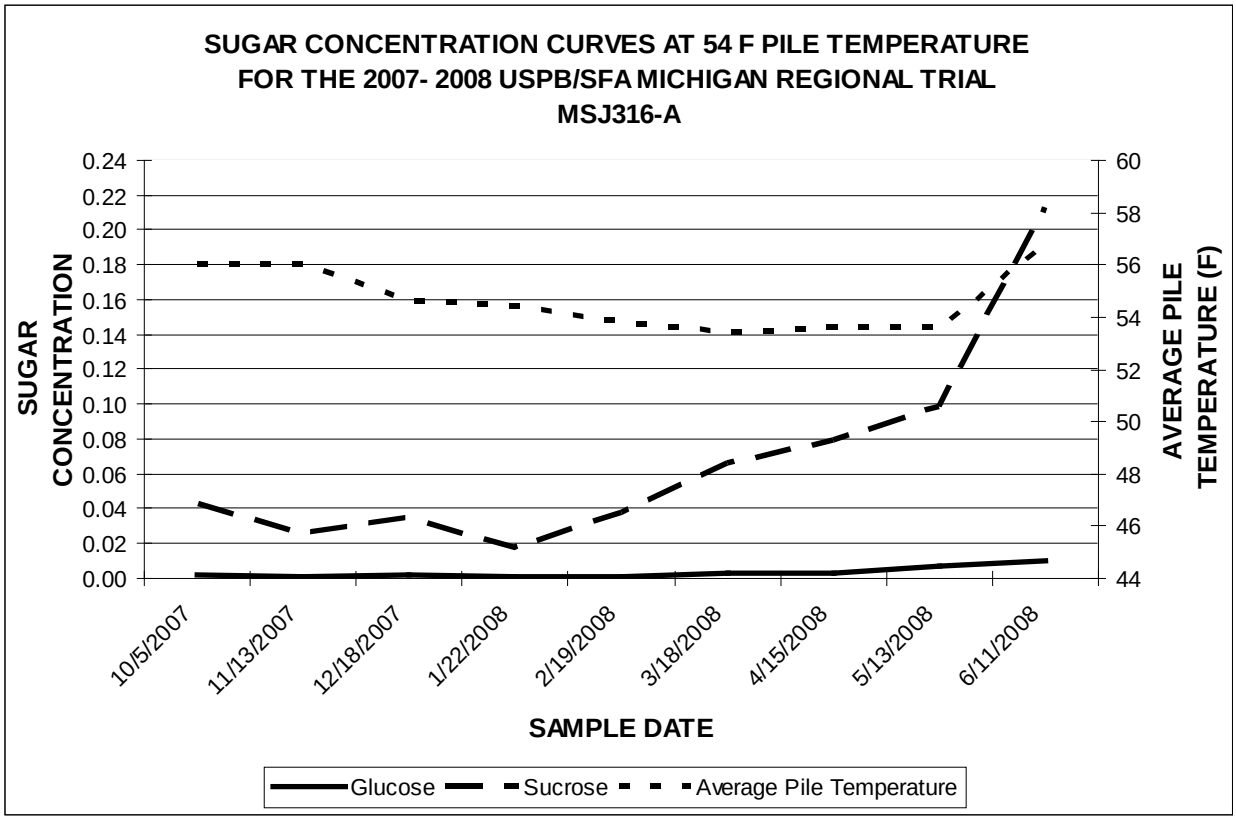


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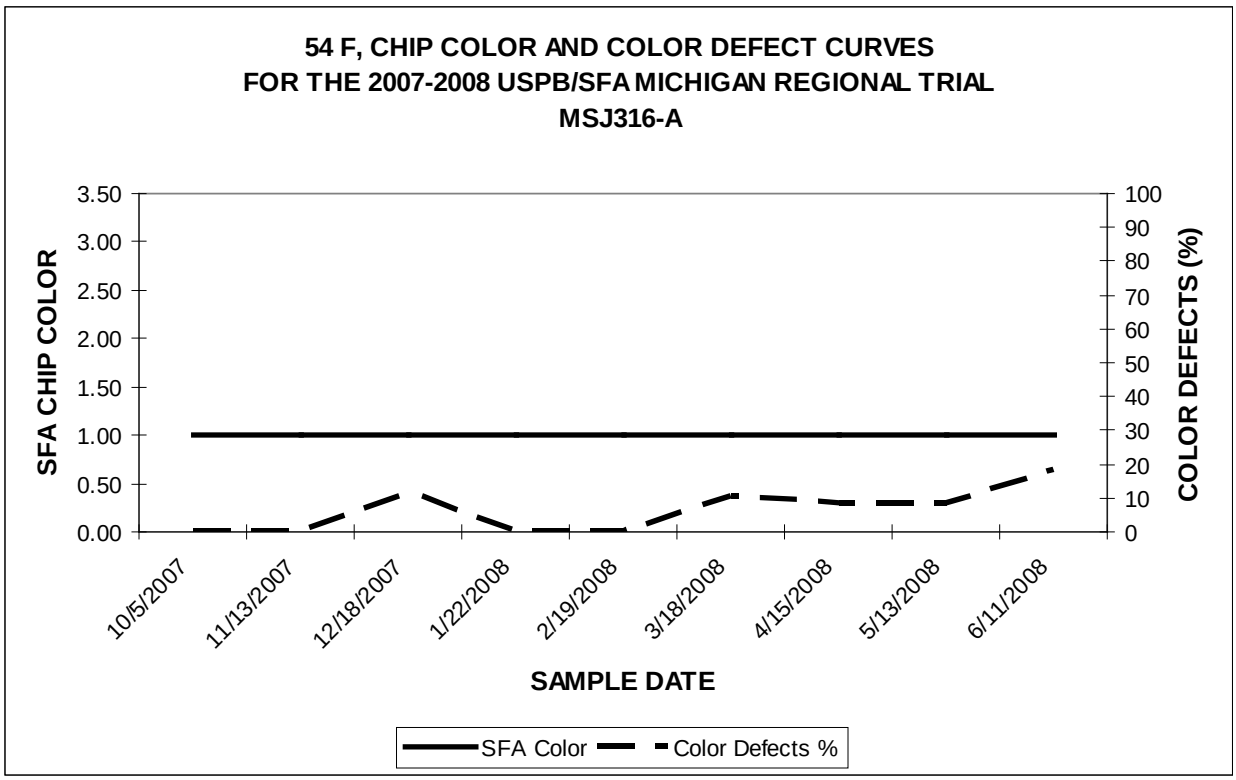

