

Blueberry Cultivar Development at The University of Georgia

A Progress Report for 2005

D. Scott NeSmith

The UGA Blueberry cultivar development program generates and evaluates numerous selections of southern highbush and rabbiteye blueberries each year. Currently, the UGA Blueberry Research Farm near Alapaha is the primary field evaluation site for advanced seedlings, new selections, and advanced selections. Griffin is the primary site for high density seedling nurseries and it is a duplicate test site for growing selections for initial testing. Starting in 2004, some on-farm sites were enlisted as advanced selection testing sites for blueberry. Having these multiple sites provides considerable climatic and edaphic variability which enhances the cultivar development process.

General Overview of 2005

The 2005 growing season at Alapaha was generally characterized by very low yields across most cultivars and selections due to poor pollination and fruit set. This was especially true for rabbiteye selections at Alapaha. In Griffin, cropping overall was very good, as there was little crop reduction due to poor pollination weather or freeze damage during 2005 at the site. Comprehensive flowering notes, cropping notes and fruit characteristic evaluations were taken for more than 300 selections and advanced seedlings of rabbiteye and southern highbush blueberries, as well as numerous cultivar standards at the test sites. Additionally, more than 2500 seedlings were evaluated in the nursery at the Griffin site in 2005. This resulted in several advanced seedlings and selections being identified for further testing. Ratings were also made for some selections at on-farm test sites in 2005.

Performance of Rabbiteye Selections at Alapaha

Detailed data on plant and berry attributes were collected for numerous rabbiteye selections in 2005 at Alapaha. Table 1 depicts data for some of the more promising selections along with observations for some cultivar standards. We continue to be interested in early ripening selections to replace 'Climax' and 'Premier'. 'Climax' had 50% ripening by June 5 this year, which is later than previous years. 'Premier' ripening date was June 6. 'Alapaha' (UGA 2001 release) ripened a few days earlier (June 3) than 'Climax' and 'Premier' during 2005. 'Vernon' (UGA 2004 release) ripened with 'Climax' and 'Premier', but flowered 8 days after 'Climax'. 'Vernon' also had more favorable berry size than 'Climax' and was firmer than 'Premier'. T-460 ripened with 'Climax' and had one of the best crop loads among all rabbiteye selections at Alapaha. This selection also had

large fruit and excellent berry color. T-611, T-616, and T-631 all had ripening dates earlier than 'Climax' and 'Premier'. Of these, T-611 had the best crop load and outstanding berry color. The selections T-670 and T-672 were notable for their early ripening dates, large berry size, and good to excellent berry firmness. These early selections have been propagated to conduct more advanced tests at multiple sites. Two newer selections, T-724 and T-747 had early ripening dates, and these will be monitored more closely next year.

As for mid-season ripening berries, 'Brightwell' continues to be the standard for testing. 'Brightwell' ripened June 15 in 2005, and it too had a reduced crop load. Several selections ripened 3 to 7 days earlier than 'Brightwell'. Selections in the 'Brightwell' season worth noting are T-516, T-538, T-619, and T-674. Of these, T-516 has very good berry color and size, T-538 has excellent berry size, T-619 has good berry size, color, and scar, and T-674 has good berry color and firmness. Some of these selections have been propagated for advanced testing. A new selection, T-727, also had many favorable attributes, and will be monitored further next year.

As for the 'Tifblue' ripening season, there are few selections we are currently looking at. T-459 has been promising the past few years, and was being considered for release. However, T-459 has been found to have severe fruit cracking problems in response to rainfall. Therefore, this selection has been removed from consideration for release.

Several rabbiteye selections are worth noting for their large berry size. We continue to exam T-451 as a potential release. The berry is very large, but it has a great tendency for fruit splitting in wet weather. In addition to favorable berry size, T-460 generally has a very good crop load, good berry color, and good plant vigor. In some years however, the ripening of T-460 has been too drawn out. T-672 continues to be of interest due to its excellent berry size and firmness.

