The purpose of this publication is to provide a guide for planting and establishing rhizoma perennial peanut (*Arachis glabrata* Benth.). This guide does not address all possible situations, but serves as a general procedural outline. In order to learn more about perennial peanut production, the authors of this document encourage producers to use their inventiveness to enhance the production practices suggested here as we strive to improve the success and speed of establishment.

**Factors to Consider**

**Planting Site**

**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 that have a longer warm growing season (refer to plant hardiness map, Figure 1).

**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.

The plant survives dry periods in Florida, but performs best with frequent rainfall.

**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 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 will be killed. Due to this and the slow spread of rhizomes in clay soils, the selection of a well-drained soil for planting is particularly important in northern production areas.

**Fertilization** - The following recommendations for establishment of perennial peanut are based on current research. Since perennial peanut is a legume with N-fixing capability, it does not require the application of N. Soil tests should be made prior to planting. Apply 30 lb/A P$_2$O$_5$ when Mehlich-I soil test level is below 30 ppm P. Do not apply P fertilizer when the soil tests above 30 ppm P. Apply 60 lb/A K$_2$O when Mehlich-I soil test level is below 20 ppm K, and zero K fertilizer when the soil tests above 20 ppm K. Apply 15 lb/A magnesium if Mehlich-I soil test level is below 20 ppm Mg.
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.

Although unconfirmed for perennial peanut, most legumes respond positively to applied sulfur. Based on perennial peanut tissue analysis, 20-30 lb/A of sulfate-form sulfur should be applied annually when the planting is intensively hayed.

Recent research has demonstrated that perennial peanut grown under dairy effluent has yielded 6 plus tons per acre. Under a dairy effluent irrigation system, an abundant quantity of water and nutrient are applied. In fact, more nutrient than the plants can take-up. Results from research conducted under rain-fed conditions on deep, well-drained sand were used to define the fertilization recommendations used today. Where abundant, uniform rainfall or irrigation is present, i.e., soil moisture is not a limiting factor, higher amounts of fertilizer may be required to achieve optimum yield, however there is no research data available upon which sound recommendation can be based.

Current observations indicate that perennial peanut performs well under a wide range of soil pH. However, research has shown that higher forage yields are associated with a soil pH of 6.0.

Site History - Post-plant weed problems are difficult to avoid; however, the problem can be reduced if the production site is carefully selected and prepared prior to planting. Recently cleared woods usually offer a relatively weed-free setting during establishment, as well as naturally accumulated fertility. Land that has been intensively row-cropped with a good weed control program offers fewer weed problems and may provide residual fertility. Low managed weedy areas or old pasture land may require preparation 6 or more months prior to planting to achieve proper weed control, fertility level, and a well-prepared seed bed.
Both research data and many years of experience have shown that soils with known disease or nematode incidence do not negatively affect perennial peanut. Until otherwise determined, there is no need for concern over these problems.

**Land Preparation** - Bottom plowing is generally needed as a first step in land preparation. This is particularly true in sod or other vegetated settings. When beginning with sufficient anticipation prior to planting, forage sorghum or other tall competitive crops can be grown to suppress weed growth and initiate the land preparation process. Watermelon followed by sorghum in the same season followed by winter-planted perennial peanut has been successful. Land preparation should begin during the summer prior to a winter planting to allow time during the growing season for both chemical and mechanical weed control. Following the initial bottom-plow operation and/or incorporation of a cover crop, repeated tillage with a disk-harrow is an effective means of weed control. If perennial broadleaf weeds or grasses persist, use of a herbicide, such as Roundup®, should be considered to eradicate this problem prior to first frost. With only a few herbicides registered at this time for use on perennial peanut, it is necessary and more economical to achieve good preplant weed control.

Land should be well prepared and idle by the first of November. This allows sufficient time for breakdown of organic matter and accumulation of soil moisture prior to planting.