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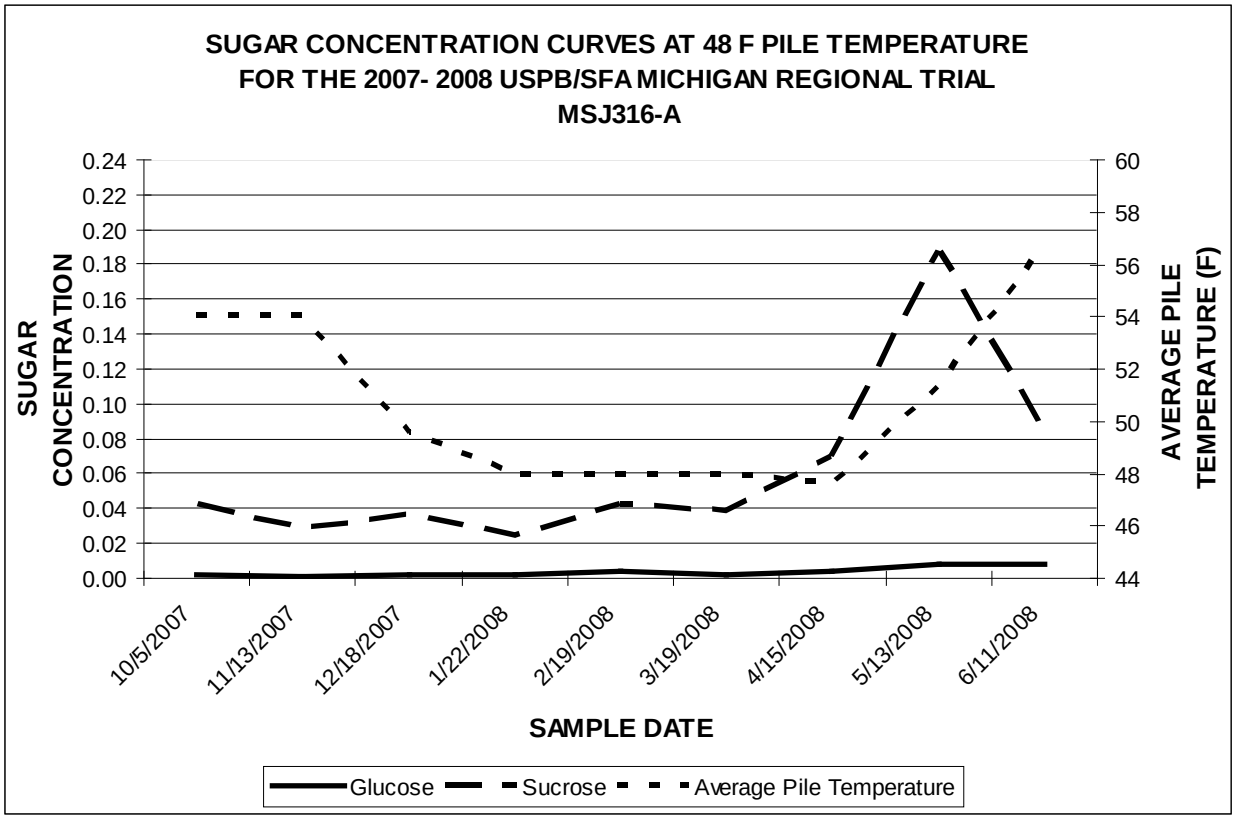