Performance of Rabbiteye Selections at Griffin

Many of the rabbiteye selections listed above for the Alapaha location also performed well at the Griffin test site in 2005 (Table 2). All plants at the Griffin test site are young (7 years old or less), and all plants are irrigated and mulched with bark. In Griffin, 'Climax' ripened on June 19 during 2005. Again, the new release 'Alapaha' performed well in comparison to 'Climax', as did 'Vernon'. Other selections ripening with or before 'Climax' in Griffin were T-611, T-626, T-630, and T-631. T-611 and T-631 did not have good crop loads in Griffin, T-626 had small berry size, and T-630 had some scar issues. We will continue to evaluate these selections at both Griffin and Alapaha, as well as at other locations.

In 2005, several rabbiteye cultivars and selections in Griffin were evaluated for fruit cracking in response to rainfall by using a protocol that involved soaking berries overnight in distilled water (Table 3). These data clearly indicate a wide range in fruit cracking susceptibility, and this needs to be monitored carefully for new selections. Early season cultivars with a low degree of fruit cracking included 'Alapaha', 'Austin', and 'Premier'.

'Vernon' had slightly more fruit cracking than these, but less than 'Climax'. For mid-to-late season, 'Columbus', 'Ochlockonee', and 'Powderblue' all performed similarly in the fruit-cracking test. 'Brightwell' displayed only a small to medium amount of cracking, yet, the types of "splits" were very serious. With 'Brightwell' fruit cracking was usually a violent rupture of the skin, followed by much leakage from the fruit. Two selections, T-672 and T-674, showed only a small degree of fruit cracking, and the cracks were only small hair-line type splits. However, some of the selections we have been testing did not perform well in the fruit-cracking test. Most notable was T-459 which had been considered a candidate for release. However, the discovery of extreme susceptibility to fruit cracking has discounted it for release.

In addition to fruit cracking, berry firmness and size were also evaluated for several rabbiteye cultivars and selections during 2005 (Table 3). It appears that selections that were high in firmness were generally those susceptible to fruit cracking as well. Exceptions were T-672 and T-674. We will explore this relationship of berry firmness and fruit cracking in more detail in future years. Several rabbiteye selections had berry size that exceeded 2.0 g. Thus, we are making progress in developing rabbiteye germplasm with more favorable berry size.

Performance of Field Grown Southern Highbush Selections at Alapaha

The UGA Blueberry Breeding Program continues to aggressively generate and evaluate southern highbush plant material. Most southern highbush selections that existed at Alapaha prior to 1998 had very low vigor due to the lack of suitable highbush soil at the site, poor drainage, and absence of irrigation. Since 1998, southern highbush selections have been planted in raised beds, with irrigation and pine bark mulch. Performance of several of these new selections grown at Alapaha under field conditions, along with some standard cultivars, is depicted in Table 4. These selections are all less than 7 years old.

Much of our effort with southern highbush has been aimed at developing selections that have high quality berry attributes and a high degree of plant vigor. Results suggest that we are making considerable advances toward these goals. Numerous selections have a plant vigor rating of 8.0 or higher (on a 1 to 10 scale). Notable selections with regards to plant vigor are TH-647, TH-653, TH-656, TH-660, TH-667, TH-683, and TH-710. TH-621 (not listed because field plants were stripped for cuttings) has a high degree of plant vigor, along with very good berry quality. The selection tends to ripen mid-to-late season for the south Georgia southern highbush market. We released TH-621 (named 'Camellia') with hopes that interest will be among growers for a vigorous, high quality berry, that ripens a few days after 'Star' but well before the rabbiteye season.

Early ripening fruit continues to appeal to many south Georgia growers. The Florida release 'Star' is currently a prominent standard cultivar, and it had 50% ripe fruit by May 15 at Alapaha in 2005 under field conditions. Among the new selections, TH-642 is one of the more outstanding with regards to early ripening (50% ripe on May 9), and it has very

good berry size, crop load, and plant vigor. This selection was approved for release in 2005, and will be named 'Rebel'. More details for 'Rebel' can be found later in this report. Several selections ripened with 'Star' or 3 to 4 days after. Of these, TH-691 was the most notable, having very large fruit size, excellent color, and good firmness. Other early selections having good fruit size and excellent vigor, firmness, and flavor include TH-647 and TH-667. Other southern highbush having large fruit size and excellent berry color include TH-681, TH-682, and TH-683. Two newer selections with early ripening, large fruit are TH-729 and TH-730. These have been propagated for further testing.