**Planting Material (Rhizomes)**

Cultivars - Florigraze and Arbrook (described in Florida Agricultural Experiment Station Circular S-275 and S-332, respectively) are two commercial cultivars currently available. Florigraze, released in 1978, has the greater acreage (approximately 22,000 acres in 2001) and is well adapted to most well-drained soils in Florida. Arbrook, released in 1986, is recommended for droughty, excessively-drained sandy soils with warm winter temperatures as occur in peninsular Florida. Planting stock of Florigraze is in good supply, while Arbrook, the more recent release, is still limited in acreage.

Emergence and survival of Arbrook following planting under dry soil conditions is considered superior to Florigraze. However, due to the difference in growth habit, lateral spread of Arbrook is slower than Florigraze. This tendency to spread slowly is made worse when extensive hay making or grazing is imposed prior to complete stand establishment. In general, Florigraze will withstand grazing better than Arbrook. The stem of Arbrook is larger in diameter than Florigraze and can require up to one extra day of drying under marginal drying conditions. Because Arbrook is ready sooner for the first cutting of the season, there are benefits to having fields of both genotypes in order to lengthen the production season.

Source - Perennial peanut is propagated vegetatively using rhizomes (modified underground stems) which concentrate in a 1 1/2 to 3” thick mat just below the soil surface. When planning to plant, the first step is to locate a source of well-managed perennial peanut rhizomes. Your county extension agent or the Perennial Peanut Producers Association (PPPA) (a non-profit organization) can provide a current list of producers who sell, dig, and plant rhizomes. Since planting normally takes place during January/February, planning, field preparation, location of rhizome sources, and planting equipment or contacts with individuals who plant should begin during the summer prior to winter planting. Advanced planning has the added advantage that the buyer will be able to inspect the growing perennial peanut nursery for vigor, weediness and condition of the rhizomes prior to the winter rhizome digging.

Rhizome Harvesting - Rhizome planting material is most commonly harvested mechanically using a sprig havester and planted with a sprig planter. The rhizome mat can be harvested using a sod lifter. The use of sod for increasing acreage of perennial peanut is not the most efficient use of rhizome material, however, experience to date with sod has shown that planted sod will survive drought periods with greater success compared to planted rhizome pieces. A major constraint in using a commercial sod lifter is the inability of the machines cut-off knife to cut the lifted sod strip into individual pieces.

Other imaginative approaches can be used to remove rhizomes from the soil. Any method used
should result in individual rhizome pieces at least 9” long with minimal damage from the digging process. A nursery harvested for rhizomes should be ready to harvest again following 2-3 years of regrowth under favorable conditions.

**Nursery Area Required** - One acre of perennial peanut nursery should yield enough rhizomes to plant 20 - 30 acres at a planting rate of 80 bu/A. The possible number of acres that can be planted from each acre dug varies with the planting rate and rhizome density in the nursery. Planting with sod generally requires more acres of nursery to plant the same 20 - 30 acres as compared to sprigs. Area of sod nursery required depends on size and spacing of sod pieces used at planting.

**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 diameter of 1/8" plus, and a minimum length of 9”, will result in good emergence and survival. Diameter/vigor of the rhizomes is enhanced when grown under good soil moisture and fertility conditions. Rhizomes harvested after regrowth is fully underway in late winter results in an inferior/weak rhizome. In north Florida, rhizome harvest should cease sometime between the end of February and the middle of March, depending on the season. Rhizome nurseries located farther south will cease digging earlier. If a newly planted field is irrigated following planting, time of rhizome harvest in the spring is of less concern.

Intensive hay making or grazing results in lower rhizome production and decreased diameter of rhizomes. Rhizomes grown as nursery stock can be mowed for hay twice during the season, once following spring growth and the second time just prior to frost. Research has demonstrated that the greatest amount of carbohydrate (energy) is stored in the rhizomes during the period extending from the middle of July until frost. The ability of a rhizome to produce shoots and survive under adverse conditions in the spring following planting is dependant on the amount of carbohydrate stored in a rhizome. Leaving the plant canopy in tact during the critical period of carbohydrate accumulation produces a better quality rhizome. To successfully harvest the second cutting, a producer must be vigilant to the changing weather conditions during the fall period as a hard frost will kill the plant canopy. In general, nursery location (north or south) will determine time of the second harvest prior to frost.

