

# Registration of 'Tift 8' Trispecific Ornamental *Pennisetum*

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## ABSTRACT

'Tift 8' (Reg. No. CV-259, PI 659801) is a trispecific ornamental hybrid of *Pennisetum* approved for release by the University of Georgia College of Agricultural and Environmental Sciences in 2010. It was produced from crosses between *P. purpureum* Schumach; *P. squamulatum* Fresen.; and *P. glaucum* (L.) R. Br. This trispecific hybrid is both pollen and seed sterile. Tift 8 is a vegetatively propagated cultivar that is perennial in USDA hardiness zones 8–10. It can be grown as a vigorous annual in more northern zones. Tift 8 is morphologically similar to 'Tift 17', but it is significantly taller and has a significantly smaller culm-leaf angle than Tift 17. Tift 8 is significantly more resistant to *Helminthosporium* leaf spot (caused by *Helminthosporium ocellum* Faris) than 'Princess'. Mature leaves of Tift 8 have a reddish-purple color. The plant color of Tift 8 is equal to, and in some tests better than, that of Tift 17. Tift 8 flowers under short days; therefore, it will not produce inflorescences where winter temperatures reach freezing (0°C) or below, or before the daylength is 10.5 h. A plant patent application has been submitted for Tift 8.

The genus *Pennisetum* comprises more than 140 species (Hanna et al., 2004). Pearl millet [*P. glaucum* (L.) R. Br.] belongs to the primary gene pool and is a major grain and forage crop around the world. Napiergrass (*P. purpureum* Schumach) belongs to the secondary gene pool, and the remaining *Pennisetum* species belong to the tertiary gene pool. Keyword patent and Internet searches revealed that a number of cultivars in various *Pennisetum* species [including *P. setaceum* (Forsk.) Chiov.; *P. alopecuroides* (L.) Spreng.; *P. glaucum*; *P. orientale* L.C. Rich.; and *P. purpureum*] have been patented and/or marketed.

An interspecific *Pennisetum* cross, 'Tift 23', and a trispecific *Pennisetum* cross, 'Tift 17', were recently released as vegetatively propagated ornamental grasses (Hanna et al., 2010). The objective of the ornamental-grass breeding program at Tifton, GA is to develop pollen- and seed-sterile cultivars with unique characteristics of value and interest to the ornamental grass industry.

## Methods

'Tift 8' (Reg. No. CV-259, PI 659801) is a trispecific hybrid that originated from a cross between red (Hanna and Burton, 1992) tetraploid pearl millet (*P. glaucum*, 04-94) and SC 1125-2 (*P. purpureum* 'Merkeron' napiergrass × PS 262 [*P. squamulatum* Fresen.]). One vigorous plant (04-26-1) was selected from the cross in 2004. In 2004, 'Princess' napiergrass (Hanna and Ruter, 2005) was pollinated with 04-26-1. Tift 8 was selected in 2005 from the 2004 cross.

Tift 8 was evaluated for its ornamental value from 2006 through 2009 in replicated tests at three Georgia locations and climates: Tifton (Coastal Plain), Griffin (Piedmont), and Blairsville (Mountain). All tests at Tifton, Griffin, and Blairsville were planted in a randomized complete block designs and had six, four, and three single-plant replications, respectively, and included a number of other experimental genotypes. Plants were spaced on 1.8-m centers. Characteristics evaluated included plant height, plant-canopy width, plant-base diameter, leaf length and width, leaf angle, number of leaves per culm, total number of culms per plant, and ratings for inflorescence exertion, color, and *Helminthosporium* leaf spot (caused by *Helminthosporium ocellum* Faris). All data in the tables are from plants established vegetatively as single-stem propagules in mid-May and rated in September and October of the same year, except in 2007 and 2009. Test 1 data are from plants that overwintered at Tifton from the 2006 planting. Data for each variable were statistically analyzed by ANOVA. Least significance differences (LSD) were used for mean separation.

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**Table 1. Plant heights of two ornamental *Pennisetum* planted at three locations for 3 yr in Georgia.<sup>†</sup>**

Entry	Tifton <sup>‡</sup>						Griffin <sup>¶</sup>	
	Test 1		2009	Test 2		Blairsville <sup>§</sup>		
	2006	2007		2006	2007	2006		2007
	cm							
Tift 8	132	154	184	107	73	132	156	
Tift 17	115	126	148	99	72	140	117	
LSD (0.05)	NS <sup>*</sup>	18	25	4	NS	NS	19	
Days of growth	158	188	189	151	138	123	165	

<sup>†</sup>Plant height was measured from ground level to top of plant canopy.