Berry firmness is of great interest in southern highbush, and the selections TH-653, TH-658, TH-664, and TH-710 all had excellent firmness. We will evaluate these many selections for 3 to 5 more years in order to identify those that are most suitable as cultivars.

Performance of Southern Highbush in A High Density System at Alapaha

Some Georgia growers are interested in growing southern highbush blueberries in high density production systems. To date, there has been little or no comparative information on how different southern highbush selections and cultivars perform in such a system. Beginning in 2002, we started testing new UGA southern highbush selections in high density production systems at the Alapaha location. The production system consists of raised beds filled with pine bark, overhead irrigation, bird netting, and a plant spacing of 3 ft. x 5 ft. Table 5 presents performance data for several selections during 2005, which was the second cropping season for these plants. Generally all selections and the standard cultivars had suitable plant vigor in this system. Two of the most important pieces of data for this system are the ripening date and yield for the various entries, as growers need to maximize returns. 'Star' was early ripening, but yields were on the low side. 'O'Neal' lacked firmness and plant vigor. TH-642 (approved for release in 2005) was the earliest ripening selection, and yields were moderate. TH-707 was the highest yielding selection in this test, and ripening date was later than 'Star', but earlier than 'O'Neal'. Three selections, TH-710, TH-729, and TH-730, had greater yields than 'Star' and 'O'Neal' and also had favorable ripening times. It appears plants having berries that ripen by May 15-20 or earlier would be those to be considered for high density production. We will continue this test next year to determine the best selections for high density production.

Performance of Field Grown Southern Highbush Selections at Griffin

All of the southern highbush plants growing in Griffin are 5 years old or less. While the test site is not considered very suitable for southern highbush production, we have been able to grow several of our selections in the red Piedmont soil with pine bark mulch and irrigation. Table 6 lists data for several of the highbush selections in Griffin. Most of these were evaluated at Alapaha as well. Again, we have selections that demonstrate outstanding plant vigor, including TH-661, TH-662, TH-664, TH-665, TH-667, TH-668, and TH-678. Of these, TH-664 is notable as it also had good berry size, excellent firmness and

flavor, and a ripening date similar to 'Star'. TH-642 ripened 6 days earlier than 'Star' in Griffin. TH-665 flowered 10 days after 'Star', but ripened 3 days before. TH-662 and TH-667 were very late flowering selections with excellent crop loads that ripened after 'Star' and with 'O'Neal'. TH-681, TH-682, TH-683, TH-687, and TH-691 all had outstanding berry size and color, but ripening was late. Some new selections having favorable ripening dates, fruit quality, and excellent plant vigor were TH-707, TH-710, TH-729, and TH-730. These will be monitored further next year and have been propagated for advanced testing at multiple locations.

Performance of a New Southern Highbush Release

After several years of testing, the selection TH-642 was approved for release in 2005 as 'Rebel'. The selection has been tested at Alapaha, Griffin, and 2 on-farm sites in south Georgia. This is a very early ripening southern highbush cultivar. On average, it ripens 7 to 9 days before 'Star', and flowers only 3 to 5 days earlier. Berry size of 'Rebel' is large and firmness is very good. Plants are very vigorous and precocious with regards to establishment and commercial yields. Yields in 2005 at Alapaha and Griffin were 1.5 to 2 times higher for 'Rebel' than for 'Star'.

Plans are being made to have 'Rebel' plant material available for licensed propagators by March 2006. In order to obtain a license for propagating 'Rebel' and other UGA blueberry cultivars, contact the Georgia Seed Development Commission in Athens (ph. 706-542-5640), or go to their website at www.gsdc.com.

