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Peanut Production Guide: Management and Cultural Practices for Peanuts[1]

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Introduction

Peanuts in the United States are grown primarily for food purposes such as peanut butter, peanut candy, roasted peanuts, peanut oil, and other products. The Southeastern Coastal Plain produces the majority of peanuts in the U.S. In Florida, peanut production occurs mostly in the Panhandle and north central Florida. Peanut production acreage ranges from Levy and Marion Counties up to the Georgia state line then westward to Escambia County. Counties with the largest concentration of peanut production include Jackson, Levy, and Santa Rosa. In these regions, peanut is a primary cash crop and dominates row crop agriculture. In 2024, a total of 165,000 acres of peanut were planted and 157,000 acres were harvested.

This publication discusses the current management and cultural practices for peanut production. This article is intended to share the latest information about peanut production and management with farmers, crop consultants, and Extension agents.

Peanut Market Types

There are four market types of peanuts in the United States: runner, Virginia, Spanish, and Valencia. Peanut market types are mainly different in growth habit, seed size and shape, and uses (e.g., runner peanut is mainly used for peanut butter, while Virginia peanut is mainly used for in-shell products due to its larger seeds). Peanut market types in the U.S. are not the same as botanical types, although there are some consistent botanical features that distinguish the market types from each other. The USDA defines market types for the purpose of valuing and marketing the peanut crop (Peanut Program (usda.gov)). Each market type has a support price based on grade factors including sound mature kernels (SMK), sound split (SS), and other kernels (OK). USDA price support programs for peanut can be found on the Farm Service Agency website. Using runner types as an example, the 2024 loan value was $4.829 per percent of total sound mature kernels (TSMK=SMK+SS) that dictates the loan levels per ton based on a five-year average of TSMK. The USDA classification system for market types is based on the seed and pod size for Virginia and runner types. Virginia types are classified as those in which 40% or more of the pods ride a roller spaced 0.53125 inch apart, and runners are those with less than 40% riding the roller separator.

Land Selection and Preparation, Tillage, and Cover Crops

Peanuts grow best on well-drained soils and in full sun. If planted on poorly drained soils, diseases will be prevalent and yields will normally be low. Peanuts can be grown on sandy or excessively drained soils, but irrigation may be needed for consistent production on deep sands.

Strip-tillage has been adopted by many peanut producers in the Panhandle, but it is still not a widely adopted practice, particularly in north central Florida. Using this method of tillage, the land is not turned but is subsoiled, and only a strip of soil (8–12 inches wide) in the row is tilled. The soil between the rows remains undisturbed with cover crops or crop residue. This method reduces time and costs for land preparation and helps prevent soil erosion by wind and water. The residue on the surface lowers disease incidence of leaf spot, tomato spotted wilt virus (TSWV), and potentially other diseases. Fields that have been fallow or uncropped for several years may have many hard-to-control weed species including broom sedge and horseweed as well as other broadleaf weeds. Normally, if the field can be planted through the various plant material, there will be no problem with inverting. All weeds need to be controlled four to five weeks prior to planting, and 2,4-D is often necessary for some of the hard-to-control weeds such as horseweed and cutleaf evening primrose. Glyphosate or paraquat can be used to control many other weeds a few weeks before planting.

Yield variability can often be explained by cover crop termination timing. Many seedling pathogens of peanut (e.g., Pythium and Phytophthora) find favorable conditions during planting into newly killed cover crops or plant residue. Risk of seedling diseases increases when cover crops are not killed early enough. With legume cover crops, about 50% of the biomass may be lost during the first four weeks. Grass cover crops may take several weeks longer than legumes to decompose due to a higher carbon-to-nitrogen ratio. Cover crops decompose more slowly when left on the soil surface than when incorporated into the soil. Generally, decomposition of cover crops is two to three times faster for each 18°F increase in temperature. Therefore, cover crops decompose more slowly under cool conditions.

