‘PP-1’ Ornamental Perennial Arachis

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Additional index words. glabrata, ornamental peanut, plant breeding

‘PP-1’ (PP27536) ornamental perennial Arachis was approved for release by the University of Georgia College of Agricultural and Environmental Sciences in 2012. We established ‘PP-1’ in a test at Tifton, GA, with five perennial peanut cultivars, Ecoturf and Arblick, Florigraze, and Arbrook from the University of Florida. Genotypes were evaluated for flower number, plant color, plant height, turf quality, percent ground-cover, canopy density, pepper spot and leaf scorch [both caused by Leptosphaeria crassiasca (Sechet) C.R. Jackson and D.K. Bell], leaf length, leaf width, leaf area, spring green-up, freeze damage, and Peanut stunt virus. ‘PP-1’ reaches a height of about 20 cm; produces dense, dark-green leaves; and produces an abundance of flowers. Wing petals are Yellow-Orange Group 14D, and standard petals transition from Orange Group 24C in the center to Yellow-Orange Group 14 toward the margins. Data for each variable were analyzed statistically by analyses of variance. Least significance differences at P ≤ 0.05 were used for mean separation.

Origin

‘PP-1’ is a vigorous Arachis glabrata Benth. clone (Supplemental Fig. 1) volunteering for more than 50 years on the University of Georgia, Tifton Campus, Tifton, GA, next to a field used during the 1940s to test perennial peanut introductions. It has developed (under no cultivation) a natural uniform stand 7 m wide between U.S. Route 41 (limited on the west side by Department of Transportation herbicides) and a University of Georgia field (limited on the east side by herbicides and cultivation) that is 123 m long. Pictures of ‘PP-1’ were sent to Dr. Charles Simpson (an expert on Arachis germplasm) at Texas A&M University to help with identification. He indicated that he received an introduction (labeled A42) from Dr. Ray Hammons in 1969 that appeared to have narrow leaves similar to ‘PP-1’. Dr. Simpson sent a sample of A42, which we included in a comparison test with ‘PP-1’. A42 has wider leaves (Table 1) and more leaf area per leaf (Table 2) than ‘PP-1’. Leaf lengths were similar for the two genotypes (Table 3).

An amplified fragment length polymorphism study titled “Genetic Variability of Cultivated Rhizome Peanut” (Maas et al., 2010) showed ‘PP-1’ most related to ‘Florigraze’ (Prine et al., 1986), a broadleaf type. Morphologically, ‘PP-1’ is most similar to Natural Resources Conservation Service ‘Brooksville 68’ (Anonymous, 2006), commonly referred to as ‘Pointed Leaf’, for which planting stock was not available when we established the 2006 test at Tifton.

‘PP-1’ produces infrequent viable seed. Forty plants produced from seed of ‘PP-1’ showed a wide range of morphologic types, none with the vigor and persistence of ‘PP-1’ (data not reported). Therefore, vegetative propagation is the means for establishing this cultivar to maintain its purity. ‘PP-1’ probably arose from either an outcross or a superior genetic recombination from an Arachis glabrata Benth. introduction.

Table 1. Leaf width on individual leaves of seven Arachis glabrata perennial peanut genotypes planted at Tifton, GA, and Quincy, FL.

| Leaf width (mm) | Tifton, GA | Quincy, FL |
|----------------|-----------|-----------|
|                | 2009 | 2011 | 2012 | 2010 |
| PP-1           | 4.0  | 6.9  | 7.5  | 6.0  | 6.7  | 7.8  | 8.5  |
| Pointed Leaf   | 10.0 |       |       | 11.0 |       |       |       |
| Ecoturf        | 10.0 |       |       | 11.0 |       |       |       |
| Arblick        | 8.0  |       |       | 8.0  |       |       |       |
| Florigraze     | 11.0 |       |       | 10.0 |       |       |       |
| Arbrook        | 8.8  |       |       |       |       |       |       |
| A42            | 8.8  | 1.0  | 0.5  | 1.2  | 1.0  | 0.9  | 0.6  |
| LSD = 0.05%    |       | 1.0  | 0.5  | 1.2  | 1.0  | 0.9  | 0.6  |

We express our appreciation to the University of Florida, Gainesville, for publication 6 Sept. 2018.

