

# ‘Tift 17’ and ‘Tift 23’ Hybrid Ornamental *Pennisetums*

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‘Tift 17’ and ‘Tift 23’ are ornamental *Pennisetum* hybrids. Both cultivars were released by the University of Georgia College of Agricultural and Environmental Sciences. ‘Tift 17’ is a trispecific cross among *P. purpureum*, *P. squamulatum*, and *P. glaucum*. ‘Tift 23’ is an interspecific hybrid between *P. glaucum* and *P. purpureum*. Both cultivars are pollen- and seed-sterile. A few inflorescences are produced on plants during December and January in the greenhouse when day lengths become less than 11 h, but no pollen is dehiscenced from shriveled anthers and no seed has been observed on inflorescences. They have been evaluated for their ornamental value in 2006 and 2007 in replicated trials representing three Georgia locations or climates: Tifton (Coastal Plain), Griffin (Piedmont), and Blairsville (Mountain). Tests at Tifton, Griffin, and Blairsville had six, four, and three single plant replications, respectively, and included a number of other experimental genotypes. Trials were arranged as randomized complete blocks. Data were taken in September or October of each year to capture the characteristics of mature plants. These vegetatively propagated cultivars are perennials in USDA hardiness zones 8 to 10. They can be grown as vigorous annuals in more northern zones. These plants flower under short days (less than 11 h); therefore, these cultivars will not produce seed heads where winter temperatures reach freezing (0 °C) or below.

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## Origin

The grass breeding program at Tifton, GA, has a history of producing pollen- and seed-sterile interspecific turf hybrids that have been widely used in home lawns, in landscapes, on athletic fields, and on golf courses around the world. In 2003, we initiated a research program to develop ornamental grasses using some of the genetic stocks and wild species in our germplasm collection. The *Pennisetum* genus is known for its broad genetic diversity and drought tolerance. Our research is focused on developing hybrids that combine the desirable characteristics from different species.

In 2003, red tetraploid ( $2n = 4x = 28$ ) pearl millet (*Pennisetum glaucum*) was crossed with an interspecific *Pennisetum* hybrid [*P. purpureum* ‘Merkeron’ ( $2n = 4x = 28$ ) napiergrass × (*P. squamulatum*,  $2n = 8x = 56$ )]. One vigorous plant selected in 2004 from this cross was used to pollinate ‘Princess’ napiergrass (*P. purpureum* ‘Princess’ ( $2n = 4x = 28$ )) (Hanna and Ruter, 2005). ‘Tift 17’ was selected in 2005 from the latter cross as shown in Figure 1.

In 2003, we crossed red napiergrass (*Pennisetum purpureum*,  $2n = 4x = 28$ ) × red tetraploid ( $2n = 4x = 28$ ) pearl millet (*Pennisetum glaucum*). ‘Tift 23’ was selected in 2004 from this cross as shown in Figure 2.

## Description and Performance

‘Tift 17’ is a perennial at Tifton, GA (USDA zone 8a). It survived  $-7$  °C for one night and 13 nights below 0 °C in the field during the 2008–2009 winter at Tifton and 45 d below 0 °C and a low temperature of  $-10$  °C during the 2008–2009 winter at Griffin. It has never survived the winter temperatures (lows of  $-13$  and  $-5$  °C in 2006–2007 and 2007–2008, respectively) in the mountains at Blairsville. ‘Tift 17’ is pollen- and seed-sterile and does not produce seed heads at Tifton, GA, in the field. All data in the tables are from plants established as single-stem

propagules in mid-May and rated in September to October, except 2007 Test 1 data are from plants that overwintered at Tifton from the 2006 planting. Because of its vigor, ‘Tift 17’ can effectively be used as an annual where it will not overwinter. ‘Tift 17’ is a semidwarf ornamental grass that is intermediate in size and texture to ‘Princess’ and ‘Prince’ (Hanna and Ruter, 2005).