<sup>‡</sup>Tifton: test 1 planted 11 May 2006; measurements taken 20 Sept. 2006, 17 Sept. 2007, and 6 Oct. 2009 (2006 Test 1 survived the 2006/2007, 2007/2008, and 2008/2009 winters in the field). Test 2 planted 19 Apr. 2007; measurements taken 17 Sept. 2007.

<sup>§</sup>Blairsville: planted 2 June 2006 and 27 May 2007; measurements taken 18 Oct. 2006 and 27 Sept. 2007, respectively.

<sup>¶</sup>Griffin: planted 6 May 2006; measurements taken 18 Oct. 2006.

<sup>\*</sup>NS, not significant.

**Table 2. Canopy diameter of individual plant of two ornamental *Pennisetum* planted at three locations for 2 yr in Georgia.<sup>†</sup>**

Entry	Tifton <sup>‡</sup>						Griffin <sup>¶</sup>
	Test 1		2007	Blairsville <sup>§</sup>		2006	
	2006	2007		2006	2007		
	cm						
Tift 8	143	166	129	133	147	162	
Tift 17	143	160	133	141	135	154	
LSD (0.05)	NS <sup>*</sup>	NS	4	NS	NS	NS	
Days of growth	158	188	151	138	123	165	

<sup>†</sup>Plant canopy was the average diameter of the widest and narrowest diameters of a single canopy.

<sup>‡</sup>Tifton: test 1 planted 11 May 2006; measurements taken 20 Sept. 2006 and 17 Sept. 2007 (2006 Test 1 survived the 2006–2007 winter in the field). Test 2 planted 19 Apr. 2007 and measurements taken 17 Sept. 2007.

<sup>§</sup>Blairsville: planted 2 June 2006 and 27 May 2007; measurements taken 18 Oct. 2006 and 27 Sept. 2007, respectively.

<sup>¶</sup>Griffin: planted 6 May 2006; measurements taken 18 Oct. 2006.

<sup>\*</sup>NS, not significant.

**Table 3. Base diameter at ground level of individual plants of two ornamental *Pennisetum* planted at three locations for 2 yr in Georgia.<sup>†</sup>**

Entry	Tifton <sup>‡</sup>				Blairsville <sup>§</sup>
	Test 1		2007	2007	
	2006	2007			
	cm				
Tift 8	49	47	23	32	
Tift 17	48	44	22	37	
LSD (0.05)	NS <sup>¶</sup>	NS	NS	NS	
Days of growth	158	188	151	123	

<sup>†</sup>Base diameter is the diameter of the base of a single plant.

<sup>‡</sup>Tifton: test 1 planted 11 May 2006; measurements taken 20 Sept. 2006 and 17 Sept. 2007 (2006 Test 1 survived the 2006–2007 winter in the field). Test 2 planted 19 Apr. 2007; measurements taken 17 Sept. 2007.

<sup>§</sup>Blairsville: planted 27 May 2007; measurements taken 27 Sept. 2007.

<sup>¶</sup>NS, not significant.

## Characteristics

Tift 8 was developed by the University of Georgia College of Agricultural and Environmental Sciences, Tifton Campus, and was approved for release in 2010. Mature leaves of Tift 8 best fit the greyed-purple group 187B (Royal Horticultural Society, 2007). Tift 8 behaves as a perennial in USDA hardiness zones 8–10 but can be grown as a vigorous annual in more northern zones.

Tift 8 is morphologically similar to Tift 17, but it was significantly taller than Tift 17 in three of four tests at Tifton and in one test at Griffin, GA. Differences in plant height between Tift 8 and Tift 17 were not significant in one of four tests at Tifton and in two tests at Blairsville (Table 1). Differences between the two cultivars in plant-canopy diameter (Table 2) and base diameter (Table 3) were not significant in five of six tests and four tests, respectively. Differences in leaf width between Tift 8 and Tift 17 were significant (but small) in two of four tests (Table 4). No significant differences between the two cultivars were measured for leaf length (Table 5). Culm-leaf angle was significantly smaller for Tift 8 compared with that of Tift 17 (Table 6). Tift 8 had significantly more leaves per culm than Tift 17 (Table 6). On 21 Dec. 2009, inflorescences were exerted (due to unusually late freezing temperatures) on Tift 8 but not on Tift 17 (completely vegetative) in three different tests in the field (Table 6). Tift 17 produced significantly more culms per plant than Tift 8 only at the mountain location in Blairsville (Table 7). No pollen or seed has been observed on plants flowering in the greenhouse during late December and January. Tift 8 did not reach anthesis at any of the locations where it was tested, except in 2009, when there was a late frost at Tifton, GA. Tift 8 had significantly better color than Tift 17 in three of six tests (Table 8). Tift 8 is significantly more resistant to *Helminthosporium* leaf spot than Princess (Table 9).