Rhizomes should be planted as soon after digging as possible. Rhizomes cannot be stored for more than 5 days without deterioration, even under the best conditions. Harvested rhizomes should be stored in a shady, cool location and covered with black plastic or a tarp to prevent drying while still allowing for aeration. 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, the plant material deteriorates rapidly. Rhizomes being transported should be covered with a tarp to prevent drying. They should be protected from freezing temperatures during transport and storage prior to planting.

**Planting**

**Time for Planting** - The best time for digging and planting is in winter during January, February, and March when the peanut is in a quiescent growing state. Winter-planted material emerges during late March to early June which coincides with low rainfall over most of Florida. Normal spring rains are important for proper root and top development. As shoots begin to emerge following a January-February planting, under conditions of low soil moisture, a percentage of shoots will die due to lack of a supporting root system. The availability of irrigation during this initial development period provides insurance against plant loss or complete stand failure. Once a root system has developed, irrigation is not required.

The result of plant loss during a late spring drought period does not always mean stand failure. Normally, a percentage of large diameter rhizomes will survive and result in an established plant. Time to 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 the end of the second or third year. Wider than 3 feet between
plants will take longer for complete coverage and a shorter distance less time, assuming other management practices are observed.

Winter is usually the best time to plant perennial peanut; however, planting may be successful beginning in mid July through the end of August. The advantage of a mid-summer planting is that unlike a winter planting the chances of complete stand failure due to a spring drought is significantly reduced. This is especially true from Ocala south. A late-season planting has two disadvantages: (1) the planting may require an extra year to achieve full coverage, and (2) the rhizome nursery may require extra year to completely recover from the summer digging.

**Planting Rate** - If rainfall is satisfactory, a winter planting can provide complete ground coverage in 1 to 2 years, using a planting rate of 80 bu/A (100 ft\(^3\)) of rhizomes. 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 bu/A (125 - 150 ft\(^3\)) of rhizomes will aid in achieving full stand in a reasonable period.

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 for this determination requires 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 acres can be calculated (1.25 ft\(^3\) = 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, and this must be considered when calculating planting rate.

A fewer number of Arbrook rhizomes are contained per bushel as compared to Florigraze. Additionally, Arbrook grows laterally at a slower rate than Florigraze. In order to achieve ground coverage with Arbrook, at the same rate of coverage as approximates Florigraze, 25% more rhizome material per acre should be planted.

If rapid establishment is important, planting rate and level of management must be considered together. The addition of water, fertilizer, and weed control are all important inputs that can be employed to maximize plant population during the first growing season.

**Planting Methods** - Several systems can be used for planting rhizomes. Bermuda sprig planters are used most commonly. This planter opens furrows, places rhizomes in the furrows at a determined rate, closes furrows, and packs the soil. The 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 the prescribed rate and planting depth. This system of planting achieves adequate plant distribution; however, a percentage of rhizomes are not completely embedded into the soil and 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 the inaccuracy of depth control when planting by the broadcast-disk method, planting rate should be increased 25%.

Regardless of planting system, it is important to place the rhizomes no more than 1 1/2 to 2" deep. For clay soil, a 1 to 1 1/2" planting depth is generally sufficient. Arbrook appears to be less sensitive to planting depth than Florigraze. Excellent shoot emergence can be achieved with Arbrook rhizomes planted at a 2" depth. Planting should be followed by a packing-roller that 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 the sod pieces, preventing
desiccation and/or freeze damage from exposure. As with other planting methods, a packing-roller should be used following sod planting.