Fig. 1. First-year plants (126 d after planting) of ‘Tift 17’ ornamental *Pennisetum* growing in an increase nursery.



Fig. 2. First-year plants (126 d after planting) of ‘Tift 23’ ornamental *Pennisetum* growing in an increase nursery.

Table 1. Plant heights of four ornamental *Pennisetum* grasses planted at three locations for 2 years in Georgia.

| Entry            | Plant ht (cm) <sup>z</sup>          |                                     |                                     |                              |                              |  |
|------------------|-------------------------------------|-------------------------------------|-------------------------------------|------------------------------|------------------------------|--|
|                  | Tifton <sup>y</sup>                 |                                     |                                     | Blairsville <sup>x</sup>     |                              | Griffin <sup>w</sup><br>2006<br>(165 d) <sup>v</sup> |
|                  | 2006 (158 d) <sup>v</sup><br>Test 1 | 2007 (188 d) <sup>v</sup><br>Test 1 | 2007 (151 d) <sup>v</sup><br>Test 2 | 2006<br>(138 d) <sup>v</sup> | 2007<br>(123 d) <sup>v</sup> |  |
| Prince           | 148                                 | 180                                 | 136                                 | 155                          | 175                          | 161  |
| Princess         | 108                                 | 98                                  | 65                                  | 71                           | 100                          | 85   |
| Tift 17          | 115                                 | 126                                 | 99                                  | 72                           | 140                          | 117  |
| Tift 23          | 73                                  | u                                   | 57                                  | 53                           | u                            | 72   |
| LSD <sup>d</sup> | 19                                  | 18                                  | 4                                   | 31                           | 41                           | 19   |

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

<sup>y</sup>Tifton Test 1 planted 11 May 2006 and 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>x</sup>Blairsville planted 2 June 2006 and 27 May 2007 and measurements taken 18 Oct. 2006 and 27 Sept. 2007, respectively.

<sup>w</sup>Griffin planted 6 May 2006 and measurements taken 18 Oct. 2006.

<sup>v</sup>Growth days of plants included in ratings.

<sup>u</sup>‘Tift 23’ did not survive the 2006–2007 winter in Test 1 at Tifton. It was not planted at Blairsville in 2007.

<sup>d</sup>Least significant difference at the  $P \leq 0.05$  level.

Table 2. Canopy diameter of individual plant (spaced on 2-m centers) of four ornamental *Pennisetum* grasses planted at three locations for 2 years in Georgia.

| Entry            | Plant canopy diam (cm) <sup>z</sup> |                                     |                                     |                              |                              |  |
|------------------|-------------------------------------|-------------------------------------|-------------------------------------|------------------------------|------------------------------|--|
|                  | Tifton <sup>y</sup>                 |                                     |                                     | Blairsville <sup>x</sup>     |                              | Griffin <sup>w</sup><br>2006<br>(165 d) <sup>v</sup> |
|                  | 2006 (158 d) <sup>v</sup><br>Test 1 | 2007 (188 d) <sup>v</sup><br>Test 1 | 2007 (151 d) <sup>v</sup><br>Test 2 | 2006<br>(138 d) <sup>v</sup> | 2007<br>(123 d) <sup>v</sup> |  |
| Prince           | 159                                 | 193                                 | 148                                 | 200                          | 210                          | 189  |
| Princess         | 109                                 | 116                                 | 81                                  | 105                          | 128                          | 118  |
| Tift 17          | 143                                 | 160                                 | 133                                 | 141                          | 135                          | 154  |
| Tift 23          | 107                                 | u                                   | 99                                  | 110                          | u                            | 120  |
| LSD <sup>d</sup> | 17                                  | 23                                  | 4                                   | 24                           | 40                           | 18   |

<sup>z</sup>Plant canopy is the average diameter of the widest and narrowest diameters of a single plant canopy.