We express our thanks to Scott Tubbs and Nino Brown for editorial suggestions.

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Received for publication 19 July 2018. Accepted for publication 6 Sept. 2018.

References

Maas, D.O., Prine, R.G., and Harris, R.J. 2010. ‘PP-1’ is a perennial, vegetatively propagated dark-green narrow-leaf perennial peanut recommended for use as an ornamental in U.S. Department of Agriculture zones 8b and 9. In 2006, ‘PP-1’ was established in a test at Tifton, GA (3.7 × 3.7-m plots, four replications) with the released or soon-to-be released perennial peanut cultivars from University of Florida. Dr. Kevin Kenworthy provided us planting materials of ‘Ecoturf’, ‘Arblick’ (Prine et al., 2010), ‘Florigraze’, and ‘Arbrook’ (Prine et al., 1990). Tests (1.5 × 3.1-m plots) were established at Quincy, FL (five replications), and at Gainesville, FL (four replications), with the same cultivars plus ‘Pointed Leaf’ at Quincy, FL (10 Apr. 2009) and at Gainesville, FL (28 June 2010). Dr. Mimi Williams, breeder of ‘Pointed Leaf’, provided us planting material of this cultivar in 2010. Eight replications of ‘Pointed Leaf’ and ‘PP-1’ were established as single-plant propagules on 14 June 2011 at Tifton, GA. Each test was planted in a randomized complete block design. Plots at Tifton, GA, were established by planting 25 established plants on 0.61-m centers in the center of the plot. Plots at Quincy and Gainesville were established by planting eight established plants on 0.61-m centers within a 5.11-m² plot. Plots at Tifton received 560 kg·ha⁻¹ 5N·4.3P·12.4K preplant and 280 kg·ha⁻¹ 5N·4.3P·12.4K yearly in April after establishment. Plots in Florida did not receive any fertilizer. Soil types for Tifton, Quincy, and Gainesville were Tifton loamy sand, Norfolk loamy fine sand, and Chipley sand, respectively.

‘PP-1’ was the top statistical group for flower number on 12 of the 13 rating dates during 2008 to 2011 at Tifton (Table 4); in four of five rating dates at Quincy, FL, in 2010 and 2011 (Table 5); and in two of five rating dates at Gainesville, FL, in 2011 and 2012 (data not reported). ‘PP-1’ had a significantly darker green color than the other genotypes.

Description and Performance

‘PP-1’ is a perennial, vegetatively propagated dark-green narrow-leaf perennial peanut recommended for use as an ornamental in U.S. Department of Agriculture zones 8b and 9. In 2006, ‘PP-1’ was established in a test at Tifton, GA (3.7 × 3.7-m plots, four replications) with the released or soon-to-be released perennial peanut cultivars from University of Florida. Dr. Kevin Kenworthy provided us planting materials of ‘Ecoturf’, ‘Arblick’ (Prine et al., 2010), ‘Florigraze’, and ‘Arbrook’ (Prine et al., 1990). Tests (1.5 × 3.1-m plots) were established at Quincy, FL (five replications), and at Gainesville, FL (four replications), with the same cultivars plus ‘Pointed Leaf’ at Quincy, FL (10 Apr. 2009) and at Gainesville, FL (28 June 2010). Dr. Mimi Williams, breeder of ‘Pointed Leaf’, provided us planting material of this cultivar in 2010. Eight replications of ‘Pointed Leaf’ and ‘PP-1’ were established as single-plant propagules on 14 June 2011 at Tifton, GA. Each test was planted in a randomized complete block design. Plots at Tifton, GA, were established by planting 25 established plants on 0.61-m centers in the center of the plot. Plots at Quincy and Gainesville were established by planting eight established plants on 0.61-m centers within a 5.11-m² plot. Plots at Tifton received 560 kg·ha⁻¹ 5N·4.3P·12.4K preplant and 280 kg·ha⁻¹ 5N·4.3P·12.4K yearly in April after establishment. Plots in Florida did not receive any fertilizer. Soil types for Tifton, Quincy, and Gainesville were Tifton loamy sand, Norfolk loamy fine sand, and Chipley sand, respectively.