Goals of The UGA Blueberry Cultivar Development Program for 2006

Plans for the year 2006 are to continue aggressively evaluating seedlings, advanced seedlings, selections, and advanced selections of both rabbiteye and southern highbush blueberries. More than 30 new crosses (yielding 50 to 300 seedlings per cross) of rabbiteye and southern highbush will be made during 2006. More than 2500 seedlings will be generated from crosses made in 2005. These seedlings will be planted in a seedling nursery during the late spring of 2006 to be grown for future evaluations. More than 2500 seedlings were planted in a nursery during 2004, and these seedlings will be screened during 2006 for fruit characteristics including size, scar, firmness, color, and flavor. The most promising seedlings will be identified as advanced seedlings for further evaluation (estimated to be 2 to 3% of total seedlings). In 2005, over 50 seedlings were identified as advanced seedlings from 2003 crosses. These advanced seedlings will be planted in the field at Alapaha, and will be further evaluated as potential selections in 2006. In addition to the advanced seedlings from 2005, more than 90 new selections were made from seedlings of crosses made by the UGA program in the last 2 years. These were propagated, and multiple plants will be established at Alapaha and Griffin in 2006 for replicated evaluations. These new selections will be added to the more than 250

selections currently growing at these locations, and all will be evaluated during 2006 for possible designation as advanced selections.

In 2005, several selections were identified as advanced selections and were propagated. These will be further evaluated in 2006 for potential as cultivars, and several of the advanced selections will be distributed to cooperators to assist in the final evaluation process. Several rabbiteye and southern highbush advanced selections were distributed to grower-cooperators in 2005 to begin the final phase of testing for their potential as cultivar releases. Data from these trials will be collected beginning in 2006 and will continue through 2010. Evaluations of these advanced selections will include fruit characteristics, plant growth characteristics, flowering times, and yields.

Table 1. Ratings (1 to 10 scale) of some fruit and plant characteristics of rabbiteye blueberry cultivars and selections from the Blueberry Cultivar Development Program at the Alapaha, GA location during 2005. A value of 6-7 is generally considered to be the minimum acceptable rating for a commercial cultivar.

Selection or Variety	Date of 50% Flowering	Date of 50% Ripening	Berry Size	Berry Scar	Berry Color	Berry Firmness	Berry Flavor	Crop Load	Plant vigor
Alapaha	March 22	June 3	7.3	8.0	7.0	7.5	7.5	5.0	8.5
Brightwell	March 26	June 15	7.5	8.5	7.5	8.5	8.5	3.0	8.5
Climax	March 14	June 5	7.5	8.5	7.0	8.0	7.5	2.0	8.5
Premier	March 23	June 6	8.3	7.8	7.8	6.9	8.0	3.0	9.0
Tifblue	March 27	June 23	7.0	8.5	9.0	7.5	8.0	3.0	10.0
Vernon	March 22	June 6	8.5	8.5	7.5	8.0	8.0	1.5	8.5
T-451	March 10	June 12	9.3	8.0	8.0	7.5	7.0	1.0	7.5
T-460	March 15	June 4	8.8	9.0	9.0	7.5	8.0	8.0	8.5
T-516	March 30	June 11	8.5	8.0	9.0	7.0	7.0	2.0	8.5
T-538	March 25	June 7	9.0	8.5	6.8	7.5	7.5	5.0	9.0
T-611	March 22	May 29	7.8	7.5	9.0	6.8	7.0	7.5	6.5
T-616	March 20	May 28	9.0	8.5	8.0	7.5	8.0	2.0	8.5
T-619	March 24	June 11	8.8	8.5	8.5	8.0	8.0	2.0	9.0
T-626	March 10	June 4	7.0	8.5	8.0	7.0	7.0	2.0	9.0
T-630	March 23	June 6	8.0	6.8	8.5	7.0	8.5	3.0	7.5
T-631	March 11	May 29	8.0	8.0	8.0	8.8	9.0	1.0	9.0
T-655	March 19	June 6	8.8	8.0	7.5	7.5	7.0	2.0	7.5
T-670	March 24	June 9	8.8	8.0	7.0	8.0	8.0	6.5	8.0
T-672	March 20	June 5	9.0	8.5	7.0	9.0	8.0	2.0	8.0
T-674	March 17	June 6	7.5	8.0	8.5	8.0	7.0	1.5	7.5
T-724	March 23	May 29	7.8	7.5	8.0	7.0	8.5	1.0	8.0
T-727	March 18	June 9	8.0	7.0	8.0	8.0	8.0	1.5	7.5
T-743	March 12	June 1	8.8	7.5	7.5	7.5	7.5	1.5	8.0
T-747	March 20	May 29	8.8	8.5	7.0	7.5	7.0	1.5	8.0