<sup>y</sup>Tifton Test 1 planted 11 May 2006 and 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>x</sup>Blairsville planted 2 June 2006 and 27 May 2007 and measurements taken 18 Oct. 2006 and 27 Sept. 2007, respectively.

<sup>w</sup>Griffin planted 6 May 2006 and measurements taken 18 Oct. 2006.

<sup>v</sup>Growth days of plants included in ratings.

<sup>u</sup>‘Tift 23’ did not survive the 2006–2007 winter in Test 1 at Tifton. It was not planted at Blairsville in 2007.

<sup>d</sup>Least significant difference at the  $P \leq 0.05$  level.

Table 3. Base diameter at ground level of individual plants (plants spaced on 2-m centers) of four ornamental *Pennisetum* grasses planted at three locations for 2 years in Georgia.

| Entry            | Base diam (cm) <sup>z</sup>         |                                     |                                     |   |  |
|------------------|-------------------------------------|-------------------------------------|-------------------------------------|---|--|
|                  | Tifton <sup>y</sup>                 |                                     |                                     | Blairsville <sup>x</sup><br>2007 (123 d) <sup>v</sup> |  |
|                  | 2006 (158 d) <sup>w</sup><br>Test 1 | 2007 (188 d) <sup>w</sup><br>Test 1 | 2007 (151 d) <sup>w</sup><br>Test 2 |   |  |
| Prince           | 59                                  | 50                                  | 25                                  | 34  |  |
| Princess         | 48                                  | 47                                  | 22                                  | 31  |  |
| Tift 17          | 48                                  | 44                                  | 22                                  | 37  |  |
| Tift 23          | 55                                  | v                                   | 21                                  | v   |  |
| LSD <sup>d</sup> | 3                                   | 10                                  | 3                                   | 9   |  |

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

<sup>y</sup>Tifton Test 1 planted 11 May 2006 and 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>x</sup>Blairsville planted 27 May 2007 and measurements taken 27 Sept. 2007.

<sup>w</sup>Growth days of plants included in ratings.

<sup>v</sup>‘Tift 23’ did not survive the 2006–2007 winter in Test 1 at Tifton. It was not planted at Blairsville in 2007.

<sup>d</sup>Least significant difference at the  $P \leq 0.05$  level.

‘Tift 17’ is similar in height to ‘Princess’ but significantly shorter than ‘Prince’ (Table 1). It produced a significantly wider plant canopy than ‘Princess’ in all tests but produced a significantly narrower canopy than ‘Prince’ in five of six tests (Table 2). Di-

ameter of the plant base is similar to that of ‘Princess’ (Table 3). Leaf width is similar to ‘Princess’ but leaf length of ‘Tift 17’ is significantly longer than that of ‘Princess’ and significantly shorter than that of ‘Prince’ (Tables 4 and 5). Tiller numbers tend to be

similar for ‘Princess’ and ‘Tift 17’, except for plants growing during the drought summer of 2007 (Test 2 at Tifton) when ‘Tift 17’ produced a fuller plant with more tillers and a much more desirable plant type (Table 6). Mature leaves best fit the grayed purple group 187D (Royal Horticultural Society, 2001). ‘Tift 17’ rated a significantly higher ornamental value than ‘Prince’ and ‘Princess’ in all tests and had a darker purple color in two of three trials (Table 7). Field trials indicate ‘Tift 17’ has improved resistance to *Helminthosporium* leaf spot as compared with ‘Prince’ and ‘Princess’ (Table 8).

‘Tift 23’ is a weak perennial at Tifton, GA (USDA zone 8a). It did not survive a single night at  $-3$  °C during the 2006–2007 winter nor  $-12$  °C in the field in the 2007–2008 winter (Tifton, Test 2). ‘Tift 23’ also did not survive the winters at Blairsville (2006–2007 and 2007–2008) or Griffin (2006–2007). ‘Tift 23’ is pollen- and seed-sterile and does not produce seed heads in the field at Tifton, GA.

