Preliminary Results on the Performance of Low-chill Peach Cultivars in North-central Florida

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Fruit yields were taken for 1 or 2 years from young ‘UFSun’, ‘Gulfking’, ‘Flordaprince’, ‘Earligrande’, ‘Flordaglo’, ‘Flordastar’, ‘Flordaking’, ‘TropicSnow’, ‘Tropic Beauty’, ‘UF2000’, ‘Flordabelle’, and ‘Rayon’ peach, and ‘Sunraycer’, ‘Sunbest’, and ‘Summist’ nectarine trees. The study was conducted at the Plant Science Research and Education Unit (PSREU) in northern Marion County near Citra, FL. Fruit was harvested in 2007 and 2008. This area can produce low-chill peaches and nectarines during the last week of April through the middle of June. The earliest-ripening cultivars were ‘UFSun’, ‘Gulfking’, ‘Flordaprince’, ‘Sunbest’, ‘Earligrande’ and ‘Flordaglo’, which began ripening in early to mid May in 2008. ‘Flordastar’, ‘Flordaking’, ‘Sunraycer’, and ‘TropicSnow’ can be early with early fulfillment of their chilling requirements, but tended to be later than expected, or variable in this study. Overall, fruit ripening was later than expected during 2007 due to low or interrupted chill accumulation. Fruit size was highly variable among cultivars and between years but tended to be inversely related to crop load. Fruit size ≥2.5 inches (diameter) is achievable with a large proportion of fruit for several cultivars when timely and thorough fruit thinning is used to adjust crop load.

Numerous low-chill peach and nectarine cultivars have been developed and released by the stone fruit breeding program at the University of Florida (Andersen et al., 2001). Several of these cultivars are widely grown in tropical and subtropical climates throughout the world. However, little quantitative data is available on fruit yield and quality of these cultivars under Florida’s subtropical conditions. Wert et al. (2007) compared the performance of four low-chill cultivars at three locations in Florida. Fruit yields were higher, and the incidence of blind nodes was lower, in north-central Florida than in central or southwestern Florida. In their study, many of the differences among sites were attributed to climate effects; however, differences in cultural practices may have also played a role. This study reports preliminary findings on the performance of young, low-chill peach and nectarine cultivars grown in north-central Florida.

Materials and Methods


Tree culture. Trees were fertilized by hand with a blended granular fertilizer (14 N–7 P₂O₅–14 K₂O–2 MgO) with 4% of N from a slow-release source. The micronutrients Fe (0.2%) and Mn (0.4%) were also included. The trees were fertilized three to four times during the growing season, providing 100–140 lb of N/acre/year. Zinc (1%) was also included in the blended fertilizer for the first and second applications each year, which occurred around budbreak and soon after fruit harvest. During Jan. 2006 and Summer 2007, trees were mulched with mushroom spent compost at approximately 320 lb (wet) per tree. The dry weight was 55 lb. The TKN of the compost was 14.675 ppm with a water-soluble N fraction of 0.20 ppm. Though the water-soluble component was negligible, the total N added was approximately 223 lb/acre released during decomposition.

Aluminum tubing was applied to each tree with two 220° Maxijet® fan emitters positioned at the trunks of each tree. An overhead system supplied supplemental irrigation as needed but was primarily used for cold protection. Trees were pruned to a modified open-center form. This was done during winter and after harvest to maintain limb height to about 6 ft, and shoot height to 7 ft. Sprout formation in the interior of the canopy along the major scaffold limbs was encouraged for sun protection, but managed throughout the growing season to prevent shading of the fruit and limit excessive vigor.

Disease and insect control were achieved with a 2.5% dormant oil spray in January or February for scale, and a cover spray of captan and phosmet (Imidan®) timed close to shuck split when the first curculio cuts were seen on plum fruit. If stink bugs were likely to become a problem, cyfluthrin (Bathroid®) was applied prior to 2 weeks before harvest. An early-season leaf spot spray was applied in March when leaves had fully expanded for rust and bacterial leaf spot control. Cuprofix® disperse (20% metallic copper equivalent) with a soy-based surfactant was used for bacterial spot control. Pyraclostrobin and boscalid (Pristine®) were alternated...
with mycobutanil (Nova®) for rust control. These leaf spot control sprays were also applied after harvest but before pruning, and again every 3–4 weeks through September. Trees were defoliated in November with 20 lb zinc sulfate in 200 gal/acre.