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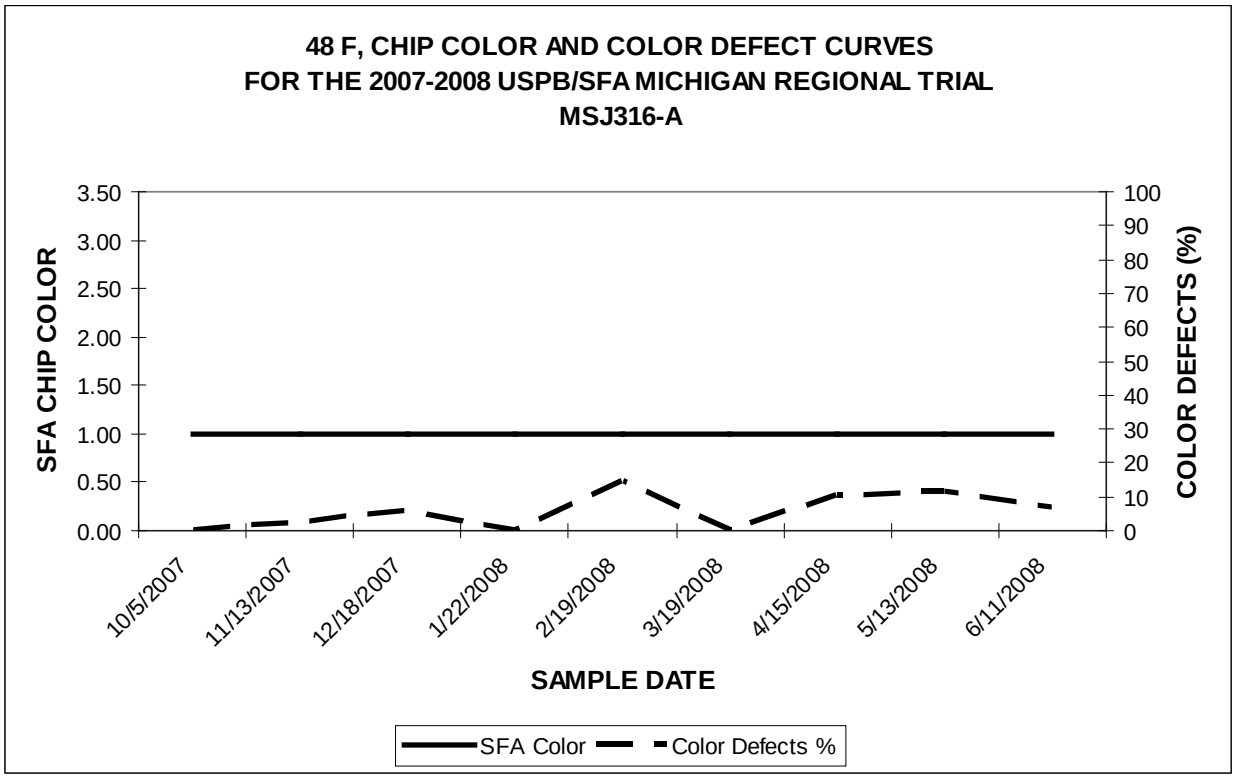

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