Preliminary methods for container production of rhizoma perennial peanut (*Arachis glabrata*)

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Significance to Industry: Rhizoma perennial peanut (*Arachis glabrata* Benth.) is becoming widely known and appreciated by the Green Industry as a low maintenance groundcover. Production and use of rhizoma perennial peanut would increase if selections were evaluated for ornamental uses and container nursery production protocols were developed. Results from this project showed that conventional container nursery practices produced salable plants of five selections of rhizoma perennial peanut provided plants were fertilized. Non-pathogenic foliar chlorosis suggests the need for additional research to determine specific nutrient requirements for production regimes lasting longer than 4 months.

Nature of Work: Rhizoma perennial peanut (RPP; *Arachis glabrata*) is becoming widely known and appreciated by the Green Industry as a drought tolerant, pest resistant, nitrogen fixing groundcover. This species is adapted to landscapes in USDA Hardiness Zones 10 through at least 8b. The landscape market for RPP could increase dramatically if container nursery production protocols were developed and selections were evaluated for ornamental attributes.

RPP has been widely studied as a forage crop, yet significantly less is known about its' production, establishment and use as a groundcover. This is partly due to a lack of knowledge about the relationship between nitrogen and total nonstructural carbohydrates (TNC) as they relate to establishment (2). Nitrogen inputs have been shown to have relatively little effect on establishment and in some cases may inhibit establishment (3). However, RPP does have the benefit of being drought tolerant and is able to grow under a variety of management systems (4); studies indicate that the nitrogen fixed by RPP is adequate to support its growth (3).

On March 26 and 27, 2009, plants of 'Apalachee', 'Arbrook', 'Brooksville 67' (Waxy), 'Brooksville 68' (Pointed) and 'Ecoturf' growing in 4-inch containers were divided and divisions potted into #3 (11-liter) containers (O3O; Nursery Supplies, Inc., Kissimmee, FL) filled with substrate [80:10:10 by volume (pine bark:peat:sand) with sludge; Graco Fertilizer Company, Cairo, GA]. Containers were placed on a conventional nursery production bed under full sun spaced 18 in (45 cm) apart within rows and 22 in (55 cm) between rows. Overhead irrigation of 0.4 in/day (1 cm/day) occurred March 26 to May 14 with an additional irrigation of 0.4 in/day (1 cm/day) commencing May 15. 'Ecoturf', Pointed and Waxy were introduced as groundcover types of RPP (1). 'Apalachee' is an unreleased selection with landscape potential, while 'Arbrook', released as a forage type, was included for comparison.

On March 30, 2009, one group of plants remained unfertilized while two others were topdressed with fertilizer [Osmocote 15-9-12; 12-14 month Southern formulation, Scotts Horticultural Products, Marysville, OH] at low (55 g/container) or medium (88 g/container) rates recommended for the container size. Unfertilized plants were included to determine if nitrogen-fixing RPP could provide its own nitrogen for acceptable growth and appearance under container production. Containers were arranged in a completely randomized block design by cultivar with 8 single-plant replications per treatment combination.

Monthly flower counts and ratings of plant quality and percent vegetative coverage of the container surface were assessed by two or three observers. Plant quality ratings were performed on a scale from 1 to 5 where 1= poor foliage density and color, not acceptable, 2=fair quality, marginally acceptable, 3= somewhat desirable density and color, 4= very acceptable density and color, desirable, and 5=excellent quality, very desirable density and color. At 4 months, on July 28, average height, widest width and width perpendicular to widest width were recorded. Data was subjected to analysis of variance (ANOVA) and significant means separated by least significant difference (LSD), P=0.05 level.

Results and discussion: All selections of RPP could be acceptably produced in conventional container nursery production. Unfertilized plants generally had poor growth or appearance. All fertilized

groundcover types produced saleable plants in #3 containers within 4 months. However, while fertilized plants generally grew larger, many developed chlorotic leaf spots by the termination of the experiment. This chlorosis suggests a nutrient deficiency or toxicity, and tissue nutrient analysis results are pending.

In the unfertilized treatment, Waxy had greater coverage and a greater average width than any other cultivar. The shortest average height was achieved by Pointed, followed by 'Apalachee', and then 'Arbrook'. Pointed and 'Apalachee' showed the greatest number of flowers without fertilization. At Fertilizer Rate 1, all cultivars had similar coverage except 'Ecoturf' had significantly greater coverage than Pointed. Also, Pointed had a significantly shorter height than any other cultivar; 'Arbrook' had the greatest average height under all treatments. 'Apalachee' had a significantly greater quality rating than either Waxy or 'Ecoturf', but similar to that of 'Arbrook' and Pointed. As in the unfertilized treatment, 'Apalachee' had the greatest number of flowers; 'Arbrook', 'Ecoturf', and Waxy had the fewest. At the highest rate of fertilization, 'Apalachee', 'Arbrook', and 'Ecoturf' had the greatest percent cover, significantly greater than that of either Pointed or Waxy. Pointed and 'Apalachee' had the shortest average height when compared to 'Arbrook' and 'Ecoturf'; 'Apalachee' had a significantly greater width than any other cultivar. 'Apalachee', 'Arbrook', Pointed, and Waxy had similarly high quality ratings when compared with 'Ecoturf', which had the lowest. The greatest number of flowers was counted for 'Apalachee', followed by Pointed and then Waxy. 'Arbrook' and 'Ecoturf' had the fewest number of flowers.

