

## Establishment and Management of Ornamental Perennial Peanuts<sup>1</sup>

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### What is Perennial Peanut?

Perennial peanut or rhizoma peanut (*Arachis glabrata*) is a primitive member of the same genus or classification group as the pod producing, or seed peanut (*Arachis hypogaea*). Perennial peanut is a true perennial because it lives from year to year without replanting. Perennial peanut does, on occasion, produce a small, thinned-shelled pod containing one seed. In general, rhizoma peanut produces very few seed. At present, there are no prospects of reproducing the plant commercially by seed. The plant produces an underground system of modified stems called rhizomes; hence rhizoma peanut. The plant is reproduced by digging the rhizomes and transplanting them in a new location. In addition, rhizomes can be dug and planted by different means including by lifting them mechanically in 16 x 24 inch pieces or as 42 inch wide rolls, in the same manner that grass is lifted and sold commercially.

Perennial peanut, which originated in South America, was introduced into Florida in 1936. Plant

breeders and collectors have since imported many species of primitive peanuts into the United States. A collection of many of these is maintained by the United States Department of Agriculture (U.S.D.A.) in Griffin, Georgia. Breeders of the seed type of peanut have an interest in the primitive perennial peanut because of its resistance to many disease, insect and nematode problems encountered with seed peanuts.

In Florida, primary focus on perennial peanut has been its use as a high-quality forage. As a result of the screening process in search of perennial peanut types suitable for use as a forage, low-growing types have been identified. Two of these low growing plant types identified as U.S.D.A. plant introductions (P.I.) 262839 (cv. Arblick) and P.I. 262840 (coined 'Ecoturf') have been under observation since the early 1980s in lawn and commercial landscape settings. Research conducted in Bartow, Florida compared performance, water use, and maintenance requirements of Arblick and Ecoturf with Floratam

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St. Augustinegrass for their potential as a lawn cover/alternative turf.

Two other ornamental perennial peanut plant introductions, Brooksville 67 ("waxy leaf", PI 262801) and Brooksville 68 ("pointed leaf", NRCS #9056068) germplasm (*A. glabrata* types) were released by the USDA-NRCS Brooksville Plant Materials Center in 2002 (by S.L. Pfaff and C. Maura, Jr.). They are both low-growing, leafy types with distinctive leaf shapes. Germplasm are available through USDA-NRCS, Plant Materials Center, 14119 Broad Street, Brooksville, FL 34601, 352-796-9600.

### A Peanut Lawn?

Low-growing perennial peanut types embody many environmentally friendly characteristics viewed as desirable by both the environmentally conscious public and professional environmentalists. These characteristics include a high degree of tolerance to the stresses of Florida's environment, which translates into a reduction of management inputs, such as water, pesticides, and fertilizer, as well as a reduction of management time.

Perennial peanut is a legume, therefore it requires no applied nitrogen fertilizer due to its symbiotic association with nitrogen-fixing *Rhizobium* bacteria. Also, the association of perennial peanut with mycorrhizal organisms in the soil environment improves phosphorus availability to the plant even in phosphorus-impooverished soils.

### Potential Uses

Ornamental perennial peanut looks promising as a lawn turf/ground cover in sunny and partially shaded areas. It is an excellent alternative to grass as a ground cover in areas that receive a relatively low level of foot-traffic, such as rough areas on golf courses, highway medians, shoulders and interchanges, and closed land-fills. It is also useful as a lawn cover for extensive areas that would traditionally be planted with grass. In addition, perennial peanut is ideal for stabilizing soil on inclines, around culverts and other structures.