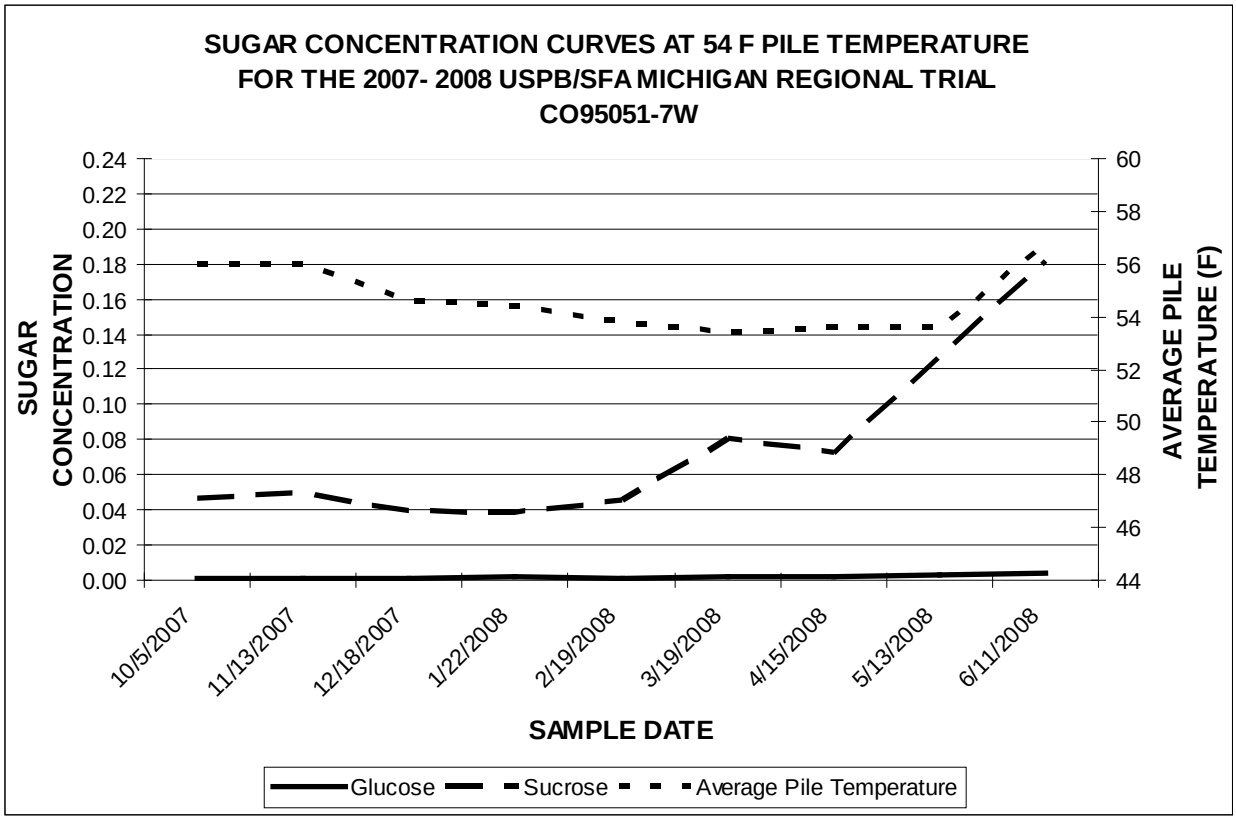


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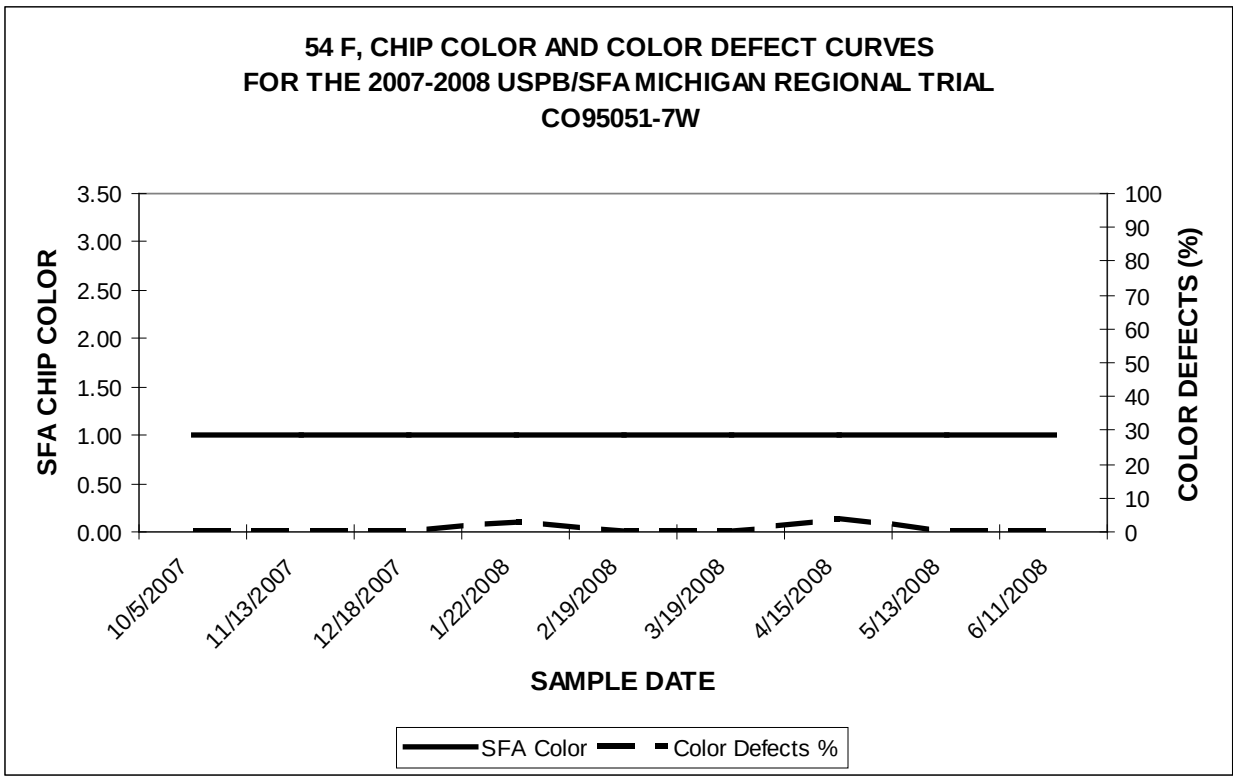