Variety Selection

Variety trial information on peanuts can be found online at the UF/IFAS North Florida Research and Education Center Florida Peanut Team website for Florida, the University of Georgia Statewide Variety Testing website for Georgia, and the Alabama Agricultural Experiment Station Official Variety Testing website for Alabama. Choosing a variety is an important decision for growers and often dictates yield, grade, management strategies, and markets. Overall productivity and profitability are the goal of variety selection. There are many varieties available with various characteristics, but high yields and grades are the most important factors to make a crop profitable for farmers. In addition to pod yield and grade, other factors should be considered including disease resistance, seed size, vine growth, and maturity. Varieties also differ considerably in their reactions to major peanut diseases. Fortunately, a uniform disease risk index is available to help users understand varietal differences in susceptibility to three major diseases: leaf spots, TSWV, and white mold (https://peanutrx.org). As discussed in this publication's section on diseases, TSWV-resistant varieties are relatively plentiful with many modern varieties scoring 10 risk points or fewer on the TSWV portion of the risk index. However, only varieties with risk points of 5 have sufficient resistance to score low risk when planted prior to May 1 and only under the following conditions: planted in twin rows using Thimet® with either more than 4 plants per foot of row in conventional tillage systems or 3–4 plants per foot in reduced tillage systems. Note that the addition of reduced tillage, which has become more common in peanut, creates low TSWV risk for varieties with 5–10 TSWV risk points, even with 3–4 plants per foot of row. Reduced tillage is not common, and achieving a plant stand of more than 4 plants per foot of row is difficult, especially with early planting when the soil is cooler.

Plant Population

Peanut seed have always been expensive and continue to be one of the higher-cost factors in production. Before TSWV became a problem, as few as 3 seeds were planted per foot of row. After TSWV became a problem, it was found that higher plant population reduced risk of TSWV, and the standard recommended seeding rate became 6 seeds per foot of row. This means an increased seed need from 85–100 lb/acre seed to 130–150 lb/acre seed, depending on variety seed size. Varieties vary considerably in seed size, even within a market type. In runner types, for example, varieties with the smallest seed have over 850 seeds per pound whereas varieties with the largest seed have around 650 seeds per pound. This difference in seed size means that the cost of seed can vary as much as $25 per acre from the largest to the smallest type.

Crop Rotation

Crop rotation is the most important cultural practice that is recommended for all crops and especially for peanuts. Rotation is recommended to reduce the effects of pests (e.g., disease, nematode, insects, and weeds). A general recommendation is for two years of other non-leguminous cash crops to be grown before peanuts are planted in the same field. Common rotational systems in Florida include peanut followed by two years of cotton or corn. Leaf spot control is usually accomplished with a routine fungicide program, but data shows that rotation with cotton or corn can reduce the incidence and severity of disease. These crops reduce pest populations (nematode, fungi, etc.) and allow for new control options from the toolbox, especially where herbicides are concerned (e.g., control options for Palmer amaranth, Benghal dayflower, etc.). Good rotations produce more profit and reduce the amount of needed management and inputs.

Alternate cropping systems where peanuts are planted after bahiagrass or winter grazing have shown beneficial impacts on peanut yield, pest management, and increased tolerance to drought conditions due to improved root systems (Sidhu et al. 2018). These systems are not widely adopted in Florida due to socioeconomic reasons, but they hold potential as a resilient cropping system.

Peanut Fertilization

Soil tests from samples taken immediately after crop harvest in the fall can be used to determine lime and fertilizer requirements for crops for the coming year. Soil test results will indicate whether there are sufficient nutrients available to support peanut growth without direct fertilization, which sometimes occurs due to residual fertilizer from previous crops. Generally, calcium (Ca) and magnesium (Mg) are supplied through lime applications that raise pH (see the Liming and pH section of this publication). Other macronutrients, such as phosphorus (P) and potassium (K), can be supplied at rates based on soil test values (Mylavarapu et al. 2021). Micronutrient deficiencies are relatively rare when pH is well-managed.