**FRUIT HARVEST.** Fruit were harvested at 2- to 3-d intervals at or close to commercial ripe based on ground color change from green-yellow to yellow. They were sized according to standards set by the California Tree Fruit Agreement and the USDA (http://www.eatcaliforniafruit.com/index.asp). Diameter or ring size of fruit correspond to the number packaged in a unit (Table 1).

### Results and Discussion

The general characteristics of the cultivars used in this study have been described by Okie (1998), Andersen et al. (2001), and Ferguson et al. (2007). Their estimated chilling requirements range from 100 chilling units (cu) to 400 cu. North-central Florida typically receives approximately 250 to 350 cu although accumulated chilling is highly variable from year to year. Bloom typically begins in late January with peak bloom in early to mid-February. Overhead irrigation was required for freeze protection both years to ensure that adequate cropping occurred.

**FRUIT HARVEST DATE.** Early fruit harvest is desirable for Florida peaches due to the low volume of commercial peaches on the market during the first half of May (http://marketnews.usda.gov/). Further, April and May are usually dry with abundant sunshine, which facilitates disease control, sugar accumulation, and red over-color development (Andersen et al., 2001). During both years ‘UFSun’, ‘Flordaprince’, and ‘Gulfking’ (2007) were among the earliest cultivars to ripen, with their first commercial harvests occurring by 10 May (Table 2). ‘UFSun’ and ‘Gulfking’ (non-melting flesh) reached 50% harvest before ‘Flordaprince’.

### Table 1. Number of fruit per marketable unit and associated fruit diameters and weight ranges.

<table>
<thead>
<tr>
<th>Diam (inches)</th>
<th>108</th>
<th>96</th>
<th>88</th>
<th>84</th>
<th>80</th>
<th>72</th>
<th>70</th>
<th>64</th>
<th>62</th>
<th>60</th>
<th>56</th>
<th>48</th>
<th>42</th>
</tr>
</thead>
</table>

*Based on the California Tree Fruit Agreement and the USDA (http://www.eatcaliforniafruit.com/index.asp).