Table 2. Ratings (1 to 10 scale) of some fruit and plant characteristics of rabbiteye blueberry cultivars and selections from the Blueberry Cultivar Development Program at the Griffin, GA location during 2005. A value of 6-7 is generally considered to be the minimum acceptable rating for a commercial cultivar.

Selection or Variety	Date of 50% Flowering	Date of 50% Ripening	Berry Size	Berry Scar	Berry Color	Berry Firmness	Berry Flavor	Crop Load	Plant vigor
Alapaha	April 1	June 13	7.0	8.0	7.0	7.0	8.0	8.5	9.0
Brightwell	April 3	June 26	7.5	8.5	7.0	8.0	7.5	7.0	9.0
Climax	March 24	June 19	8.0	8.0	7.9	8.5	8.2	8.3	7.9
Columbus	April 1	June 24	9.5	7.0	9.5	7.0	8.0	3.5	8.5
Ochlockonee	April 8	July 18	7.0	8.5	8.0	7.5	7.0	10.0	8.0
Powderblue	April 4	July 12	7.0	8.5	9.0	7.0	7.0	8.5	8.5
Premier	March 31	June 25	8.0	8.0	7.0	7.0	8.0	2.0	8.0
Tifblue	April 5	July 10	6.8	8.5	9.0	8.0	7.0	9.5	9.5
Vernon	March 30	June 17	8.0	8.5	8.5	8.0	8.0	7.5	9.0
T-451	March 26	July 9	9.2	7.5	8.5	8.5	7.0	7.5	9.0
T-611	April 2	June 15	7.0	8.0	9.5	7.5	7.0	1.0	9.0
T-619	April 4	July 8	8.0	8.0	9.5	8.0	7.0	8.0	8.0
T-626	March 23	June 20	6.5	9.0	8.0	7.5	7.5	7.8	9.5
T-630	April 2	June 18	8.0	6.8	8.0	8.0	8.5	7.5	8.0
T-631	March 22	June 20	8.0	8.0	8.0	8.5	8.5	5.0	7.5
T-655	March 28	June 28	8.5	7.0	7.0	8.0	7.0	7.0	6.0
T-670	April 3	June 30	9.0	8.0	7.5	8.5	8.0	7.0	8.5
T-672	March 28	June 27	8.5	8.5	8.0	9.0	8.0	7.5	8.5
T-674	March 22	June 27	8.0	7.0	8.5	8.0	8.5	8.5	8.5
T-724	April 4	June 12	7.5	7.0	8.0	7.0	7.5	3.5	8.5
T-727	April 4	July 2	7.0	7.0	8.0	8.0	8.0	4.5	9.0
T-743	March 29	June 15	8.8	7.5	8.5	7.5	8.0	5.5	10.0

Table 3. Fruit cracking, initial berry firmness, post-harvest firmness, and average berry weight of several rabbiteye blueberry selections from the Blueberry Cultivar Development Program at the Griffin, GA location during 2005.