Much remains to be learned about the possible uses for perennial peanut as well as the range or areas

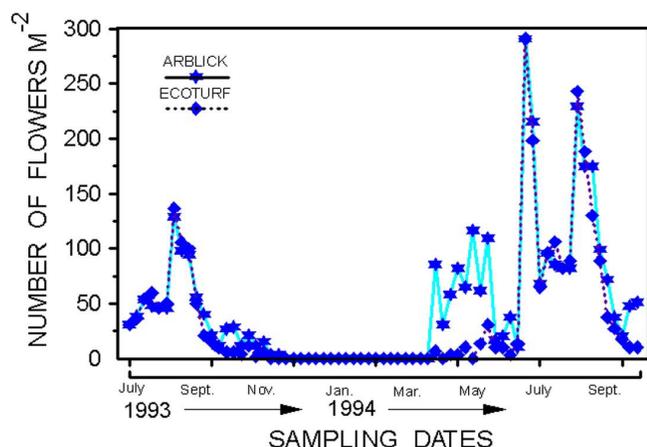
of the U.S. appropriate for the ornamental types. Based on current experience, the lower south from Texas to North Carolina can be considered for planting. In general, well-drained sites across Florida constitute potential planting sites.

The upper canopy of the plant is quite susceptible to frost, which implies that perennial peanut grown in south Florida will be green for a greater portion of the year compared to perennial peanut grown in north Florida. Overseeding a grass lawn with ryegrass is common practice for maintaining a green appearance during winter months. Perennial peanut may be overseeded with ryegrass in the same manner. It has been demonstrated that residue remaining from mulched perennial peanut clippings provides nutrients for overseeded winter ryegrass, thus reducing the need for added fertilizer.

Locations where perennial peanut will serve may vary depending on how it is maintained. If mowed every 2 to 3 weeks during the growing season, a location with full sun is most appropriate. If the desired effect is that of a ground cover where infrequent or no mowing will occur, full sun to partial shade is acceptable. In general, perennial peanut should be mowed less frequently when growing in partial shaded areas to maintain a healthy lawn cover.

Perennial peanut grown in full sun and mowed every 2 to 3 weeks to a height of 1.5 inches provides a uniform green turf surface quite appropriate for many home and commercial lawn settings. Hard to manage areas such as steep slopes, canal banks, around culverts or locations not requiring a manicured appearance or one with partial shade can be managed with little to no mowing.

Perennial peanut characteristically produces yellow flowers throughout the warm growing season (Figure 1). Flower production is enhanced by a combination of rainfall, warm temperatures, and full sun. Flower production is also enhanced by mowing, periods of drought followed by rainfall, or low fertility.



**Figure 1.** Flowering of perennial peanut under rainfed conditions.

In erosion-prone situations perennial peanut provides a very effective means of erosion control. The naturally woven mat of rhizomes which develops immediately below the soil surface provides protection from soil loss through soil stabilization and improved water infiltration.

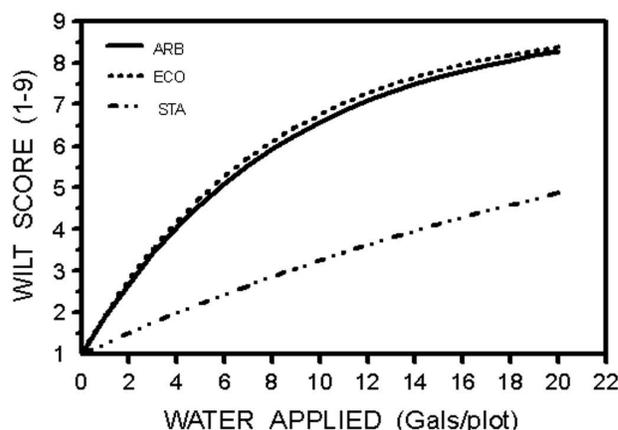
Perennial peanut has been observed to perform well in beachfront lawn settings along the Florida coast. Perennial peanut appears to be an ideal lawn cover for beachfront property. Once it is well established, perennial peanut will withstand the drought periods that would otherwise kill a St. Augustine lawn growing in dry beach sand.

## Recent Findings

Water is another key input in the production and maintenance of commercially important turf grasses used in Florida. With increasing demand for water in peninsular Florida's rapidly growing urban centers, water is becoming a precious commodity, resulting in greater restriction of its use. Today, use of water for lawns and gardens is restricted by law in many municipalities not only during dry periods but also year-around. During periods of little or no rainfall, limitation of water for lawns results in a rapid deterioration of the health, vigor and appearance of many grass lawns.