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Table 2. Leaf area on individual leaves of seven Arachis glabrata genotypes planted at Tifton, GA, and Quincy, FL.

| Entry | Leaf area (cm²) | Tifton, GA | Quincy, FL |
|-------|----------------|-----------|-----------|
|       | 2009 | 2011 | 2012 | 2010 | 2009 | 2011 | 2012 | 2010 |
| PP-1 | 3.0  | 4.6  | 5.2  | 4.0  | 4.2  | 5.1  | 4.7  | 5.5  |
| Pointed Leaf | 6.5  | 5.3  | 5.5  | |
| Ecoturf | 7.0  | 6.4  | 6.1  | |
| Arblick | 6.0  | 4.7  | 6.7  | |
| Florigraze | 11.0 | 3.2  | 3.7  | |
| A42 | 2.0  | 1.5  | 1.0  | 0.7  | 0.8  |
| LSD-0.05% | 2.0  | 1.0  | 1.5  | 1.0  | 0.7  | 0.8  |

Table 3. Leaf length on individual leaves of seven Arachis glabrata genotypes planted on 18 May 2006 and 2010 at Tifton, GA, and Quincy, FL.

| Entry | Leaf length (mm) | Tifton, GA | Quincy, FL |
|-------|-----------------|-----------|-----------|
|       | 2009 | 2011 | 2012 | 2010 | 2009 | 2011 | 2012 | 2010 |
| PP-1 | 25.0 | 31.6 | 34.3 | 22.0 | 30.2 | 36.6 | 35.5 | |
| Pointed Leaf | 26.0 | 27.5 | 18.0 | 27.8 | |
| Ecoturf | 28.0 | 38.1 | 18.0 | |
| Arblick | 36.0 | | 21.0 | |
| Florigraze | 3.0  | 4.1  | 5.0  | 2.0  |
| A42 | 3.0  | 4.1  | 5.0  | 2.0  | 2.0  | 2.7  |
| LSD-0.05% | 3.0  | 4.1  | 5.0  | 2.0  | 2.0  | 2.7  |

Table 4. Flower number ratings on five Arachis glabrata perennial peanut genotypes planted at Tifton, GA, on 18 May 2006.

| Flower number | 2008 | 2009 | 2010 | 2011 |
|---------------|------|------|------|------|
| Entry | 1 May | 1 July | 2 Sept. | 11 May | 1 Aug. | 1 Nov. | 1 Jan. | 1 Apr. |
| PP-1 | 5.5  | 1.3  | 5.8  | 8.7  | 3.5  | 2.0  | 7.0  | 5.5  | |
| Ecoturf | 3.0  | 1.8  | 2.5  | 3.0  | 2.2  | 1.2  | 4.2  | 3.0  | 2.7  |
| Arblick | 2.0  | 2.0  | 2.0  | 2.0  | 2.0  | 1.2  | 4.0  | 4.0  | 2.5  |
| Florigraze | 2.3  | 2.0  | 2.0  | 2.5  | 2.0  | 1.7  | 3.2  | 3.7  | 2.0  |
| A42 | 1.5  | 2.0  | 1.3  | 2.7  | 1.5  | 1.0  | 2.0  | 1.7  | 1.0  |
| LSD-5% | 0.8  | 0.6  | 0.5  | 0.8  | 0.9  | 0.5  | 1.1  | 1.5  | 0.7  |

Table 5. Flower number ratings on six Arachis glabrata perennial peanut genotypes planted at Quincy, FL, on 10 Apr. 2009.