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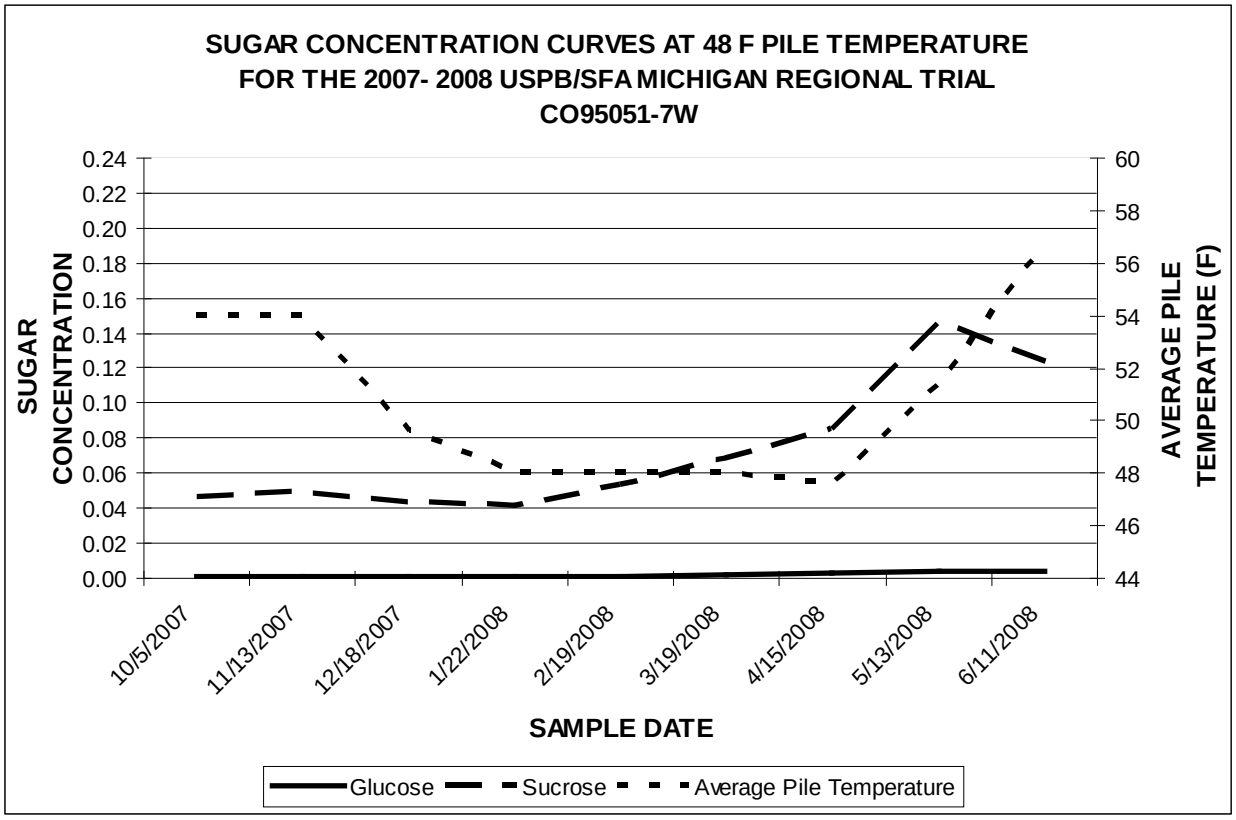