### Table 2. Bloom date, harvest date, and yield of low-chill peach and nectarine cultivars in north-central Florida.

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Trees harvested (no.)</th>
<th>Year</th>
<th>First commercial harvest (date)</th>
<th>50% fruit harvested (date)</th>
<th>Last commercial harvest (date)</th>
<th>Fruit no. per tree</th>
<th>Total fruit wt (lbs)</th>
<th>% Fruit ≥2-5/16”</th>
<th>% Fruit ≥2 1/2”</th>
<th>Chilling requirement (estimated hours ≤45 °F and ≥32 °F) necessary for both seasonal timeliness and strong dormancy break previously reported for each cultivar.</th>
<th>% of Full bloom</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Peach</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UFSun</td>
<td>6</td>
<td>2007</td>
<td>3 May</td>
<td>9 May</td>
<td>21 May</td>
<td>155</td>
<td>38</td>
<td>88</td>
<td>50</td>
<td>100</td>
<td>100</td>
</tr>
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<td>UFSun</td>
<td>1</td>
<td>2008</td>
<td>8 May</td>
<td>10 May</td>
<td>14 May</td>
<td>514</td>
<td>89</td>
<td>35</td>
<td>20</td>
<td>---</td>
<td>100</td>
</tr>
<tr>
<td>Flordaprince</td>
<td>4</td>
<td>2007</td>
<td>10 May</td>
<td>19 May</td>
<td>19 May</td>
<td>221</td>
<td>48</td>
<td>78</td>
<td>36</td>
<td>150</td>
<td>100</td>
</tr>
<tr>
<td>Flordaprince</td>
<td>1</td>
<td>2008</td>
<td>5 May</td>
<td>13 May</td>
<td>14 May</td>
<td>723</td>
<td>145</td>
<td>54</td>
<td>23</td>
<td>---</td>
<td>100</td>
</tr>
<tr>
<td>GulfKing</td>
<td>4</td>
<td>2007</td>
<td>8 May</td>
<td>15 May</td>
<td>21 May</td>
<td>170</td>
<td>39</td>
<td>79</td>
<td>49</td>
<td>350</td>
<td>30</td>
</tr>
<tr>
<td>Flordarst</td>
<td>1</td>
<td>2008</td>
<td>15 May</td>
<td>26 May</td>
<td>13 Jun</td>
<td>796</td>
<td>136</td>
<td>40</td>
<td>15</td>
<td>225</td>
<td>50</td>
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<tr>
<td>Flordaking</td>
<td>1</td>
<td>2008</td>
<td>19 May</td>
<td>23 May</td>
<td>11 Jun</td>
<td>606</td>
<td>111</td>
<td>42</td>
<td>19</td>
<td>400</td>
<td>15</td>
</tr>
<tr>
<td>Flordaglo</td>
<td>5</td>
<td>2007</td>
<td>25 May</td>
<td>30 May</td>
<td>4 Jun</td>
<td>80</td>
<td>16</td>
<td>74</td>
<td>34</td>
<td>150–175</td>
<td>50</td>
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<tr>
<td>Flordaglo</td>
<td>2</td>
<td>2008</td>
<td>2 May</td>
<td>10 May</td>
<td>17 May</td>
<td>469</td>
<td>37</td>
<td>14</td>
<td>3</td>
<td>---</td>
<td>70</td>
</tr>
<tr>
<td>Earlargrnda</td>
<td>2</td>
<td>2007</td>
<td>21 May</td>
<td>22 May</td>
<td>1 Jun</td>
<td>90</td>
<td>22</td>
<td>90</td>
<td>46</td>
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<td>15</td>
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<tr>
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<td>2 May</td>
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<td>361</td>
<td>85</td>
<td>77</td>
<td>39</td>
<td>---</td>
<td>50</td>
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<tr>
<td>Tropic Snow</td>
<td>2</td>
<td>2007</td>
<td>11 Jun</td>
<td>13 Jun</td>
<td>22 Jun</td>
<td>78</td>
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<td>78</td>
<td>31</td>
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<td>35</td>
</tr>
<tr>
<td>Tropic Snow</td>
<td>2</td>
<td>2008</td>
<td>19 May</td>
<td>10 Jun</td>
<td>13 Jun</td>
<td>500</td>
<td>99</td>
<td>40</td>
<td>13</td>
<td>---</td>
<td>50</td>
</tr>
<tr>
<td>Tropic Beauty</td>
<td>1</td>
<td>2008</td>
<td>15 May</td>
<td>22 May</td>
<td>30 May</td>
<td>371</td>
<td>73</td>
<td>65</td>
<td>32</td>
<td>150</td>
<td>100</td>
</tr>
<tr>
<td>UF2000</td>
<td>4</td>
<td>2008</td>
<td>4 Jun</td>
<td>11 Jun</td>
<td>18 Jun</td>
<td>241</td>
<td>73</td>
<td>92</td>
<td>57</td>
<td>300</td>
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<tr>
<td>Floridabelle</td>
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<td>12 Jun</td>
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<td>99</td>
<td>91</td>
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<tr>
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<td>29 May</td>
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<td>120</td>
<td>69</td>
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<td>100</td>
</tr>
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<td>Rayon</td>
<td>2</td>
<td>2008</td>
<td>6 Jun</td>
<td>11 Jun</td>
<td>18 Jun</td>
<td>653</td>
<td>159</td>
<td>84</td>
<td>58</td>
<td>175</td>
<td>90</td>
</tr>
</tbody>
</table>

| **Nectarine** |   |      |                                |                           |                               |                     |                   |                  |                 |                                                                                                                                   |               |
| Sunraycer | 1               | 2007 | 21 May                          | 21 May                    | 28 May                        | 223                 | 57                | 99               | 43              | 250                                                                                                                                  | 80            |
| Sunraycer | 2               | 2008 | 5 May                           | 6 May                     | 14 May                        | 423                 | 74                | 53               | 20              | ---                                                                                                                                  | 80            |
| Sunbest   | 3               | 2008 | 5 May                           | 14 May                    | 14 May                        | 397                 | 61                | 27               | 4               | 150–250                                                                                                                             | 100           |
| Sunmist   | 1               | 2008 | 1 May                            | 1 May                     | 12 May                        | 239                 | 27                | 13               | 4               | 225                                                                                                                                  | 20            |

*The first fruit harvest that was ≥10% of the crop.

†Approximate date of 50% of total fruit harvested.

‡The last fruit harvest that was ≥10% of the crop.

