

APPLICATION FOR RELEASE

APPLICATION FOR RELEASE OF (check one):

 CULTIVAR ASSOCIATE CULTIVAR GERMPLASM PARENTAL LINE GENETIC STOCK

1. Crop: Rabbiteye blueberry (*Vaccinium ashei* Reade)

2. Experimental no. or name: T-959

3. Pedigree and history: T-959 was selected in 2005 at the Georgia Experiment Station in Griffin, Ga, originating from a cross of T-460 X FL 80-11 made by Dr. Scott NeSmith in 2002. A more detailed pedigree of T-959 is depicted in Fig. 1. The selection has been tested in plantings at Alapaha and Griffin, Ga. established in Fall 2006.

4. Description of plant material: T-959 is a rabbiteye blueberry (*V. ashei*), being released for commercial usage as well as pick-your-own and homeowner markets. The selection ripens around the time of the early rabbiteye varieties 'Alapaha', 'Vernon' and 'Premier', but before the mid-season 'Brightwell. T-959 has very large, firm berries, and the plant has a high degree of plant vigor as compared to standards in Griffin and Alapaha over the past 3 years (Tables 1 and 2). No notable disease or other pest problems have been observed for T-959 that were not also present on other blueberry varieties and selections in the vicinity of the test plots. However, the new variety is susceptible to fruit splitting/cracking following certain rainfall events during fruit ripening, which can be problematic at times. The selection is estimated to have a chilling requirement of 500 to 550 hours below 45 F (based on comparison of flowering dates with those of known standard cultivars). More detailed information on T-959 follows in various Tables and Figures.

5. Need for and potential users of plant material: Rabbiteye blueberry cultivars constitute the major portion of the blueberry acreage in Georgia. The species is largely grown due to its high plant vigor and adaptability to the Southeast. However, the small fruit size of current rabbiteye blueberry varieties often diminishes their potential to compete with larger fruited highbush varieties from other regions in the fresh market arena. Also, the small berry size of current varieties leads to high inefficiency with hand harvesting, which often destines much of the rabbiteye crop to machine harvests to be used for processing to a large extent. Concurrently, many small pick-your-own operations would greatly benefit from larger fruited varieties to improve the overall "harvest experience" for their customers. We have been diligently seeking larger fruit

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rabbiteyes in the past 10 years with hopes of alleviating some of these issues. T-959 is a large fruited rabbiteye that has stirred interest among many growers and visitors to our program during the past 3 years. The impressive fruit size has garnered excitement from all interested in rabbiteye varieties. The new variety is, however, susceptible to rain splitting, which is a periodic physiological phenomenon occurring in certain years, but not all. After in depth discussions with several growers and visitors from other areas, we have been encouraged to release T-959 anyway. They are willing to accept the negative rain splitting issue in order to receive the benefit of the very large berry size. Also, many growing areas around the world do not have rainfall/splitting issues during the fruit ripening period and would thus not be affected by the potential problem.

6. Justification for release: As discussed above (Tables 1 and 2), the most outstanding feature of T-959 is its large berry size. Table 3 depicts berry weight for T-959 and standard cultivars from both Griffin and Alapaha locations during the past 3 growing seasons for the first 25% of ripe fruit. In each of the sets from the site/years, T-959 has had much greater average berry weight than all other cultivar standards. We released 'Alapaha' in 2001 as a new early season variety with consistent cropping, and followed that with 'Vernon' in 2004 for an early season companion variety with larger berry size to compete with the much older standard 'Premier'. T-959 is superior to each of these with respect to berry size. It is also much larger than the popular early-mid season older variety 'Brightwell'. Data from several harvests over time (not shown) have revealed that T-959 maintains superior berry size over the entire season by a similar magnitude, although all varieties fall off in size some as harvest progresses. Nevertheless, T-959 consistently produces very large fruit.

While yield data is limited, Table 4 depicts total yield per plant taken from three single plant replicates via hand harvesting in selection test plots at Alapaha in 2009 and 2010, and in Griffin in 2010. These data support that T-959 is also high yielding, primarily due to the large berry size. The total yield of 10.5 kg per plant for T-959 from Alapaha in 2010 is the largest yield we have ever recorded for 4 year old plants. Hence, it appears the large berry size of T-959 leads to not only more efficiently harvested yield, but greater yield as well.

In addition to large berry size, T-959 has also demonstrated excellent firmness (Table 5). 'Brightwell' is considered the standard for firmness in the industry, which makes it useful for machine harvesting and long distant shipping. 'Premier' is considered the softer berry of these varieties. T-959 had equal or greater firmness than 'Brightwell' (as measured with a specialized laboratory instrument called a FirmTech 2) in each of the last 3 years in Griffin. The new proposed variety had greater firmness than 'Alapaha', 'Vernon', and 'Premier'.