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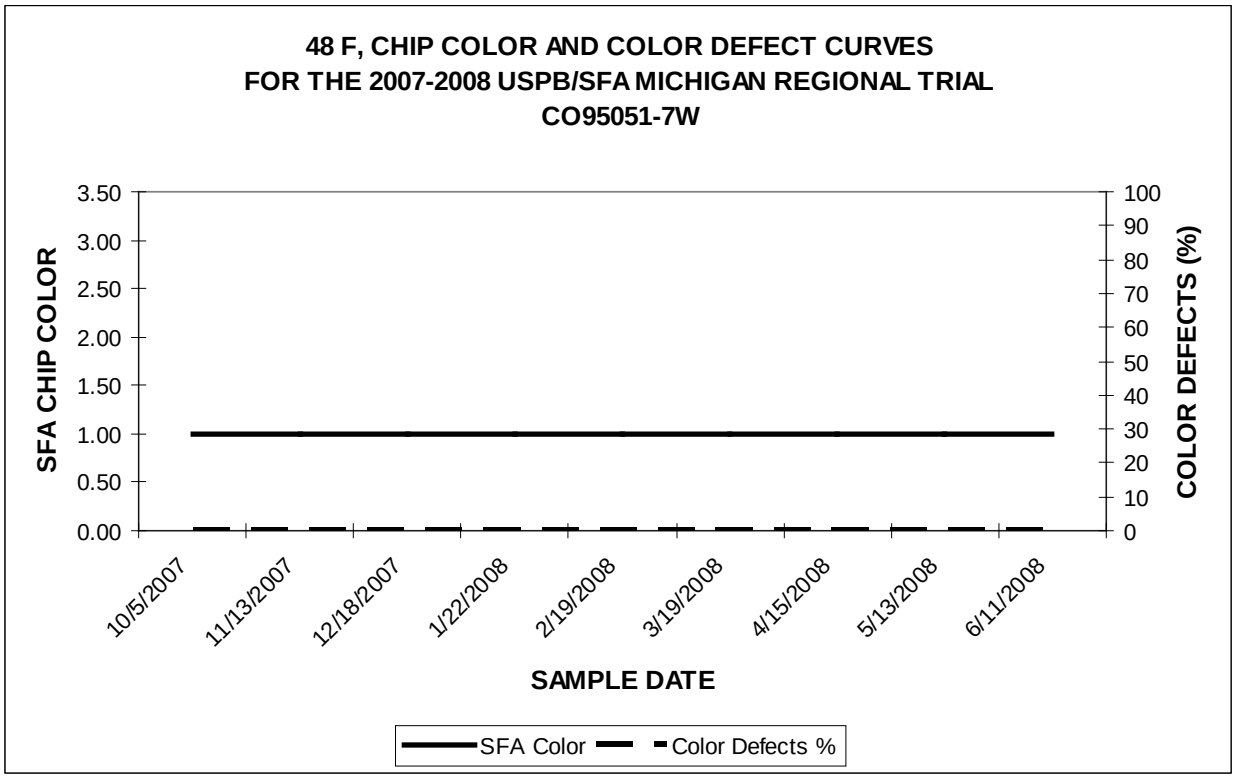

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