Selection	Fruit cracking in response to simulated rainfall (%)	Initial firmness (g/mm)	Post-harvest firmness after 72 h at room temperature (g/mm)	Average berry weight (g)
Alapaha	8.0	158.8	147.3	1.32
Austin	9.0	155.2	143.8	1.81
Brightwell	18.0	171.1	135.7	1.83
Climax	26.0	156.7	138.8	1.68
Columbus	11.0	165.3	110.5	2.66
Ochlockonee	14.0	170.5	123.2	1.39
Powderblue	13.0	166.1	121.4	1.55
Premier	6.0	148.6	128.0	1.72
Tifblue	45.0	202.9	144.4	1.38
Vernon	15.0	158.6	130.4	1.52
T-451	66.0	177.0	136.5	2.31
T-459	67.0	194.5	161.3	1.79
T-655	19.0	197.9	137.4	1.96
T-670	28.0	187.7	143.5	2.57
T-671	52.0	243.0	159.5	2.38
T-672	17.0	174.5	116.4	2.01
T-674	11.0	199.8	132.3	1.79
T-675	66.0	189.4	137.7	2.49

Table 4. Ratings (1 to 10 scale) of some fruit and plant characteristics of field grown southern highbush blueberry cultivars and selections from the Blueberry Cultivar Development Program at the Alapaha, GA location during 2005. A value of 6-7 is generally considered to be the minimum acceptable rating for a commercial cultivar.

Selection or Variety	Date of 50% Flowering	Date of 50% Ripening	Berry Size	Berry Scar	Berry Color	Berry Firmness	Berry Flavor	Crop Load	Plant vigor
O'Neal	March 11	May 20	8.0	7.0	7.0	7.0	8.0	2.0	7.0
Star	March 5	May 15	7.5	8.0	7.3	7.8	7.3	3.0	7.3
TH-642	Feb. 28	May 9	8.0	8.0	8.0	8.0	7.0	4.0	7.8
TH-644	March 4	May 12	8.0	8.0	8.0	8.3	8.0	2.5	7.0
TH-647	March 20	May 17	8.0	8.0	7.5	8.5	9.0	5.5	9.5
TH-653	March 19	May 20	7.5	7.5	8.0	9.5	8.0	2.5	8.0
TH-656	March 10	May 16	8.5	7.3	6.5	8.5	8.0	2.0	8.5
TH-658	Feb. 24	May 14	8.0	8.0	7.0	9.0	8.5	1.5	7.0
TH-660	March 10	May 17	7.0	7.3	7.3	7.0	8.0	2.5	8.0
TH-661	March 9	May 17	7.0	7.3	7.0	7.3	7.3	2.0	7.5
TH-664	March 11	May 14	7.5	8.0	7.3	8.8	9.0	2.0	7.5
TH-665	March 9	May 12	7.3	7.3	8.0	7.0	7.3	1.0	7.5
TH-667	March 15	May 17	7.5	8.3	8.8	8.0	8.0	5.0	8.0
TH-668	March 7	May 25	8.0	8.0	8.0	7.5	8.0	3.0	7.0
TH-678	March 7	May 20	7.8	8.5	8.5	8.0	7.0	5.0	7.0
TH-681	March 13	May 26	9.0	8.5	9.5	8.5	8.0	3.5	7.5
TH-682	March 17	May 28	9.0	9.0	9.5	8.0	7.5	3.5	7.0
TH-683	April 3	May 31	9.0	9.0	9.8	8.5	8.0	6.5	8.5
TH-691	March 1	May 19	9.8	8.5	10.0	8.5	8.5	3.5	7.5
TH-710	Feb. 28	May 15	8.0	8.3	8.0	8.8	8.0	4.5	8.0
TH-729	March 2	May 12	9.0	8.3	8.0	8.0	8.3	2.0	7.0
TH-730	March 3	May 15	8.5	8.0	8.0	7.5	8.0	4.0	7.0

Table 5. Yield, flowering and ripening dates, and ratings (1 to 10 scale) of some fruit and plant characteristics of several southern highbush blueberry cultivars and selections from the Blueberry Cultivar Development Program grown in a high density bed at the Alapaha, GA location during 2005. A value of 6-7 is generally considered to be the minimum acceptable rating for a commercial cultivar.