Recent research focused on a comparison of plant response by ornamental perennial peanut and St. Augustinegrass (cv. Floratam) to varying levels of applied water. In this study both plant species were managed as a turf/lawn cover. Findings from this

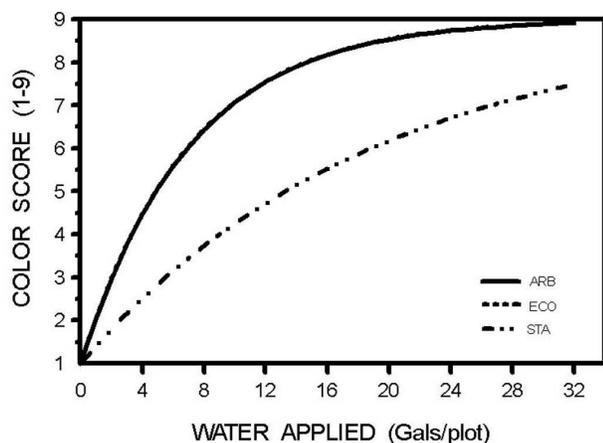
study indicated that during moisture stress periods, Arblick and Ecoturf require less water than St. Augustinegrass to maintain a comparable level of plant turgidity, or wilt rating, where a rating of 1 is extreme wilt and 9 is completely turgid (Figure 2). Turf color ratings for Arblick and Ecoturf were also consistently higher under water stress conditions compared to St. Augustinegrass, where a rating of 1 is void of green color and 9 is dark green (Figure 3). Under nonirrigated conditions the two perennial peanut genotypes received better wilt and color rating scores compared to St. Augustinegrass. Low levels of applied water resulted in die-back of St. Augustinegrass with no such long-term impact on the perennial peanut turf.



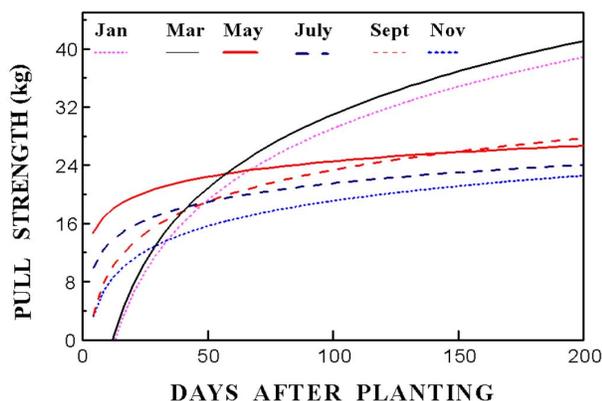
**Figure 2.** Wilt score rating for Arblick, Ecoturf and St. Augustinegrass in response to gallons of water applied to plots 10 ft. X 10 ft. in size. 1 = high wilt, 9 = no wilt.

Other studies were conducted to determine optimum time of the year for planting perennial peanut sod. Sod pieces, planted every two months during the year, rooted best when planted during period from January through March (Figure 4). Despite the fact that later-planted sod did not achieve high rooting scores attained by early plantings, all sod plantings, early through late, survived and completely established under irrigation.

Plots of Ecoturf and Arblick were established under varying mowing heights (1.5 and 3.0 inches) and mowing frequencies (2 wk., 4 wk., and 6 wk.). Plots were rated for their overall appearance, cover, shade of green, and bloom. A 1.5 inch cutting height mowed every 4 weeks consistently had the highest



**Figure 3.** Color score rating for Arblick, Ecoturf and St. Augustinegrass in response to gallons of water applied to 10 ft. X 10 ft. in size. 1 = yellow/straw color, 9 = deep green.



**Figure 4.** Maximum rooting strength of perennial peanut (Ecoturf) sod pieces up to 180 days after planting.

ratings. Lowest ratings resulted from mowing to a 3.0 inch height every two weeks. Plants subjected to a 1.5 inch mowing height assumed a low-growing canopy of leaves that remained intact between mowing and reduced stubble appearance observed in a 3.0 inch treatment. Further study is needed to determine the long-term effect of close mowing on sod performance and persistence. Based on past experience, infrequent mowing (twice per year) in observational plots should be practiced when producing nursery rhizome material for lifting. This allows a maximum amount of energy to be produced in the canopy and stored in the below-ground rhizome system.