| Flowers number | 2010 | 2011 |
|---------------|------|------|
| Entry | 2 Feb. | 30 July | 1 June | 1 June |
| PP-1 | 4.8  | 4.2  | 3.8  | 3.0  |
| Pointed Leaf | 4.8  | 5.0  | 4.0  | 3.2  |
| Ecoturf | 2.0  | 2.4  | 2.6  | 4.0  |
| Arblick | 4.6  | 5.0  | 5.2  | 6.0  |
| Florigraze | 3.8  | 3.4  | 2.8  | 2.8  |
| Arbrook | 3.2  | 2.0  | 2.4  | 1.6  |
| LSD-5% | 0.7  | 0.9  | 1.5  | 1.4  |
Table 6. Plant color ratings on five *Arachis glabrata* perennial peanut genotypes planted at Tifton, GA, 18 May 2006.

| Entry   | 2 May | 7 Oct. | 11 Aug. | 30 Sept. | 16 Dec. | 20 Apr. | 3 Aug. | 1 Sept. | 29 Sept. | 19 Nov. | 19 Apr. | 20 June | 27 July |
|---------|-------|--------|---------|----------|---------|---------|--------|---------|----------|---------|---------|---------|---------|
| PP-1    | 7.0   | 8.0    | 8.0     | 9.0      | 9.0     | 9.0     | 9.0    | 9.0     | 9.0      | 8.0     | 8.0     | 9.0     | 9.0     |
| Ecoturf | 6.0   | 6.0    | 5.5     | 6.2      | 6.7     | 7.7     | 6.5    | 7.5     | 7.0      | 5.0     | 7.5     | 7.5     | 7.2     |
| Arblick | 7.0   | 7.0    | 6.0     | 7.2      | 8.0     | 7.7     | 7.7    | 8.0     | 9.0      | 6.5     | 8.0     | 7.7     | 8.0     |
| Florigraze | 4.0 | 4.0    | 4.2     | 4.7      | 4.5     | 6.2     | 4.0    | 6.2     | 5.5      | 3.5     | 6.2     | 6.5     | 6.0     |
| Arbrook | 8.0   | 7.0    | 4.2     | 5.7      | 5.5     | 8.0     | 6.2    | 7.7     | 7.2      | 5.2     | 7.5     | 7.2     | 7.0     |
| LSD-5%  | 1.0   | 1.0    | 0.7     | 0.5      | 1.0     | 0.5     | 0.5    | 0.7     | 0.8      | 0.7     | 0.5     | 0.8     | 0.7     |

*Color is rated on a scale of 1 to 9, where 1 is poor and 9 is excellent. LSD = least significant difference.*

Table 7. Height of five *Arachis glabrata* perennial peanut genotypes planted at Tifton, GA, on 18 May 2006.

| Entry   | 2008 | 2009 | 2011 |
|---------|------|------|------|
| PP-1    | 6.0  | 8.0  | 10.0 |
| Ecoturf | 6.0  | 8.0  | 11.0 |
| Arblick | 8.0  | 9.0  | 13.0 |
| Florigraze | 4.0 | 7.0  | 14.0 |
| Arbrook | 14.0 | 16.0 | 17.0 |
| LSD-5%  | 2.0  | 1.0  | 2.0  |

*Height measured from ground level to top of canopy. LSD = least significant difference.*

Table 8. Height of six *Arachis glabrata* perennial peanut genotypes planted at Gainesville, FL, on 28 June 2010.

| Entry   | 2010 | 2011 |
|---------|------|------|
| PP-1    | 6.2  | 6.2  |
| Pointed Leaf | 6.2 | 6.2  |
| Ecoturf | 17.2 | 12.7 |
| Arblick | 9.5  | 12.7 |
| Florigraze | 14.2 | 19.0 |
| Arbrook | 52.2 | 25.5 |
| LSD-5%  | 4.0  | 3.7  |

*Height measured from ground level to top of canopy. LSD = least significant difference.*

Table 9. Turf quality for 2008 of five *Arachis glabrata* perennial peanut genotypes planted at Tifton, GA, on 18 May 2006.

| Entry   | 2 June | 7 July | 1 Aug. | 2 Sept. |
|---------|--------|--------|--------|---------|
| PP-1    | 6.5    | 9.0    | 8.0    | 9.0     |
| Ecoturf | 6.0    | 7.0    | 7.8    | 7.3     |
| Arblick | 7.8    | 7.8    | 8.0    | 8.0     |
| Florigraze | 3.5 | 5.5    | 4.5    | 4.3     |
| Arbrook | 4.0    | 3.8    | 5.3    | 2.5     |
| LSD-5%  | 1.1    | 0.9    | 0.7    | 1.0     |