Scouting for symptoms of nutrient deficiency is a worthwhile time investment. Common symptoms include yellowing, which occurs for several reasons including poor nodulation (see the Improving Nodulation and N Fixation section of this publication), secondary or micronutrient deficiencies, waterlogged soils, or herbicide damage. Plants usually grow out of yellowing from waterlogging once soils dry. Micronutrient deficiencies can occur when pH is high and typically result in yellowing of the newest growth. Sandy soils are most likely to be deficient in boron (B) or manganese (Mn). Boron is only needed in small amounts by plants, but it is critical for building cell walls and elongating roots. It is also critical for seed development and seed quality when peanut is being grown for seed production. When applying boron to soils, keep rates below 0.75 lb/acre to avoid boron toxicity. Foliar rates of boron should be kept below 0.5 lb/acre. Full information about boron management in peanut can be found in EDIS publication SL366 (Mylavarapu et al. 2019). While boron deficiencies are generally due to coarse-textured soils, not pH management, manganese deficiencies are more commonly associated with high pH (pH>6.3). Manganese applications can be made to the crop, or a base application may be made at planting. It is possible to lower the pH through acid-forming fertilizers such as ammonium sulfate; however, applications of a few pounds of micronutrient may be more cost-effective, and the response will be quicker than changing the pH.

Liming and pH

Lime should be added if the soil pH is below 5.8, with the target pH being 6.2–6.5. Keeping pH within the optimal range can improve the availability of Ca, Mg, P, and micronutrients. Fall is a good time of year to apply lime because it may take up to six months for it to fully react. However, some reaction occurs soon after application. If lime is needed, either a dolomitic or calcitic lime can be used to raise pH. Calcitic lime supplies the Ca while dolomitic lime supplies both Ca and Mg. More information on soil liming is found in EDIS publication SL519 (Sharma et al. 2024).

Lime can be tilled in or applied on the soil surface based on producer preference and machinery availability. Georgia research has shown that surface-applied lime provides more Ca to subsequent peanut crops than incorporated lime applications (University of Georgia Extension 2024). A high Ca and P layer can develop in the top 2 to 3 inches after many years of surface applications of fertilizer and lime, although this pattern is less pronounced in sandy fields with irrigation.

Calcium and Gypsum

Ca is routinely applied as gypsum (CaSO4) at pegging on sandy soils for rapid replenishment of soil solution Ca. In a recent study, it has been found that around 92% of Ca is absorbed by the pods within 20 to 80 days of peg penetration into the soil (Singh et al. 2025). Therefore, gypsum should typically be applied at early bloom so pods can absorb nutrients from the soil. The timing of application works closely with the soil type. Well-drained, sandy soils, ideal for peanuts, can be more prone to leaching. This explains why gypsum is typically applied at bloom rather than at planting: if the mineral is applied too early, it can leach faster because of its water-soluble properties. Moreover, because developing pods are absorbing Ca dissolved in the soil solution through the hull during the 60- to 90-day "peak pod fill" period, applying gypsum after 100 days of planting is too late.

Test soils and apply needed amounts of Ca for good yields and quality. To determine the needed Ca fertilization, the initial crucial step is to conduct pegging zone soil sampling (3 inches deep, next to the peanut row, after emergence) to calculate the existing Ca levels in the soil. Determining the Ca needs for peanuts based on soil samples collected in January or February at 6 inches or deeper is not as reliable as pegging zone soil sampling after peanut emergence. Details of calcium fertilization on peanuts are available in EDIS publication SS-AGR-487 (Singh et al. 2025). There is no need to apply gypsum if the pegging zone soil samples show 500 lb/acre (or 250 ppm) of soil test Ca, and when the Ca:K ratio is 3:1. However, if both requirements are not met, supplemental Ca will be needed for peanut production. All recommendations are based on the Mehlich-1 extraction method; these recommendations are not reliable when other extraction methods such as Mehlich-3 or ammonium acetate are used. Soil test levels of about 500 lb/acre of Ca result in maximum yields of runner peanuts while levels almost double this are necessary for maximum yields of Virginia peanuts. In general, runner and Spanish peanuts require around 200 lb/acre of elemental Ca while large-seeded Virginia peanuts require around 400 lb/acre of elemental Ca. Peanuts grown for seed should receive the application of gypsum at the rate of 1000 lb/acre regardless of soil test Ca levels, because Ca is essential for good germination of peanut seeds.