## Considerations for Perennial Peanut Establishment

### Planting Site

1. **Geographic** - Perennial peanut evolved under tropical conditions; however, it adapts well to subtropical or warm temperate climates. In the northern hemisphere, this includes locations below 31° to 32° latitude, which have a longer warm growing season.

2. **Climatic** - Perennial peanut grows best in full sun. Specific rainfall requirements have not been determined; however, it grows best in Florida when days are long, hot, and humid. Irrigation has proven beneficial during establishment in droughty springs.

3. **Soil** - Perennial peanut persists in a variety of well-drained soil types and does well in the deep sands of Florida. Rocky areas and high clay soil should be avoided if the objective is to produce rhizomes or sod for digging.

In northern production regions, clay soils with excess moisture may freeze during prolonged periods with temperatures below 32°F. Rhizomes located in the zone of frozen soil may be killed. Due to this and slow spread of rhizomes in clay soils, selection of a well-drained soil for planting is particularly important.

4. **Fertilization** - Since perennial peanut is a legume with nitrogen-fixing capability, **it does not require application of nitrogen**. Soil should be sampled from the field to be planted and tested for its nutrient content prior to planting. Apply 30 pounds  $P_2O_5$ /acre when Mehlich-I soil test level is below 30 ppm P. Do not apply phosphorus fertilizer when the soil tests above 30 ppm P. Apply 60 pounds  $K_2O$ /acre when Mehlich-I soil test level is below 20 ppm K, and do not apply potassium fertilizer when soil tests above 20 ppm K. Apply 15 pounds magnesium per acre if Mehlich-I soil test is below 30 ppm Mg. Nutrition should not be a production-limiting factor on soils with Mehlich-I soil test levels near those suggested.

Recent research has confirmed that perennial peanut, like most legumes, responds positively to applied sulfur. Twenty to thirty pounds of the

sulfate-form of sulfur per acre should be applied annually when mowed clippings are removed.

Observations over many sites indicate that perennial peanut performs well under a wide range of soil pH. Modify soil pH only if measured pH is outside the 5.0 to 7.5 range.

**5. Land Preparation** - Land preparation should begin during summer prior to a winter planting to allow time for both chemical and mechanical weed control to be effective. If perennial broadleaf weeds or grasses persist, use a herbicide such as glyphosate should be considered to eradicate this problem prior to first frost. With no legal herbicides registered at this time for use on perennial peanut, it is necessary and more economical to achieve good pre-plant weed control.

### Planting Material (Rhizomes)

**1. Source** - Perennial peanut is propagated vegetatively using rhizomes (modified underground stems) which concentrate in a 1 1/2 to 3 inch thick mat just below the soil surface. When planting, it is important to locate a source of well-managed perennial peanut rhizomes. The Perennial Peanut Producers Association (PPPA), a non-profit organization, can provide a current list of producers who sell, dig, and plant rhizomes in a customer's field. Sources of planting material are also given in SS-AGR-159, Perennial Peanut - Source List of Planting Material (Rhizomes) and Hay. Since the best time for planting is January/February/March, planning, field preparation, and location of producers with quality rhizome material should begin during the summer prior to winter planting. Advance planning has an added advantage of permitting visual inspection during the growing season of plant material to be planted.

**2. Rhizome Harvesting** - Rhizomes are removed from soil mechanically with a sprig harvester and planted as individual rhizome pieces or as sod pieces. For best establishment, for an individual rhizome to be planted, it should average no less than 9 inches in length, with minimal damage from the digging process.

**3. Nursery Area Required** - One acre of perennial peanut nursery should yield enough rhizomes to plant 20-25 acres at a planting rate of 100 bu./A. Planting with sod requires more acres of nursery to plant the same 20-25 acres as compared to sprigs. The area of sod nursery required depends on the size and spacing of sod pieces used at planting.