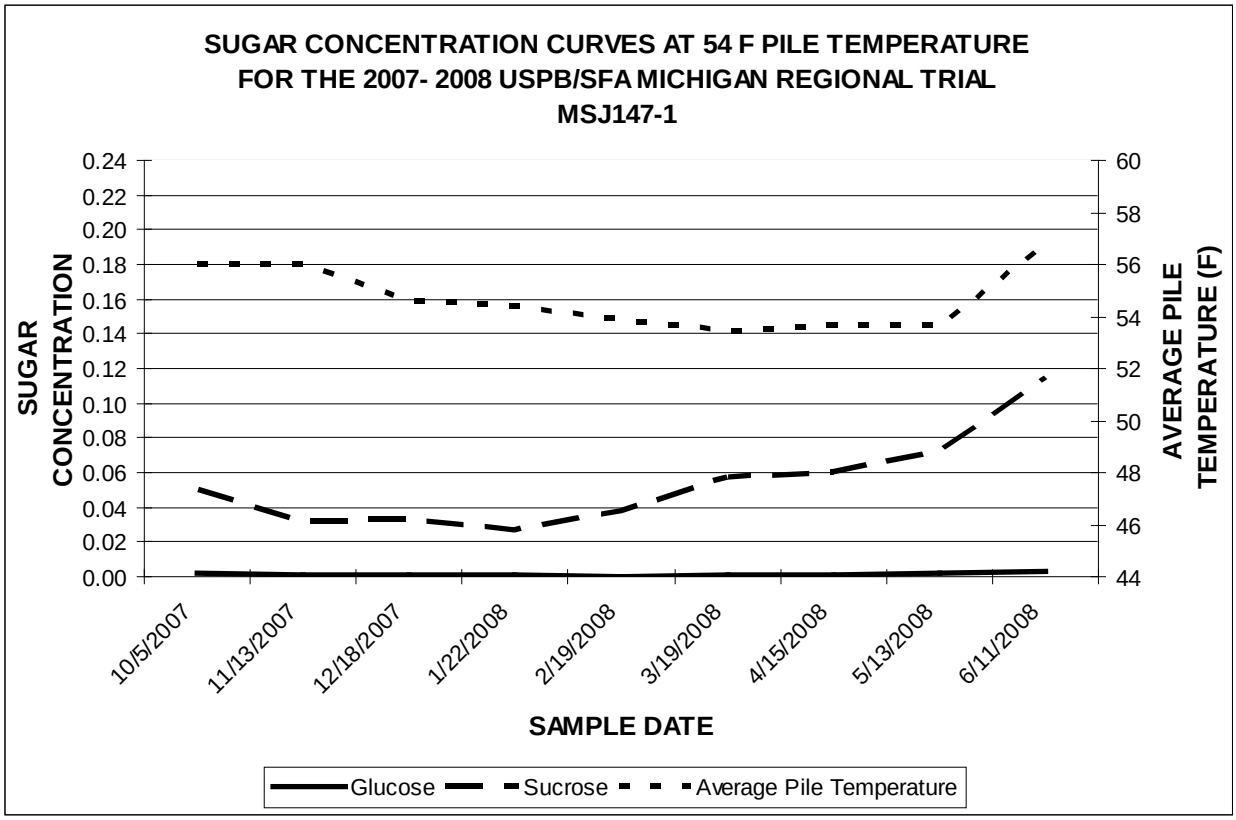


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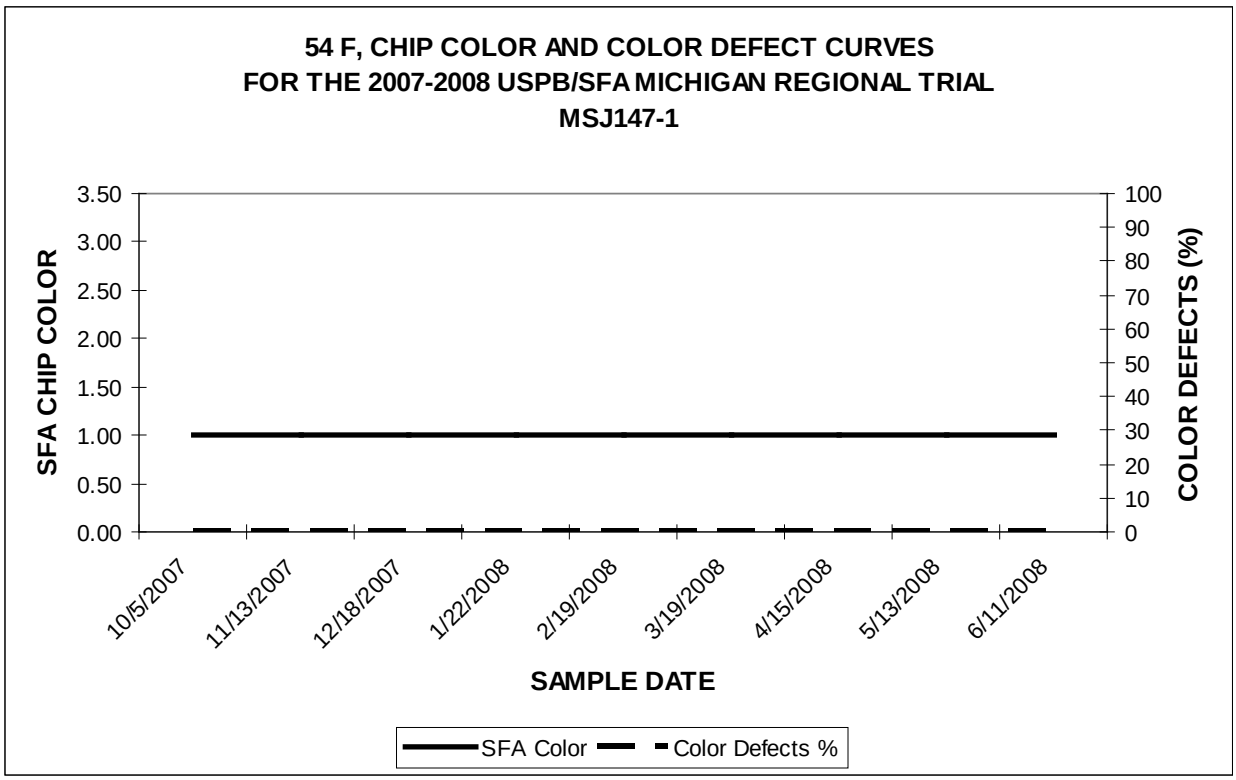