*Visual turf quality (based on color, density, and texture) rating on scale of 1 to 9, where 1 is poor and 9 is excellent. Rating of 6 is considered acceptable turf quality. LSD = least significant difference.*

Table 10. Percent groundcover of five *Arachis glabrata* perennial peanut genotypes planted at Tifton, GA, on 18 May 2006.

| Entry   | 2008   | 2009   | 2010   | 2011   |
|---------|--------|--------|--------|--------|
| PP-1    | 42.0   | 97.5   | 100.0  | 9.0    |
| Ecoturf | 57.0   | 70.0   | 95.0   | 5.2    |
| Arblick | 75.0   | 87.5   | 97.0   | 6.7    |
| Florigraze | 77.0 | 10.0   | 77.0   | 2.0    |
| Arbrook | 72.0   | 35.0   | 57.0   | 4.0    |
| LSD-5%  | 17.0   | 11.7   | 11.0   | 1.6    |

LSD = least significant difference.

except for ‘Pointed Leaf’ in October as a result of pepper spot disease [Leptosphaeria crassiasca (Schect) C.R. Jackson and D.K. Bell].

Spring green-up at Gainesville, FL, was similar for all cultivars except for ‘Florigraze’, which showed a slower green-up (Table 12). ‘PP-1’ showed better freeze tolerance than ‘Ecoturf’ and ‘Arblick’ at Gainesville, FL, and all of the cultivars tested at Quincy, FL (Table 12).

At Tifton, GA, ‘PP-1’ had low pepper spot ratings at the October and November rating dates (Table 13) regardless of the year. The disease rating was greater at a December date in 2009, but less than the disease on ‘Florigraze’ and ‘Arbrook’. Pepper spot ratings for ‘PP-1’ were low for ‘PP-1’ and similar to ‘Pointed Leaf’ at Quincy, FL (data not reported). Leaf scorch caused by the same organism as pepper spot was greater for ‘PP-1’ (and similar to ‘Pointed Leaf’) at Quincy, FL (data not reported), and at Gainesville, FL (Table 14), than for the other cultivars in the test. On 7 Oct. 2012, the ‘PP-1’ growing in the original collection area next to U.S. Route 41 showed high pepper spot infection whereas the adjacent, fertilized 14 June 2011 test and the foundation planting showed no disease symptoms (personal observation). Similar leaf spot symptoms are observed on bermudagrass [Cynodon dactylon (L.) Pers.] in the fall as a result of the soil being depleted of potassium. No Peanut stunt virus, also known as Cucumber mosaic virus [Cucumovirus], was detected in ‘PP-1’ growing at Gainesville, FL, in 2010, 2011, and 2012 (Table 14). A number of propagation studies (not reported here) have been conducted using rhizomes as sod (using a peanut inverter to dig the sod) and dug sprigs (using a traditional bermudagrass sprig harvester). Both propagation materials work well, but sprigs are easier to plant and handle. Best establishment takes place when sprigs are planted in furrows (continuous row of rhizomes with an average density of two to four sprigs side by side), covered with 2.5 cm of soil. Rhizomes planted in 1-m-wide rows establish in 1 year. Closer row spacings speed up establishment. A layer of rhizomes with 80% surface coverage planted in 23 × 46-cm flats or pots establishes as a marketable product in 5 to 6 weeks in the greenhouse.