With all of the positive attributes, T-959 does carry the negative characteristic of fruit splitting (Table 6). Fruit splitting is a physiological phenomenon, not completely understood, that occurs periodically for certain varieties after heavy rains that occur during fruit ripening. The laboratory test used to assess fruit splitting does not represent

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actual degree of splitting that occurs under field conditions (it is typically much less in the field), but it has proven useful for ranking splitting susceptible cultivars. The data indicate that T-959 could encounter fruit splitting problems under certain conditions.

7. Participating scientists: Scientists participating in the development of this blueberry cultivar include D. Scott NeSmith, UGA.

8. Location(s) at which plant material was developed: T-959 was developed at both the Georgia Station and the Coastal Plain Experiment Station.

9. Recommended form of intellectual property protection and royalty: T-959 should be patented and royalty should be charged on a per plant or production basis.

Cultivar and associate cultivar applications only provide the following information:

10. Method of propagation: Propagation of T-959 has been rather easily accomplished from softwood cuttings, and we have had some tissue culture initiation with success.

11. Amount of breeder seed stocks available (if applicable): NA

12. Amount of foundation seed stocks available if applicable: NA

13. Amount of cutting or bud material available for vegetatively propagated material for nursery distribution (if applicable): There is limited plant material (4 year old plants) that are available in the field at Griffin and Alapaha for some cuttings. We have sent material to a tissue lab at Michigan State University to have 2500 small rooted plants propagated. We will also propagate 200 to 300 conventional liners in summer 2010.

14. Describe any unusual difficulty anticipated in the production of any class of seed stocks:

15. Suggest up to three names for the cultivar, if appropriate: Titan, Blue Titan, Georgia Giant, others???

16. Name approved by plant cultivar and germplasm release committee:

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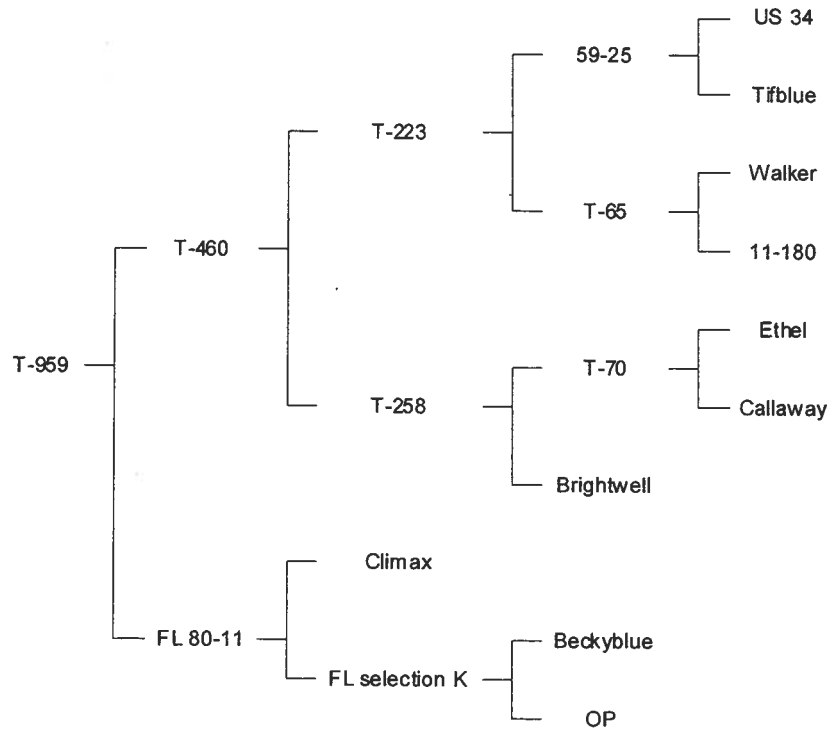


Fig. 1 – Pedigree for rabbiteye T-959.

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Table 1. Average ratings of some fruit and plant characteristics of T-959 and rabbiteye standard cultivars Alapaha, Vernon, Premier, and Brightwell from 2008-2010 in field test plots at Alapaha, Ga. Rating scales are based on a 1 to 10 score, with 1 being the least desirable and 10 being the most desirable. A value of 6-7 is generally considered to be the minimum acceptable rating for a commercial cultivar. These plants were established in Fall 2006.