Additionally, it is important to note that the response of gypsum application can vary between non-irrigated and irrigated peanut production. Data from the study conducted by Howe et al. (2012) shows that gypsum did not result in peanut yield increase in irrigated fields, but yields for non-irrigated peanuts were increased. It is mainly because the adequate soil moisture availability under irrigated conditions facilitated higher diffusion gradient and uptake of soil Ca, even at lower pegging zone soil Ca levels, and response of additional gypsum was not observed. However, in non-irrigated conditions where low soil moisture limited availability of soil Ca, a response to additional gypsum was observed. Therefore, a greater response to gypsum application is expected in non-irrigated peanut production.

Improving Nodulation and N Fixation

Fertility, pH, and environmental conditions can have strong impacts on the nitrogen (N)-fixing bacteria that form nodules on peanut roots. Nodulation is generally better when soil pH is above 6.0 and adequate Ca levels are present. Maximum peanut root growth occurs at a pH of about 7.3, while shoot growth, nodulation, and N fixation are best at a pH range of 5.9 to 6.3. Peanut fields need to be scouted five to six weeks after planting to assess early nodulation. An average of 15 large nodules (0.125 inch or larger) per taproot is considered good nodulation. Fewer than 10 nodules per taproot is considered marginal and fewer than 5 indicates poor nodulation. The common causes for marginal or poor nodulation include but are not limited to shallow planting, flooding, or drought conditions.

Peanuts may not always respond to rhizobium inoculation. The main reason for this is that there is an indigenous population of rhizobium called cowpea miscellany that is common to many native plants. These organisms are potentially able to nodulate a crop of peanuts grown for the first time in a field. However, inoculants act as insurance in providing needed N for plant growth, and their use is particularly important in fields that have not had peanut grown on them for several years or at all. If needed, a commercial inoculant can be applied to seed or in-furrow at planting to provide the needed bacteria. If using inoculants, proper placement of in-furrow inoculants, proper handling of inoculants, and their compatibility with other products applied at planting should be considered.

Planting Date and Depth

Peanuts were traditionally planted in April before TSWV. The disease has delayed the optimum planting window to May 10 through May 25. However, recent information with newer varieties shows that optimum yields may be obtained from plantings made around April 25 (Sidhu et al. 2019). Peanuts can do well planted through the first week of June but will suffer yield loss when planted later. Early-planted peanuts (any time in early April) could suffer a stand loss from cool soil temperatures. The highest numbers of thrips (*Frankliniella fusca*) that vector TSWV have occurred on April-planted peanuts; peanuts planted in May had lower populations. The population dynamics of thrips in non-crop plants or volunteer peanuts early in the season may serve as reservoirs for TSWV.

Peanuts may be planted deeper than any of the other row crops due to their large seed size. Peanut can emerge from 2 to 3 inches deep or deeper. However, like other seed high in oil content, it should be planted into moist soil with temperatures above 68°F for rapid germination and emergence.

When planting peanuts, handle seed gently and carefully. If seeds split, germination will be reduced, and a poor stand will result. Peanut seed should be planted in rows 30 to 36 inches apart. The distance between rows will be determined by the variety being planted and the equipment available. Many growers plant in twin rows, which are two rows 7 to 9 inches apart, with row centers 30 to 36 inches in width. Seed should be placed 2 to 4 inches apart in the rows depending on the row pattern and type of peanut. The seed should be placed 1.5–3 inches deep in light-textured soils and 1.5–2 inches deep in heavier-textured soils. After planting, the top of the seed rows should be level with or slightly raised above the middles. Many farmers plant peanuts on a bed to provide good water drainage away from the peanuts. If the soil is well drained, planting on a bed would not be necessary. Irrigation may be done ahead of planting to make the planting operation easier. If it is dry after planting, irrigation may be needed to provide adequate moisture for germination and emergence. If certain herbicides are applied at or soon after planting without any following rain or irrigation, weed control will be unsatisfactory. Therefore, irrigation to move the pesticides into the top 2 or 3 inches of soil would be beneficial. Likewise, soil temperature needs to be near 70°F for optimum germination, with the ideal range being from 64°F to 75°F. Planting should be delayed during years with cool, wet soil conditions for maximum germination. Peanut germination time is quicker in warm soil conditions than in cooler soil temperatures.