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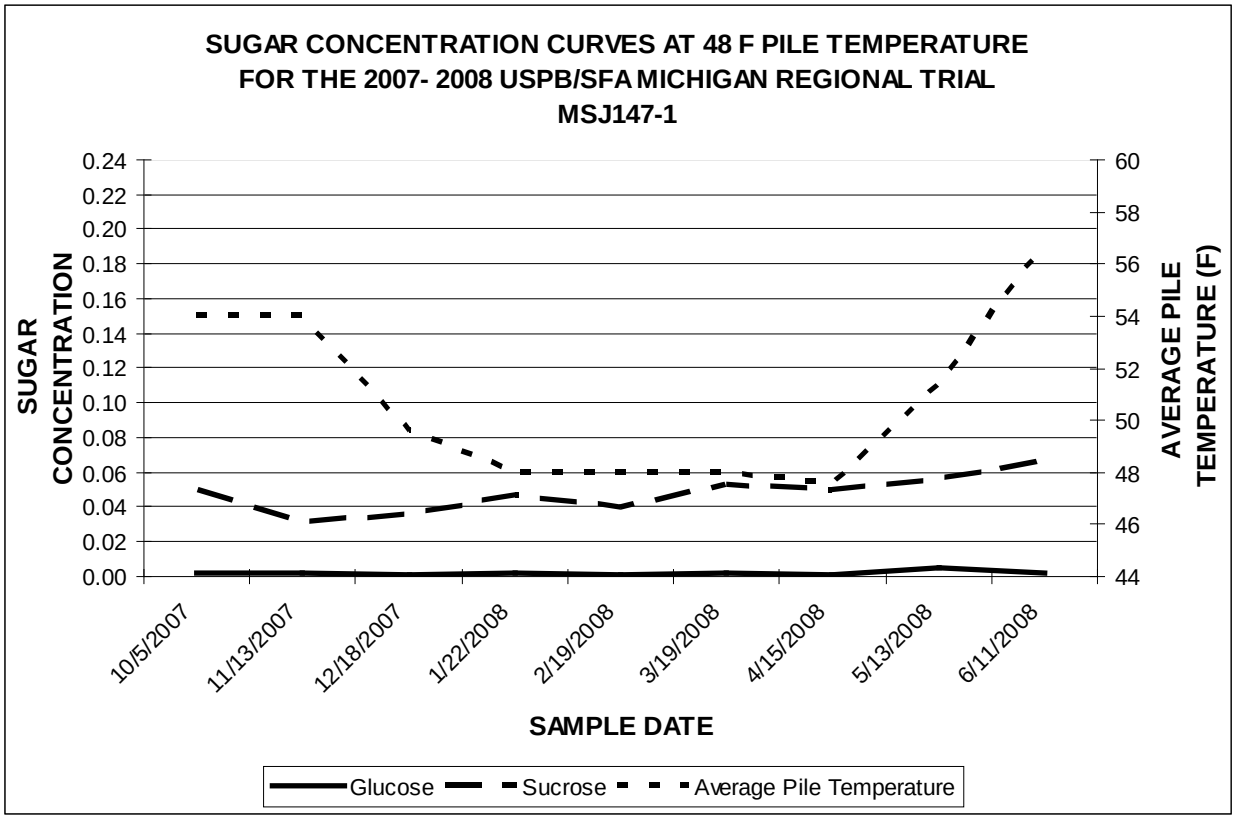


Table 38.