Tift 8 is a perennial at Tifton, GA (USDA zone 8a). It survived  $-7^{\circ}\text{C}$  for 1 night and 13 nights below  $0^{\circ}\text{C}$  in the field during the 2008–2009 winter at Tifton, and 45 d below  $0^{\circ}\text{C}$  and a low temperature of  $-10^{\circ}\text{C}$  during the 2008–2009 winter at Griffin. It has never survived the winter in the mountains at Blairsville (lows of  $-13^{\circ}\text{C}$  in 2006–2007 and of  $-15^{\circ}\text{C}$  in 2007–2008). Because of its vigor, Tift 8 can effectively be used as an annual where it will not overwinter. Tift 8 is a semidwarf ornamental grass that is intermediate in size and texture to Princess and ‘Prince’ (Hanna and Ruter, 2005) and similar to Tift 17 (Hanna et al., 2010) in morphological characteristics.

In summary, Tift 8 is similar to Tift 17 in canopy diameter, plant-base diameter, leaf length and width, total number of culms per plant, and disease resistance. Tift 8 is taller than Tift 17, has a smaller culm-leaf angle at the collar, produces more leaves per culm, and generates exerted inflorescences at a day length of approximately 10.5 h or less. Tift 8 tends to have somewhat better color than Tift 17 and is more disease resistant than Princess. Tift 8 makes available for homeowners and landscapers a robust, hardy, and disease-resistant ornamental perennial *Pennisetum* that does not produce seed or pollen.

**Table 4. Leaf width of individual plants of two ornamental *Pennisetum* planted at three locations for 2 yr in Georgia.<sup>†</sup>**

Entry	Tifton <sup>‡</sup>			
	Test 1	Test 2	Blairsville <sup>§</sup>	Griffin <sup>¶</sup>
	2006	2007	2006	2006
	cm			
Tift 8	29	30	27	38
Tift 17	33	30	30	33
LSD (0.05)	4	NS*	NS	5
Days of growth	158	151	138	165

<sup>†</sup>Leaf width was measured in center of the latest fully extended leaf.

<sup>‡</sup>Tifton: test 1 planted 11 May 2006; measurements taken 20 Sept. 2006. Test 2 planted 19 April 2007; measurements taken 17 Sept. 2007.

<sup>§</sup>Blairsville: planted 2 June 2006; measurements taken 18 Oct. 2006.

<sup>¶</sup>Griffin: planted 6 May 2006; measurements taken 18 Oct. 2006.

\*NS, not significant.

**Table 5. Leaf length on individual plants of two ornamental *Pennisetum* planted at three location for 2 yr in Georgia.<sup>†</sup>**

Entry	Tifton <sup>‡</sup>			
	Test 1	Test 2	Blairsville <sup>§</sup>	Griffin <sup>¶</sup>
	2006	2007	2006	2006
	cm			
Tift 8	63	56	84	78
Tift 17	68	61	83	70
LSD (0.05)	NS*	5	NS	NS
Days of growth	158	151	138	165

<sup>†</sup>Leaf length was measured from the leaf collar to the leaf tip of the latest fully extended leaf.

<sup>‡</sup>Tifton: test 1 planted 11 May 2006; measurements taken 20 Sept. 2006. Test 2 planted 19 Apr. 2007; measurements taken 17 Sept. 2007.

<sup>§</sup>Blairsville: planted 2 June 2006; measurements taken 18 Oct. 2006.

<sup>¶</sup>Griffin: planted 6 May 2006; measurements taken 18 Oct. 2006.

\*NS, not significant.

**Table 6. Leaf angle, leaf number, and heading characteristics of individual plants of two ornamental *Pennisetum* planted at Tifton, Georgia.**

Entry	Culm leaf angle <sup>‡</sup>	No. leaves per culm <sup>§</sup>	Inflorescence exertion <sup>†</sup>		
			Test 1	Test 2	Nursery
			2006	2009	2009
	1–9 <sup>¶</sup>				
Tift 8	19.0	11.3	4.3	2.6	3.9 ± 0.3
Tift 17	27.0	9.6	1.0	1.0	1.0 ± 0.0 <sup>#</sup>
LSD (0.05)	4.5	1.3	0.2	0.5	

<sup>†</sup>Percentage of culms with fully exerted inflorescences.

<sup>‡</sup>Angle between adaxial leaf surface and culm at the leaf collar measured on last fully extended leaf on 10 Oct. 2008. Test planted 12 May 2008.

<sup>§</sup>Number of fully extended leaves on 10 Oct. 2008. Test planted on 12 May 2008.