All data for ‘Tift 23’ in the tables are from plants established as single-stem propagules in mid-May and rated in September to October, except the 2007 Test 1 data are from plants that overwintered at Tifton from the 2006 planting (Test 1). Because of its vigor, ‘Tift 23’ can effectively be used as an annual where it will not overwinter. ‘Tift 23’ is more dwarf than ‘Princess’, ‘Prince’, and ‘Tift 17’.

‘Tift 23’ was significantly shorter than ‘Princess’ in four trials (Table 1). Canopy and plant base diameter of ‘Tift 23’ tended to be similar to that of ‘Princess’ (Tables 2 and 3). Leaves of ‘Tift 23’ were narrower in three of four tests (Table 4) and similar in length to ‘Princess’ (Table 5). The number of tillers were similar for ‘Princess’ and ‘Tift 23’ except under drought stress condition at Tifton in 2007 and Blairsville in 2006 when ‘Tift 23’ produced significantly more tillers (Table 6). ‘Tift 23’ rated significantly better than ‘Princess’ for ornamental value at two of three locations and in 1 of 2 years for color at Tifton (Table 7). Mature leaves are a mottled grayed purple/green (187D/137B) according to the Royal Horticultural Society (2001) color index. ‘Tift 23’ showed better resistance to *Helminthosporium* leaf spot than ‘Princess’ in two of three tests (Table 8).

In summary, ‘Tift 17’ has the advantage over ‘Princess’ in that it has longer and more colorful leaves and tends to maintain its ornamental value and color better than ‘Prince’ and ‘Princess’ under drought stress and favorable disease conditions.

‘Tift 23’ is shorter and has narrower leaves than ‘Princess’, giving it a fine-textured appearance. It tends to maintain its ornamental value and color better than ‘Princess’ under drought stress and favorable disease conditions.

## Availability

Plant patents have been applied for on behalf of the University of Georgia. Contact the corresponding author for more information. Field planting of breeders’ material for

Table 4. Leaf width of individual plants (spaced on 2-m centers) of four ornamental *Pennisetum* grasses planted at three locations for 2 years in Georgia.

| Entry            | Leaf width (mm) <sup>z</sup>        |                                     |   |   |
|------------------|-------------------------------------|-------------------------------------|---|---|
|                  | Tifton <sup>y</sup>                 |                                     | Blairsville <sup>x</sup><br>2006 (138 d) <sup>y</sup> | Griffin <sup>w</sup><br>2006 (165 d) <sup>y</sup> |
|                  | 2006 (158 d) <sup>y</sup><br>Test 1 | 2007 (151 d) <sup>y</sup><br>Test 2 |   |   |
| Prince           | 29                                  | 27                                  | 30  | 31  |
| Princess         | 34                                  | 27                                  | 25  | 30  |
| Tift 17          | 33                                  | 30                                  | 30  | 33  |
| Tift 23          | 19                                  | 18                                  | 19  | 22  |
| LSD <sup>u</sup> | 4                                   | 2                                   | 11  | 5   |

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

<sup>y</sup>Tifton Test 1 planted 11 May 2006 and measurements taken 20 Sept. 2006. Test 2 planted 19 Apr. 2007 and measurements taken 17 Sept. 2007.

<sup>x</sup>Blairsville planted 2 June 2006 and measurements taken 18 Oct. 2006.

<sup>w</sup>Griffin planted 6 May 2006 and measurements taken 18 Oct. 2006.

<sup>v</sup>Growth days of plants included in ratings.

<sup>u</sup>Least significant difference at the  $P \leq 0.05$  level.

‘Tift 17’ and ‘Tift 23’ are maintained at Tifton, GA. As protected cultivars, ‘Tift 17’ and ‘Tift 23’ can only be produced by nurseries licensed by the Georgia Research Foundation. Significant number of plants of these cultivars should be available in 2010.