Morphologically, ‘PP-1’ is most similar to ‘Pointed Leaf’. However ‘PP-1’ has narrower leaves (Table 1) than ‘Pointed Leaf’, A42, and all the cultivars tested. ‘PP-1’ and most of the
Table 11. Canopy density ratings on five *Arachis glabrata* perennial peanut genotypes planted at Tifton, GA, 18 May 2006.

| Entry         | 2008 | 2009 | 2010 | 2011 |
|---------------|------|------|------|------|
|               | 7 Oct. | 15 Oct. | 3 Aug. | 1 Sept. | 29 Sept. | 29 Nov. | 27 July |
| PP-1          | 8.0  | 8.0  | 9.0  | 9.0  | 8.0  | 9.0  |
| Ecoturf       | 7.0  | 8.7  | 7.2  | 8.7  | 9.0  | 7.2  | 7.5  |
| Arblick       | 7.8  | 8.5  | 7.2  | 9.0  | 8.7  | 7.7  | 8.2  |
| Florigraze    | 4.5  | 4.2  | 4.7  | 6.7  | 6.5  | 3.5  | 6.0  |
| Arbrook       | 3.8  | 6.0  | 5.2  | 6.7  | 6.5  | 4.7  | 6.7  |
| LSD-5%        | 1.1  | 1.0  | 1.0  | 0.5  | 0.9  | 0.7  | 0.8  |

LSD = least significant difference.

Table 12. Ratings for spring green-up and freeze damage on six *Arachis glabrata* perennial peanut genotypes planted at Gainesville, FL, on 28 June 2010 and at Quincy, FL, on 10 Apr. 2009.

| Entry         | 2010 | 2011 |
|---------------|------|------|
|               | 21 Mar. 2012 | 18 Nov. 2011 | 5 Jan. 2012 |
| PP-1          | 4.9  | 7.5  | 4.6  |
| Pointed Leaf  | 5.0  | 10.0 | 3.4  |
| Ecoturf       | 5.0  | 45.0 | 3.2  |
| Arblick       | 5.0  | 51.2 | 3.0  |
| Florigraze    | 3.5  | 40.0 | 3.2  |
| Arbrook       | 4.7  | 25.5 | 3.6  |
| LSD-5%        | 0.5  | 34.9 | 0.6  |

LSD = least significant difference.

Table 13. Pepper spot ratings on five *Arachis glabrata* perennial peanut genotypes planted at Tifton, GA, on 18 May 2006.

| Entry         | 2008 | 2009 | 2010 | 2011 |
|---------------|------|------|------|------|
|               | 7 Oct. | 15 Oct. | 16 Dec. | 29 Nov. |
| PP-1          | 1.0  | 1.0  | 3.5  | 1.5  |
| Ecoturf       | 1.3  | 2.0  | 3.2  | 2.2  |
| Arblick       | 1.0  | 1.0  | 2.0  | 1.7  |
| Florigraze    | 1.5  | 6.0  | 5.7  | 4.2  |
| Arbrook       | 1.0  | 4.2  | 5.0  | 4.2  |
| LSD-5%        | 0.4  | 1.3  | 1.0  | 2.0  |

LSD = least significant difference.

Table 14. Peanut stunt virus ratings and leaf scorch ratings on six *Arachis glabrata* perennial peanut genotypes planted at Gainesville, FL, on 28 June 2010.

| Entry         | 2010 | 2011 | 2012 | 2010 | 2011 | 2012 |
|---------------|------|------|------|------|------|------|
|               | 22 Oct. | 29 July | 30 Sept. | 30 June | 22 Oct. | 29 July | 30 Sept. |
| PP-1          | 1.0  | 1.0  | 1.0  | 1.0  | 3.3  | 3.0  | 3.0  |
| Pointed Leaf  | 1.0  | 1.0  | 1.0  | 1.0  | 3.5  | 2.8  | 2.8  |
| Ecoturf       | 1.0  | 1.0  | 1.0  | 1.0  | 1.0  | 1.0  | 1.0  |
| Arblick       | 1.0  | 1.0  | 1.0  | 1.0  | 1.0  | 1.0  | 1.0  |
| Florigraze    | 6.8  | 5.8  | 5.3  | 6.0  | 2.0  | 1.8  | 1.8  |
| Arbrook       | 2.0  | 2.0  | 1.8  | 1.5  | 1.8  | 1.5  | 1.8  |
| LSD-5%        | 0.3  | 0.5  | 0.6  | 0.3  | 0.5  | 0.5  | 0.5  |

LSD = least significant difference.
Supplemental Fig. 1. Three-year-old foundation field of ‘PP-1’ at the University of Georgia, Tifton Campus.