<sup>¶</sup>1 = completely vegetative; 2 = 1–20%; 3 = 21–30%; 4 = 31–40%; 5 = 41–50%; 6 = 51–60%; 7 = 61–70%; 8 = 71–80%; 9 = > 80%. Test 1 planted 11 May 2006, test 2 planted 7 May 2009, nursery planted 9 May 2009. All ratings made on 21 Dec. 2009. Test 1 survived the 2006–2007, 2007–2008, and 2008–2009 winters at Tifton, GA.

<sup>#</sup>Standard error of 12 consecutive plants within a single replication field increase nursery for each cultivar.

**Table 7. Total number of culms on individual plants of two ornamental *Pennisetum* planted at three locations for 2 yr in Georgia.**

Entry	Tifton <sup>‡</sup>				
	Test 1		Test 2	Blairsville <sup>§</sup>	Griffin <sup>¶</sup>
	2006	2007	2007	2006	2006
Tift 8	38	58	25	47	43
Tift 17	52	61	27	65	38
LSD (0.05)	NS <sup>¶</sup>	NS	NS	16	NS
Days of growth	158	188	151	138	165

<sup>‡</sup>Tifton: 2006 test 1 planted 11 May 2006; measurements taken 20 Sept. 2006 and 17 Sept. 2007 (2006 test 1 survived the 2006–2007 winter in the field). Test 2 planted 19 Apr. 2007; measurements taken 17 Sept. 2007.

<sup>§</sup>Blairsville: planted 2 June 2006; measurements taken 18 Oct. 2006.

<sup>¶</sup>Griffin: planted 6 May 2006; measurements taken 18 Oct. 2006.

<sup>¶</sup>NS, not significant.

**Table 8. Color ratings on individual plants of two ornamental *Pennisetum* planted at three locations for 3 yr in Georgia.**

Entry	Tifton <sup>‡</sup>					
	Test 1		Test 2	Blairsville <sup>§</sup>		Griffin <sup>¶</sup>
	2006	2009	2007	2007	2009	2006
	1–9 <sup>¶</sup>					
Tift 8	8.3	8.6	7.1	7.5	8.3	9.0
Tift 17	7.8	7.6	7.0	7.0	7.3	8.0
LSD (0.05)	NS*	0.6	NS	NS	0.7	0.5
Days of growth	158	181	151	123	163	141

<sup>‡</sup>Tifton: test 1 planted 11 May 2006; ratings taken 20 Sept. 2006 and 6 Oct. 2009. Test 2 planted 19 Apr. 2007; measurements taken 17 Sept. 2007. Color in test 2 was rated on young propagules in the greenhouse on 28 Jan. 2007 before the plants were transplanted to the field.

<sup>§</sup>Blairsville: planted 27 May 2007 and 28 Apr. 2009; measurements taken 27 Sept. 2007 and 8 Oct. 2009, respectively.

<sup>¶</sup>Griffin: planted 14 May 2009; measurements taken 2 Oct. 2009.

<sup>¶</sup>1 = green; 9 = dark purple/red.

\*NS, not significant.

**Table 9. Ratings for *Helminthosporium* leaf spot on two ornamental *Pennisetum* planted at three locations for 2 yr in Georgia.**

Entry	Tifton <sup>‡</sup>	Blairsville <sup>§</sup>		Griffin <sup>¶</sup>
	2008	2006	2007	2006
		1–5 <sup>¶</sup>		
Tift 8	1.0	1.0	1.0	1.0
Tift 17	1.0	1.0	1.0	1.0
Princess	5.8	3.5	3.5	3.3
LSD (0.05)	0.2	0.6	0.5	1.0
Days of growth	153	138	123	165

<sup>‡</sup>Tifton: test planted 12 May 2008 and rated 10 Oct. 2008.

<sup>§</sup>Blairsville: planted 2 June 2006 and 27 May 2007; rated 18 Oct. 2006 and 27 Sept. 2007, respectively.

<sup>¶</sup>Griffin: planted 6 May 2006 and rated 18 Oct. 2006.

<sup>¶</sup>Disease ratings: 1 = no disease; 2 = 1–20%; 3 = 20–40%; 4 = 41–60%; 5 = >60% leaves infected. Symptoms occur in the field during late August and September.

## Availability

A plant patent has been applied for on behalf of the University of Georgia. Contact the corresponding author for more information. Tift 8 has been registered with the National Plant Germplasm System but is available only through the University of Georgia. Field-planting of breeders' material for Tift 8 is maintained at the University of Georgia, Tifton Campus. As a protected cultivar, Tift 8 can only be produced by nurseries licensed by the Georgia Research Foundation.

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