#### Literature Cited

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Royal Horticultural Society. 2001. RHS colour chart. Royal Hort. Soc., London, UK.

Table 5. Leaf length on individual plants (spaced on 2-m centers) of four ornamental *Pennisetum* grasses planted at three location for 2 years in Georgia.

| Entry            | Leaf length (cm) <sup>z</sup>       |                                     |   |   |
|------------------|-------------------------------------|-------------------------------------|---|---|
|                  | Tifton <sup>y</sup>                 |                                     | Blairsville <sup>x</sup><br>2006 (138 d) <sup>y</sup> | Griffin <sup>w</sup><br>2006 (165 d) <sup>y</sup> |
|                  | 2006 (158 d) <sup>y</sup><br>Test 1 | 2007 (151 d) <sup>y</sup><br>Test 2 |   |   |
| Prince           | 84                                  | 95                                  | 116   | 97  |
| Princess         | 52                                  | 44                                  | 66  | 51  |
| Tift 17          | 68                                  | 61                                  | 83  | 70  |
| Tift 23          | 54                                  | 46                                  | 67  | 63  |
| LSD <sup>u</sup> | 11                                  | 5                                   | 12  | 11  |

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

<sup>y</sup>Tifton Test 1 planted 11 May 2006 and measurements taken 20 Sept. 2006. Test 2 planted 19 Apr. 2007 and measurements taken 17 Sept. 2007.

<sup>x</sup>Blairsville planted 2 June 2006 and measurements taken 18 Oct. 2006.

<sup>w</sup>Griffin planted 6 May 2006 and measurements taken 18 Oct. 2006.

<sup>v</sup>Growth days of plants included in ratings.

<sup>u</sup>Least significant difference at the  $P \leq 0.05$  level.

Table 6. Total number of culms on individual plants (spaced on 2-m centers) of four ornamental *Pennisetum* grasses planted at three locations for 2 years in Georgia.

| Entry            | Number of culms <sup>z</sup>        |                                     |                                     |   |   |
|------------------|-------------------------------------|-------------------------------------|-------------------------------------|---|---|
|                  | Tifton <sup>y</sup>                 |                                     |                                     | Blairsville <sup>x</sup><br>2006 (138 d) <sup>y</sup> | Griffin <sup>w</sup><br>2006 (165 d) <sup>y</sup> |
|                  | 2006 (158 d) <sup>y</sup><br>Test 1 | 2007 (188 d) <sup>y</sup><br>Test 1 | 2007 (151 d) <sup>y</sup><br>Test 2 |   |   |
| Prince           | 50                                  | 90                                  | 39                                  | 33  | 45  |
| Princess         | 41                                  | 50                                  | 8                                   | 28  | 35  |
| Tift 17          | 52                                  | 61                                  | 27                                  | 65  | 38  |
| Tift 23          | 38                                  | <sup>u</sup>                        | 35                                  | 119   | 39  |
| LSD <sup>l</sup> | 21                                  | 28                                  | 3                                   | 16  | 15  |

<sup>z</sup>Total number of culms per plant.

<sup>y</sup>Tifton Test 1 planted 11 May 2006 and 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>x</sup>Blairsville planted 2 June 2006 and measurements taken 18 Oct. 2006.

<sup>w</sup>Griffin planted 6 May 2006 and measurements taken 18 Oct. 2006.

<sup>v</sup>Growth days of plants included in ratings.

<sup>u</sup>‘Tift 23’ did not survive the 2006–2007 winter in Test 1 at Tifton.

<sup>l</sup>Least significant difference at the  $P \leq 0.05$  level.