Distance between planted rows of sprigged material will vary with the equipment used, but 18” to 24” will result in a first season coverage if other factors are not limiting. As a general rule, coverage time will decrease as distance between rows decreases. Rhizome mats dug with a sod lifter or other means can be planted 4 to 6 feet apart in every direction and still achieve coverage in a reasonable amount of time.

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

Common with all legumes, perennial peanut obtains its N from Rhizobium species bacteria associated with the plants root system. Many agriculturally important legumes planted by seed are inoculated with bacteria at planting to ensure adequate infection of the plant by the bacteria and a subsequent adequate supply of N. Because perennial peanut is propagated by rhizomes that carry the bacteria, it is not necessary to inoculate the rhizomes at planting under normal conditions.

**Cost Consideration**

The expense of establishing perennial peanut varies widely from as little as $200 to $500 per acre. Cost is, in part, a result of producers needs and resource availability. Many factors influence cost including acreage planted (scale of operation), rhizome source, cost of land, equipment, labor, and interest rate on borrowed money. Level of management has a direct influence on cost and changes as practices implemented vary. For example, intensity of weed control and fertilizer applied have significant effect on establishment costs. Opportunity cost should be weighed carefully when considering that, under normal conditions, time to production can be shortened by 1 - 2 years as management level increases.

Relative to other forage crops, perennial peanuts can be expensive to establish. Lower production costs and higher returns over the long term should be important considerations.

For more cost and return information, refer to Economics of Perennial Peanut Hay Production, Marianna North Florida Research and Education Center Research report 97-5, by T.D. Hewitt and C.B. Olson.

It should be pointed out that hay storage costs have not been included in the current economic analysis. Like alfalfa and other high quality legumes, dry perennial peanut hay deteriorates rapidly when subjected to moisture. The hay must be dry prior to storage (12% moisture for square bales; 15% or less for rolls) and must be protected against wetting during storage. To maintain hay with a bright pale green color, the dried hay must be stored in a closed barn, isolated from ambient humidity.

Table 1 represents the primary cost variables to consider for the first year of establishment. These costs vary depending on individual situations and the market price for required inputs. The table has been left blank to serve as a worksheet for individual assessment of costs.

**Post-Plant Management**

**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 by planting single or double rows of rye every 8 - 10 feet across the field perpendicular to prevailing winds. This should be done immediately following perennial peanut winter planting.

**Irrigation** - Lack of soil moisture is most critical from the time of shoot initiation on the rhizome, until a supporting root system develops. Under conditions of low soil moisture, the application of water insures plant survival and growth. Soil-plant moisture status should be carefully monitored during the spring
months following planting. Irrigation should be considered if it is available. If the option exists, always locate your field near an irrigation source.

**Weed Control** - Weed control constitutes the major management practice during the first and possibly the second growing season. Eliminating competitive weeds insures greater survival during the dry months prior to summer rainfall and allows the plant to grow and spread more rapidly.

Mowing is important in the fight against weeds. Keeping the perennial peanut canopy clear for maximum sunlight penetration is critical to proper development. Mowing is effective for controlling canopy height of tall growing weeds. Whenever possible, weeds can be eliminated or reduced by mowing both weeds and peanuts as close to soil as possible. This practice can be done once during the first growing season in late July or early August. For grassy weeds such as crabgrass, bermuda grass, and bahiagrass, Fusilade® herbicide is cleared for use during establishment, but as presently labeled, forage should not be harvested in any form for up to one year following application. Select® can be applied during establishment and up to 40 days prior to harvest.

Winter overseeding of perennial peanut with a small grain and/or annual ryegrass can provide grazing, grain, or hay, as well as 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 that may occur in northern perennial peanut zones.

Basagran® is effective for control of yellow nutsedge, as well as a few other selected broadleaved weeds. It is cleared for use on perennial peanut during establishment and, like Fusilade, forage should not be harvested in any form for up to one year following application. Always read the herbicide label and follow it as herbicide recommendations are subject to change.
Table 1. Inputs to be considered in calculating cost of perennial peanut establishment.

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