Berry and plant attributes ^{Y/}	Cultivar				
	T-959	Alapaha	Vernon	Premier	Brightwell
Berry size	9.5 ± 0.2	6.9 ± 0.1	7.9 ± 0.2	7.8 ± 0.2	7.0 ± 0.1
Berry scar	8.2 ± 0.2	7.6 ± 0.1	8.0 ± 0.1	7.7 ± 0.2	7.7 ± 0.2
Berry color	7.3 ± 0.1	7.0 ± 0.1	7.2 ± 0.2	7.5 ± 0.3	7.3 ± 0.2
Berry firmness	8.3 ± 0.3	7.0 ± 0.2	7.7 ± 0.3	6.9 ± 0.2	7.7 ± 0.2
Berry flavor	7.0 ± 0.1	7.8 ± 0.1	7.7 ± 0.2	7.8 ± 0.1	7.0 ± 0.2
Cropping	6.3 ± 0.5	6.2 ± 0.2	4.5 ± 1.0	2.5 ± 0.3	7.8 ± 1.0
Plant vigor	10.0 ± 0.1	8.0 ± 0.1	8.8 ± 0.1	9.3 ± 0.4	9.2 ± 0.6
Date of 50% flowering	Mar. 21	Mar. 22	Mar. 20	Mar. 23	Mar. 25
Date of 50% ripening	June 1	June 4	June 2	June 6	June 19
Fruit development period (days)	73 ± 3.2	75 ± 2.0	74 ± 4.5	75 ± 3.5	86 ± 4.5

^{Y/} Values are means ± the standard error with n=3.

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Table 2. Average ratings of some fruit and plant characteristics of T-959 and rabbiteye standard cultivars Alapaha, Vernon, Premier, and Brightwell from 2008-2010 in field test plots at Griffin, Ga. Rating scales are based on a 1 to 10 score, with 1 being the least desirable and 10 being the most desirable. A value of 6-7 is generally considered to be the minimum acceptable rating for a commercial cultivar. These plants were established in Fall 2006.

Berry and plant attributes ^{Y/}	Cultivar				
	T-959	Alapaha	Vernon	Premier	Brightwell
Berry size	9.6 ± 0.2	7.1 ± 0.2	8.0 ± 0.3	7.7 ± 0.2	6.8 ± 0.2
Berry scar	8.2 ± 0.2	7.7 ± 0.3	7.8 ± 0.2	7.5 ± 0.3	7.7 ± 0.2
Berry color	7.3 ± 0.1	7.0 ± 0.1	7.2 ± 0.2	7.3 ± 0.4	7.4 ± 0.2
Berry firmness	8.3 ± 0.3	7.2 ± 0.2	7.8 ± 0.2	6.8 ± 0.1	8.1 ± 0.1
Berry flavor	7.2 ± 0.2	7.9 ± 0.1	8.0 ± 0.1	7.7 ± 0.2	7.1 ± 0.2
Cropping	5.5 ± 0.6	5.2 ± 1.3	4.2 ± 0.9	3.2 ± 0.7	6.0 ± 2.1
Plant vigor	9.8 ± 0.1	8.3 ± 0.2	8.2 ± 0.4	7.8 ± 0.3	8.3 ± 0.2
Date of 50% flowering	April 6	April 3	April 2	April 2	April 5
Date of 50% ripening	June 20	June 16	June 14	June 16	June 28
Fruit development period (days)	75 ± 2.0	74 ± 2.5	73 ± 3.5	75 ± 2.0	86 ± 2.3

^{Y/} Values are means ± the standard error with n=3.

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Table 3. Average berry weight for T-959 and four standard rabbiteye blueberry cultivars at Griffin and Alapaha research farm locations during 2008 thru 2010. Average berry weights were determined from multiple berry samples (25 to 50 fruit per sample) taken from the first 25% of ripe fruit.

Variety	2008		2009		2010	
	Griffin	Alapaha	Griffin	Alapaha	Griffin	Alapaha
	----- Average berry wt (g) ^{Y/} -----					
T-959	4.0 ± 0.1	4.4 ± 0.2	4.2 ± 0.1	3.3 ± 0.1	3.1 ± 0.2	3.2 ± 0.1
Alapaha	1.6 ± 0.1	---	1.8 ± 0.1	1.4 ± 0.1	1.8 ± 0.1	1.4 ± 0.1
Vernon	2.0 ± 0.1	---	2.3 ± 0.1	2.1 ± 0.1	2.2 ± 0.1	2.1 ± 0.1
Premier	1.8 ± 0.1	1.6 ± 0.1	2.1 ± 0.1	1.8 ± 0.1	2.0 ± 0.1	1.7 ± 0.1
Brightwell	1.5 ± 0.1	---	1.6 ± 0.1	1.5 ± 0.1	1.2 ± 0.1	1.6 ± 0.1

^{Y/} Values are means ± the standard error with n=3.