**4. Rhizome Quality and Care** - No specific methodology has been established as a measurement for rhizome quality; however, it is generally considered that Florigraze rhizomes, with a minimum diameter of 1/8 inch plus and a minimum length of 9 inches, will result in good emergence and survival when planted. Diameter/vigor of rhizomes is enhanced when grown under good soil moisture and fertility conditions. Intensive hay making, mowing or grazing of fields to be harvested for rhizomes results in lower rhizome production and decreased diameter of rhizomes.

Rhizomes should be planted as soon after digging as possible. Rhizomes cannot be stored for more than five days without deterioration, even under the best conditions. Rhizomes should be stored in a shady, cool location and covered with black plastic or a tarp to prevent drying while still providing aeration. Rhizomes being transported should be covered with a tarp to prevent drying. They should also be protected from freezing temperatures during transport and storage prior to planting.

Digging rhizomes during the cool temperatures of January and February minimizes overheating during transport and storage. When rhizomes are subjected to heating in a stack, plant material deteriorates rapidly.

No research has been conducted on the holding time of rhizomes dug as sod; however, it should be no more than 4 days if the top green material was removed prior to lifting and if the sod is protected from drying and the intense direct heat of the sun. Based on limited experience, the holding time for palletized perennial peanut sod with tops is no more than two days before the top growth begins to deteriorate.

## Planting

**1. Time for Planting** - Winter (January, February and March) is the best time for planting because plants are in a quiescent growing state. Winter-planted material emerges during late March to early May, depending on the temperature, which coincides with low rainfall over most of Florida. Irrigation will be necessary as a supplement to natural rainfall to achieve proper root and top development. Once a root system has developed, irrigation is not a requirement. However, application of water during hot dry periods will maintain perennial peanut plants in an optimal growing condition. For a sod farm or rhizome nursery that depends on rapid regeneration of quality plant material for sale, supplemental irrigation is required.

In a young establishing stand, loss of plants during a late spring drought period does not mean stand failure. Normally, a percentage of large diameter rhizomes will survive and result in an established plant. However, time required to reach complete stand coverage increases as plant population decreases. If a sufficient number of plants survive to leave at least one plant every 3 feet in any direction, complete coverage may result by end of the second or third year. For most commercial or homeowner situations, this prolonged period to establishment is not acceptable.

Although winter is the best time to plant perennial peanut, planting may be successful anytime up to mid-July. A late-season planting has two disadvantages: (1) planting may require an extra year to achieve full coverage, and (2) the rhizome nursery may require an extra year to completely recover from digging. If an area is planted solid with sod, full coverage is automatically achieved.

**2. Planting Rate** - If rainfall is satisfactory, a winter planting can provide complete ground coverage in one to two years, using a planting rate of 80 bushels (100 ft<sup>3</sup>) of rhizomes per acre. Under drought and other stresses such as high weed competition, a higher planting rate may be desirable to compensate for plant loss. If rhizomes can be obtained at a low cost, 100-120 bushels (125-150 ft<sup>3</sup>) of rhizomes planted/acre will ensure a satisfactory plant stand.

Calibration of the planter may be necessary to achieve the desired number of bushels planted per acre. Calibration begins by checking the number of bushels planted in a given number of acres. Calculation requires determining the volume of loosely-packed rhizomes contained in each planter load multiplied by the number of loads planted per acre. With this, the number of bushels or cubic feet planted per acre can be calculated (1.25 ft<sup>3</sup> = 1 bushel) and adjustments to the planter made if necessary.

When planting rhizomes by broadcast-disk or hand method, an approximate planting rate can be achieved by calculating the volume of rhizome material hauled to field and planted. However, hauling by truck or trailer results in compaction of rhizomes; therefore, a compaction factor must be considered when calculating the planting rate (volume per acre) of loosely-packed rhizomes.

If rapid establishment is important, planting rate and level of management must be considered together. Addition of water, fertilizer, and weed control are all important inputs that can be employed to maximize plant population during the first growing season. However, an increase in planting rate can substitute to some degree for less-than-intensive management.