Selection or Variety	Yield (g/plant)	Date of 50% flowering	Date of 50% ripening	Berry wt. (g)	Berry scar rating	Berry color rating	Berry firmness rating	Berry flavor rating	Plant vigor rating
Star	223	Mar. 10	May 15	1.77	8.5	8.0	7.5	7.5	9.0
O'Neal	385	Mar. 14	May 25	1.58	7.0	7.0	6.8	8.0	6.5
TH-642	444	Mar. 2	May 10	1.63	9.0	8.0	8.0	7.0	9.5
TH-707	982	Mar. 23	May 22	1.57	8.5	7.5	8.5	8.8	10.0
TH-710	560	Feb. 28	May 12	1.48	8.5	8.0	8.8	8.8	10.0
TH-720	485	Mar. 5	May 13	1.48	6.8	8.0	8.0	9.3	10.0
TH-729	438	Mar. 2	May 14	1.80	6.8	9.0	8.5	8.5	9.5
TH-730	544	Mar. 1	May 15	1.94	8.5	9.0	8.5	8.5	9.5
TH-748	252	Feb. 28	May 10	1.19	8.5	8.0	7.5	7.0	7.0
TH-749	229	Mar. 10	May 18	2.44	8.5	8.0	8.5	8.0	7.5

Table 6. Ratings (1 to 10 scale) of some fruit and plant characteristics of field grown southern highbush blueberry cultivars and selections from the Blueberry Cultivar Development Program at the Griffin, GA location during 2005. A value of 6-7 is generally considered to be the minimum acceptable rating for a commercial cultivar.

Selection or Variety	Date of 50% Flowering	Date of 50% Ripening	Berry Size	Berry Scar	Berry Color	Berry Firmness	Berry Flavor	Crop Load	Plant vigor
O'Neal	March 21	June 1	6.5	7.0	7.0	6.8	8.0	6.0	5.0
Star	March 10	May 23	7.0	8.0	8.0	7.0	7.0	9.5	6.0
Palmetto	March 22	May 25	7.0	8.5	7.5	8.8	9.3	6.5	8.0
TH-642	March 8	May 17	7.0	8.0	8.0	8.0	7.0	8.5	8.0
TH-658	March 7	May 17	8.5	7.5	7.5	9.5	9.0	6.0	8.5
TH-660	March 19	June 2	7.0	8.0	8.5	7.8	8.5	8.0	6.0
TH-661	March 12	May 21	7.5	7.5	8.0	8.5	8.5	8.5	9.0
TH-662	April 5	June 5	7.0	8.0	7.5	8.0	8.0	9.5	10.0
TH-663	April 3	June 6	7.5	8.5	8.0	8.0	8.0	10.0	8.5
TH-664	March 18	May 23	7.8	8.5	8.5	9.0	9.5	8.8	9.5
TH-665	March 20	May 20	7.5	8.5	8.5	8.0	8.5	7.8	9.0
TH-667	March 26	May 28	7.8	8.5	8.5	7.8	8.0	9.0	10.0
TH-668	March 11	June 10	8.0	8.0	8.0	7.5	8.0	9.5	10.0
TH-678	March 29	June 4	8.0	8.0	7.5	8.0	8.0	9.0	9.0
TH-681	March 24	June 11	9.5	8.0	9.5	8.0	7.5	8.0	7.0
TH-682	March 27	June 10	8.8	7.0	9.8	7.5	8.0	7.5	8.5
TH-683	April 4	June 10	9.2	8.0	9.8	8.5	8.0	7.0	8.0
TH-687	April 5	June 18	9.0	8.0	10.0	7.0	8.0	8.5	8.5
TH-691	March 22	June 9	9.5	8.0	9.5	7.5	7.5	7.0	7.5
TH-707	March 25	June 4	8.5	8.5	7.8	8.0	8.5	7.5	10.0
TH-710	March 14	May 30	8.0	8.0	7.5	8.5	7.5	7.5	9.0
TH-729	March 17	May 23	8.5	7.0	8.0	9.0	8.5	7.5	10.0
TH-730	March 18	May 25	8.5	8.0	8.5	7.5	7.0	7.5	8.0