Table 4. Total yield (kg/plant) for T-959 and three standard rabbiteye blueberry cultivars at Griffin (2010) and Alapaha (2009 and 2010) research farm locations during 2009 and 2010. Total yields were obtained from 3 to 5 hand-harvests at each location from plants established in Fall 2006. Three single plant replicates were harvested for each variety at each location.

Variety	2009		2010	
	Griffin	Alapaha	Griffin	Alapaha
	----- Total yield per plant (kg) ^{Y/} -----			
T-959	---	5.6 ± 0.2	6.7 ± 1.2	10.5 ± 0.5
Alapaha	---	3.5 ± 0.5	4.9 ± 0.2	7.9 ± 0.6
Vernon	---	2.4 ± 0.4	4.9 ± 0.4	4.7 ± 0.1
Brightwell	---	3.9 ± 0.7	1.9 ± 0.3	7.1 ± 0.7

^{Y/} Values are means ± the standard error with n=3.

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Table 5. Average berry firmness for T-959 and four standard rabbiteye blueberry cultivars at the Griffin research farm location during 2008 thru 2010. Average berry firmness was determined from multiple 25-berry samples using a FirmTech 2 firmness device. Fruit samples were taken from the first 25% of ripe fruit.

Variety	2008	2009	2010
	----- Average berry firmness (g/mm) ^{Y/} -----		
T-959	237 ± 8.3	213 ± 2.0	260 ± 18.5
Alapaha	221 ± 3.1	194 ± 2.1	210 ± 9.1
Vernon	208 ± 4.7	191 ± 1.9	206 ± 15.6
Premier	199 ± 5.9	172 ± 3.5	165 ± 3.8
Brightwell	211 ± 10.5	216 ± 1.0	241 ± 8.9

^{Y/} Values are means ± the standard error with n=4.

Table 6. Fruit splitting assessment for T-959 and four standard rabbiteye blueberry cultivars at the Griffin research farm location during 2008 and 2010. Fruit splitting assessment was determined from overnight soaking of multiple 25-berry samples in water in the lab. This does not represent actual fruit splitting from rain under field conditions, but it has been shown to be indicative of cultivars susceptible to the problem of fruit splitting. Fruit samples were taken from the first 25% of ripe fruit.

Variety	2008	2010
	----- Percent fruit splits (%) ^{Y/} -----	
T-959	62.5 ± 4.8	26.0 ± 5.0
Alapaha	0.0 ± 0.0	3.0 ± 1.0
Vernon	0.0 ± 0.0	8.0 ± 2.8
Premier	0.0 ± 0.0	3.0 ± 3.0
Brightwell	7.5 ± 2.5	1.0 ± 1.0

^{Y/} Values are means ± the standard error with n=4.

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Fig. 2 – Fruit ripening on a 2nd leaf plant (2008) of T-959.



Fig. 3 – Berries of T-959 and Premier during 2008.

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Fig. 4 – Fruit ripening on 3rd leaf plant (2009) of T-959.



Fig. 5 – Close-up of T-959 berries.

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Appendix

Blueberry Traits and Rating Scale D. Scott NeSmith

Many of the traits evaluated in the blueberry breeding program are qualitative and/or subjective, and we use a 1 to 10 scale for our ratings. In this system, typically a value of 1 is poor and least desirable, and a value of 10 is excellent and most desirable. A value of 6-7 on this scale is generally considered to be the minimum level for "commercial acceptability". An exception is cropping score, which can be less than 6 in some years depending on weather, pollination, etc. For advanced selections, nearly all traits would be at the minimum value (6-7), therefore, there is not a wide range in values among entries in these final trials (i.e., those selections with values < 6 didn't make it this far). Ratings are based on averaged or integrated values across several plants and berries, not just single berries. More specific information for the different traits is listed below.

Berry size – For berry size large berries are typically desirable. There are occasions that small berries may be desired, but in general we select for large fruit. Our berry size scale does relate to a quantity in many regards. A value of 6 is given to berries that are 13 to 14 mm in diameter, a value of 7 is 15 to 16 mm, a value of 8 is 17 to 18 mm, a 9 is 20 to 21 mm, and a value of 10 is greater than 21 mm.

Berry scar – Berry scar refers to the region where the fruit is detached from the stem. The most desirable form of this trait is a very small scar, that is completely dry. A value less than 6 is unacceptable commercially because the tearing and leakage would cause fruit storage problems. A value of 6 would be a scar with perhaps slight tearing on an occasional berry. A value of 7 would be a large scar, but would tend to be dry. The rest of the scale (8 to 10) basically accounts for a smaller and smaller scar.