* Estimated hours ≤45 °F and ≥32 °F necessary for both seasonal timeliness and strong dormancy break previously reported for each cultivar. Accumulated chilling from 1 Nov. 2006 to 25 Feb. 2007 was 289 cu. For the same period in 2007–08 it was 271 cu.

‡Percent bloom was visually rated when the lowest chill cultivars (100–150 cu) were at full bloom. This occurred on 26 Feb. 2007, with accumulated chilling of 289 cu and on 9 Feb. 2008, with accumulated chilling of 230 cu.
This may have been due to the larger fruit load of ‘Flordaprince’ compared to the other two cultivars. In 2008, ‘Earligrande’ ripened fruit with ‘UFSun’, ‘Gulfking’, and ‘Flordaprince’. However, ‘Earligrande’ was much later in 2007, perhaps because this was its first cropping year. ‘Sunraycer’ and ‘Flordaglo’ had late crops in 2007, but ripened with ‘UFSun’ and ‘Gulfking’ in 2008. The delayed ripening in 2007 may have been related to chilling or temperatures after bloom. Typically, ‘Flordastar’ and ‘Flordaking’ begin ripening within a few days after ‘Flordaprince’, but in 2008 the harvest began later than usual. Again, this may have been due to insufficient chilling since the FDPs of ‘Flordastar’ and ‘Flordaking’ are comparatively low, 74 and 78 d, respectively (Andersen et al., 2001; Okie, 1998). Generally, ‘TropicBeauty’ is a mid-season peach, with harvest beginning at the end of the commercial harvest for the earlier cultivars, and ending during the last week in May. ‘TropicSnow’ is also considered mid-season but was later than expected both years, probably because of insufficient chilling. ‘TropicBeauty’ and ‘TropicSnow’ have FDPs of 89 and 84 d, respectively. ‘UF2000’, ‘Flordabelle’, and ‘Rayon’, all with relatively long FDPs, complete the Florida low-chill peach season with final harvests extending into the second or third week of June.

**Fruit yield.** Fruit number, total fruit weight, and percentage of fruit 2.5 inches (diameter) was highly variable among cultivars and between years. Fruit size is influenced by many factors including genotype, crop load, tree age, as well as environmental conditions. Generally, fruit numbers per tree increased in 2008 compared to 2007 since trees were older and larger, but the percentage of fruit ≥2.5 inches tended to decrease. With the exception of ‘Earligrande’, trees with more than 350 fruits had a small proportion of fruit ≥2.5 inches in diameter. When fruit number per tree was less than 250, fruit size was notably larger. This preliminary result reinforces the importance of proper fruit thinning for achieving adequate fruit size, especially with early-season cultivars that are often inherently smaller than mid to late- season cultivars. Fruit weight per tree in Georgia for early-season peaches is about 100 lb or 275–425 fruit (K.C. Taylor, personal communication). All peaches trees in this study were hand-thinned about three times during a 2- to 3-week interval. However, for optimum size, thinning may be needed more frequently and over a longer period, especially during years with low chill accumulation and unsynchronized, protracted bloom periods.

Inadequate chilling before warmer temperatures force bloom is a factor in late cropping, poor fruit shape, and protracted bloom period (Couvillon, 1995; Sherman et al., 2003; Weinberger, 1950). The higher chill cultivars with ≤50% bloom at the time the lower chilling cultivars were at full bloom cropped late even though their FDPs are short. ‘Gulfking’ may be an exception since, even with inadequate chilling and late bloom, fruit ripening was early. However, additional data are needed to confirm this. It appears that cultivars needing more than 250 h should have their chilling requirement satisfied by mid-February to make the May market. In north-central and colder areas of central Florida, peaches requiring less than 250 h will generally receive chilling early enough to have adequate yields, ripening from late April through May. However, cold protection may be necessary.

Although nitrogen from the compost was released slowly, there may have been an excess of N during periods of warm temperatures and abundant rainfall. Excess nitrogen rates are known to increase FDP and therefore delay harvest by 7 to 12 d (Blake, 1930; Saenz et al., 1997). Ripening dates for some of the same cultivars growing at the breeding orchard in Gainesville were generally 4–7 d earlier. The mulch compost applied to the trees increased leaf canopy when compared to those that did not receive this treatment (data not shown). Therefore, the mulched trees’ capacity to carry and size fruit may be greater than trees grown with standard commercial practices.

**Literature Cited**


Taylor, K.C. 2008. Personal communication, University of Georgia. Byron, GA.