**3. Planting Methods** - Several systems can be used for planting rhizomes. Bermudagrass sprig planters are most commonly used. This planter opens furrows, places rhizomes in the furrows at a determined rate, closes furrows, and packs the soil. A fairway-type sprig planter is a relatively recent addition to the list of planting methods. This form of planting replaces the opening of furrows with 2 gangs of closely spaced blunt-edged rolling disks that push rhizomes into the soil at a prescribed rate and planting depth. This system of planting achieves adequate plant distribution; however, a percentage of rhizomes not completely embedded into the soil will be lost due to drying. Excellent results have been achieved with this planter, especially where irrigation is available. Planting can be achieved without equipment by hand placing individual rhizome pieces in furrows and covering, or by broadcasting and disk-harrowing rhizomes into the soil. Due to inaccuracy of depth

control when planting by the broadcast-disk method, planting rate should be increased 25%.

Regardless of the planting system, it is important to place the rhizomes no more than 1 1/2 inches deep. A 1-1 1/4 inch planting depth is generally sufficient in clay soil. Planting should be followed by a packing-roller which leaves the field level, preserves soil moisture, and achieves good rhizome soil contact.

When planting sod pieces, a flat furrow is formed in which rhizome mats are placed at a depth equivalent to their original growing position. Because much of the soil in the sod will fall out during handling and transport, soil from the furrow should be spread around and over sod pieces to prevent desiccation and/or freeze damage from exposure. As with other planting methods, a packing-roller should be used following sod planting.

The distance between planted rows of sprigged material will vary with the equipment used, but 18 to 24 inches will result in a first season coverage if other factors are not limiting. As a general rule, coverage time will decrease as the distance between rows decreases. Rhizome mats dug with a sod lifter or other means can be planted 4 feet apart (center to center of mat) to achieve coverage in one growing season.

The advantage of using sod over sprigs is realized when planting in a nonirrigated field during a dry year. The undisturbed integral system of rhizomes and roots characteristic of sod provides greater survival capability during dry periods that may occur prior to the formation of a root system. The handling cost for sod usually increases the establishment cost over sprigging.

Commercial companies supplying ornamental peanuts have developed several methods of supplying planting material to the home owner. These consist of peanuts growing on clay chips, in small pots, and as rhizome mats grown on plastic film. Follow the directions of the various companies on planting the peanuts.

Common with all legumes, perennial peanut obtains its nitrogen from *Rhizobium* species bacteria associated with the plant's root system. Many

agriculturally important legumes planted by seed are inoculated with bacteria at planting to ensure adequate infection of the plant by bacteria and a subsequent adequate supply of nitrogen. Because perennial peanut is propagated by rhizomes which carry the bacteria, it is not necessary to inoculate the rhizomes at planting under normal conditions.

## Post-plant Management

1. **Sand Blast Prevention** - Late winter and early spring winds cause significant sand blast damage to new emerging plants in open fields. Severe sand blasting can completely kill all top growth. Such an event is followed by weak plant recovery. This can be prevented simply by planting single or double rows of cereal rye every 8-10 feet across the field perpendicular to prevailing winds. This should be done immediately following winter planting of perennial peanut.

2. **Irrigation** - Lack of soil moisture is most critical from time of shoot initiation until a supporting root system develops. Under conditions of low soil moisture, the application of water ensures plant survival and growth. Soil-plant moisture status should be carefully monitored following planting and water should be applied as needed.

3. **Weed Control** - Weed control constitutes a major management practice until full perennial peanut coverage is achieved. As with management of soil moisture, the elimination of competitive weeds is important in managing for optimum perennial peanut performance during and following establishment.

At present there are no legal herbicides registered for use on perennial peanut. A request for IR4 clearance is being addressed for several herbicides.

Mowing is probably the best insurance against weeds. Keeping the perennial peanut canopy clear for maximum sunlight penetration is critical to proper development. Mowing is effective for controlling the canopy height of tall growing weeds. Whenever possible, mow weeds just above the foliage of the developing peanut. Competition from short-growing annual weeds can be reduced by mowing both weeds and peanuts as close to the soil as possible. This

practice can be done once during the establishment season in late July or early August.

Winter overseeding of perennial peanut with a small grain and/or annual ryegrass can provide good control of many winter weeds. Winter overseeding has the added advantage of protecting an established stand from freeze damage during extreme cold periods which may occur in northern perennial peanut zones.

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