Berry color – The "blue color" of blueberries actually is caused by the waxy bloom covering the fruit. Nearly all blueberries are midnight blue to black if this wax is removed. So, in essence the color scale we use is an indicator of waxy bloom on the fruit. The most desirable form of this trait is a high wax bloom that gives a sky blue appearance. In our scale, a value less than 6 is considered too dark (not waxy enough) for commercial acceptance. Going from 6 to 10 is basically increasing in intensity of light blue color.

Berry firmness – Firmness of blueberries is important for harvesting, handling, and storage of the fruit. If a berry is too soft, it will bruise during these processes and become unusable. Our fruit firmness rating is based on "feel" when rolling berries between the fingers, and somewhat on texture "crispness" when biting into the fruit. Rating values < 6 are considered too soft to be commercially viable. Going from a value of 6 to 10 is increasing in firmness. Very few berries are ever rated at 10 on this

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scale. Typically fruit that exceed a value of 8.0 to 9.0 could likely be machine harvested for the fresh market.

Berry flavor – Blueberry flavor is a blend of volatiles, acid and sugars that give various combinations of flavor. If berries are too acid, they are bitter and are not appealing to consumers. If both acidity and sugars are too low, berries can have too bland of a flavor and this is not appealing to consumers either. A flavor rating < 6 is not considered commercially suitable. Going from a rating of 6 to 10, flavor is becoming increasingly sweet, aromatic, and more pronounced.

Cropping – Cropping score is an integrated value of the “percent” crop a plant is carrying. It is related to yield somewhat, but is actually more a measure of fruit set. Thus, overall size of the canopy is not accounted for. You could have a small plant canopy with high fruit set, but overall yield would be low due to its size. Also, large berry size can increase yield if two selections have a similar crop load, but one has larger berry size. The 1 to 10 scale used is basically a percentage of crop that is set (i.e., 1 = 10%, 2=20%, etc.). A cropping score of 9 to 10 can be overcropped resulting in small, slow ripening fruit.

Plant Vigor – Rating of plant vigor integrates the overall robustness and durability of the plant itself (wood and vegetation). It does not reflect berry quality, although poor vigor plants can have very small berries, but not always. This is a 1 to 10 visual scale, with 1 being near death, and 10 being extremely healthy and vigorous.

J & B Blueberry Farms, Inc.



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Manor, Georgia 31550***

***Office (912)285-1602
Fax (912)284-1956***

Joe Cornelius, Jr., President

July 19, 2010

Dr. Scott NeSmith
1109 Experiment Street
Griffin, Georgia 30223-1797

Dr. NeSmith,

I am writing this letter in support of the potential release of T-959, a large fruited variety of rabbiteye blueberries.

The information that you have provided about this variety indicates that a significant need in our industry will be met with its release.

The ripening dates indicate that this new variety could serve as a bridge between highbush and rabbiteye seasons, providing a quicker transition for the hand harvest crews into other rabbiteye varieties. The large fruit size, as well, would allow hand harvest operations to be more cost efficient at a very important market window.

Fruit quality, bloom, and quantity appear to be excellent with yields far surpassing those of other varieties in the same harvest window.

I feel, wholeheartedly, that the release of this variety to Georgia blueberry producers will provide a tremendous asset, and give us a tool to increase our competitive edge within the North American blueberry growing area.

Please continue the excellent work.

Regards,

A handwritten signature in black ink, appearing to read "Joe Cornelius, Jr.", written in a cursive style.

Joe Cornelius, Jr.

Chairman,
Georgia Agricultural Commodity Commission for Blueberries

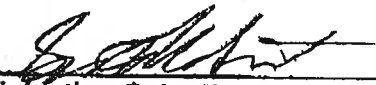


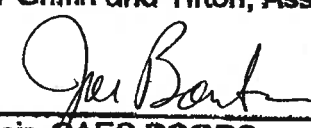
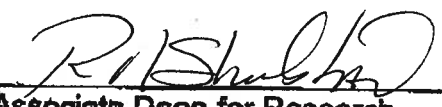
Vice-Chairman,
Michigan Blueberry Growers Association Board of Directors

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(Please keep this as a separate page)

Application for the release of (insert experimental name or number and crop)

Recommended:

- A.  7/21/10
Originating Scientist Date
- B.  7/26/10
Department Head Date
- C.  8/16/10
For Griffin and Tifton, Assistant Dean Date
- D.  8-23-10
Chair, GAES PCGRC Date
- E.  8-24-10
Associate Dean for Research Date

Approved:

- F.  8/25/10
Dean and Director Date