Table 7. Ornamental value and color ratings on individual plants (spaced on 2-m centers) of four ornamental *Pennisetum* grasses planted at three location for 2 years in Georgia.

| Entry            | Ornamental value <sup>z</sup> |                           |                           | Color <sup>y</sup>        |                           |                           |
|------------------|-------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
|                  | Tifton <sup>x</sup>           | Griffin <sup>w</sup>      | Blairsville <sup>v</sup>  | Tifton <sup>x</sup>       |                           | Blairsville <sup>v</sup>  |
|                  | 2006 (158 d) <sup>u</sup>     | 2006 (165 d) <sup>u</sup> | 2006 (138 d) <sup>u</sup> | 2006 (158 d) <sup>u</sup> | 2007 (151 d) <sup>u</sup> | 2007 (123 d) <sup>u</sup> |
|                  | Test 1                        |                           |                           | Test 1                    | Test 2                    |                           |
| Prince           | 6.6                           | 6.3                       | 6.5                       | 8.0                       | 3.3                       | 7.0                       |
| Princess         | 6.1                           | 6.7                       | 6.0                       | 7.3                       | 2.3                       | 6.0                       |
| Tift 17          | 8.6                           | 9.0                       | 9.0                       | 7.8                       | 7.0                       | 7.0                       |
| Tift 23          | 6.1                           | 7.8                       | 8.5                       | 8.0                       | 3.3                       | <sup>t</sup>              |
| LSD <sup>s</sup> | 0.6                           | 0.7                       | 1.1                       | 0.7                       | 0.5                       | 0.8                       |

<sup>z</sup>Ornamental value rating includes color, density, height, and texture, which contribute to overall appearance and appeal: 1 = poor, 9 = excellent.

<sup>y</sup>Color ratings are: 1 = green, 9 = dark purple/red.

<sup>x</sup>Tifton Test 1 planted 11 May 2006 and ratings taken 20 Sept. 2006. Test 2 planted 19 Apr. 2007 and 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>w</sup>Griffin planted 6 May 2006 and measurements taken 18 Oct. 2006.

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

<sup>u</sup>Growth days of plants included in ratings.

<sup>t</sup>'Tift 23' was not planted at Blairsville in 2007.

<sup>s</sup>Least significant difference at the  $P \leq 0.05$  level.

Table 8. *Helminthosporium* leaf spot ratings on four ornamental *Pennisetum* grasses planted at three locations for 2 years.

| Entry            | <i>Helminthosporium</i> leaf spot <sup>z</sup> |                           |                           |                           |
|------------------|--|---------------------------|---------------------------|---------------------------|
|                  | Tifton <sup>y</sup>                            | Griffin <sup>x</sup>      | Blairsville <sup>w</sup>  |                           |
|                  | 2007 (186 d) <sup>v</sup>                      | 2006 (165 d) <sup>v</sup> | 2006 (138 d) <sup>v</sup> | 2007 (123 d) <sup>v</sup> |
|                  | 27 Oct   | 18 Oct                    | 18 Oct                    | 27 Sept                   |
| Princess         | 4.5  | 3.3                       | 3.5                       | 3.5                       |
| Prince           | 3.0  | 2.5                       | 3.5                       | 2.0                       |
| Tift 17          | 1.0  | 1.0                       | 1.0                       | 1.0                       |
| Tift 23          | 2.0  | 2.0                       | 3.0                       | <sup>u</sup>              |
| LSD <sup>t</sup> | 0.3  | 1.0                       | 0.6                       | 0.5                       |

<sup>z</sup>Disease ratings: 1 = no disease, 2 = 1% to 20%, 3 = 20% to 40%, 4 = 41% to 60%, 5 = greater than 60% leaves infected. Symptoms occur in the field during late Aug. and Sept.

<sup>y</sup>Tifton test planted 19 Apr. 2007 and rated 27 Oct. 2007.

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

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

<sup>v</sup>Growth days of plants included in ratings.

<sup>u</sup>'Tift 23' was not planted at Blairsville in 2007.

<sup>t</sup>Least significant difference at the  $P \leq 0.05$  level.