The results of this study indicate increased coverage and increased plant width under heavier fertilization regimes. Flower number was relatively unaffected by the addition of fertilizer, and plant quality under high vs. low fertilizer rates was not significantly different. Fertilization did not increase plant height. It is also notable that Waxy had similar coverage under all treatments including no fertilization, as well as a steady quality rating and no significant increase in height. This would indicate that it has some potential for use in the landscape setting and in situations where additional fertilizer inputs are undesirable.

Further studies are needed in order to determine the cause of the foliar chlorosis observed, possibly relating growth and leaf color to micronutrient deficiencies over the long term. Soil properties, specifically pH, as they relate to growth of RPP also demand further study because the contribution of the rhizome to aboveground growth is not well understood at this time. Long term field studies may be helpful in determining if RPP can sustain itself without N inputs or other individual nutrient inputs, as initial buffering by the rhizomes in the short term may not allow deficiency symptoms to fully manifest themselves.

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Table 1. Average cumulative visual quality and final percent coverage of the container surface, number of flowers, height and average width on 28 July, of five rhizoma perennial peanut selections grown 4 months in #3 (11-liter) containers at three fertilizer rates.

	Unfertilized					Fertilizer rate 1[z]					Fertilizer rate 2[z]				
Name	Ave. visual quality[y]	Ave. cover (%)[x]	Number of flowers	Ave. height (in)	Ave. width (in)	Ave. visual quality[y]	Ave. cover (%)[x]	Number of flowers	Ave. height (in)	Ave. width (in)	Ave. visual quality[y]	Ave. cover (%)[x]	Number of flowers	Ave. height (in)	Ave. width (in)
'Apalachee'	2.0 *c*[v]	64.7 *b*	4.3 *ab*	3.5 *c*	12.2 *b*	3.0 *a*	127.2 *ab*	11.1 *a*	3.7 *c*	25.6 *a*	2.9 *a*	145.0 *a*	12.5 *a*	3.7 *cd*	27.6 *a*
'Arbrook'	2.1 *c*	64.4 *b*	0.0 *c*	8.4 *a*	12.4 *b*	2.7 *abc*	118.4 *ab*	1.8 *c*	8.1 *a*	23.0 *a*	2.9 *a*	136.9 *a*	2.3 *c*	9.2 *a*	23.1 *b*
'Brooksville 67' (Waxy)	2.8 *a*	124.1 *a*	3.0 *bc*	3.7 *c*	20.4 *a*	2.6 *bc*	121.6 *ab*	3.5 *bc*	3.5 *c*	19.0 *b*	2.8 *a*	117.8 *bc*	4.3 *bc*	3.9 *c*	20.1 *bc*
'Brooksville 68' (Pointed)	2.6 *ab*	83.1 *b*	6.4 *a*	2.5 *d*	13.0 *b*	2.9 *ab*	113.8 *b*	7.3 *ab*	2.6 *d*	17.0 *b*	3.1 *a*	104.7 *c*	7.6 *b*	2.9 *d*	17.2 *c*
'Ecoturf'	2.2 *bc*	86.6 *b*	0.8 *c*	6.3 *b*	15.5 *b*	2.4 *c*	132.8 *a*	2.9 *c*	6.1 *b*	23.5 *a*	2.3 *b*	130.9 *ab*	3.1 *c*	6.2 *b*	22.4 *b*
LSD (0.05)[w]	0.47	30.7	3.4	0.8	3.9	0.36	14.6	4.1	0.8	2.8	0.40	18.0	3.5	0.9	3.3

[z] Fertilizer rate 1 is 55g/container and Fertilizer rate 2 is 88 g/container of Osmocote 15-9-12, 12-14 month Southern formulation.

[y] Average rating was derived by dividing the cumulative monthly quality rating by 4 months.

[x] Percent vegetative coverage of the container surface at project termination 28 July. Ratings of percent vegetative coverage greater than 100 occurred if the plant extended beyond the container rim.

[w] Least significant difference at *P*=0.05 level.

[v] Grouping letters in italics within columns indicate significant differences at the P=0.05 level.