After planting, peanuts should be monitored routinely for proper growth and pest problems. If stands are poor or if the plants are weak and deformed, it may be necessary to replant to achieve a good stand of healthy peanuts. However, it is important to try to determine the reason for the poor stands. If stands are poor due to seed quality, a new seed source may be needed. If disease is the issue, an alternative seed treatment or in-furrow fungicide may be needed. If soil compaction, dryness, or other factors are causing the poor stands, then the problems should be corrected before the peanuts are replanted.

Peanut Disease Management

Peanut diseases cause significant economic losses if left unmanaged. However, not every field will experience disease outbreaks severe enough to impact yield. Diseases affecting peanuts can be categorized based on the plant parts they impact. Seedling diseases, such as Aspergillus crown rot and Pythium crown rot, can reduce plant stand and vigor early in the season, often thriving in wet or stressed conditions. Root and stem diseases, including Cylindrocladium black rot, Diplodia collar rot, Rhizoctonia limb rot, southern stem rot (also known as southern blight or white mold), and the pod rot complex, can weaken plants and reduce yield potential by causing decay in underground structures. Foliar diseases such as early and late leaf spot and peanut rust can rapidly defoliate plants, compromising their ability to produce pods and reducing yield quality. Additionally, viral diseases such as tomato spotted wilt can cause stunting, yield loss, and plant death, with severity influenced by factors such as planting date and variety selection. Understanding the conditions that favor disease development, combined with an integrated disease management strategy, is essential for minimizing losses. Identification of disease can be difficult, but UF/IFAS Extension has plant diagnostic clinics located around the state that can assist with peanut disease identification (Peres et al. 2021). Below are descriptions of the most common and economically significant peanut diseases, along with information on favorable conditions and management approaches. Extension specialists from across the southeastern U.S. have developed a disease management tool called Peanut Rx (https://peanutrx.org/index.html). The tool evaluates scenarios that involve three major diseases of peanut: leaf spots, stem rot, and tomato spotted wilt virus. Real-time risk scenarios can be generated using the website listed above. Table 1 presents a summary of the overall risk values.

Leaf Spot Diseases

Leaf spot diseases, including early leaf spot (*Passalora arachidicola*) and late leaf spot (*Nothopassalora personata*), are among the most economically significant diseases in peanut production, often requiring intensive fungicide management to prevent severe defoliation. These diseases thrive in warm, wet conditions, making their severity highly dependent on weather patterns. If peanuts are planted late, fungicide applications should begin around 30 days **after emergence**, but early-planted peanuts should receive their first application between 30 and 45 days **after planting**. Managing leaf spot is critical, as defoliation from these diseases can contribute to increased white mold (*Agroathelia rolfsii*) severity by providing the fungus with decaying leaf material as a food source.

Fungicide applications are one of the largest costs in peanut production, and strategic use is essential for effective control. Typically, a spray interval of 10 to 14 days is recommended, although more frequent applications may be needed during periods of frequent rainfall. However, fungicide resistance has become a concern with leaf spot management, particularly with the QoI (strobilurin) fungicides, classified under FRAC Group 11, which have shown reduced efficacy against both early and late leaf spot in Florida. Resistance management strategies, such as rotating fungicides with different modes of action and incorporating multi-site fungicides, are critical to maintaining control efficacy. More information on fungicide resistance management can be found at www.frac.info.

Southern Stem Rot, White Mold, Southern Blight

Southern stem rot, also known as southern blight or white mold, is caused by *Agroathelia rolfsii* and is one of the most destructive soilborne diseases in peanut production. This pathogen thrives in hot, moist conditions, attacking stems, pegs, and pods at or just below the soil surface. The disease is often first noticed as wilting plants, with white fungal mycelium and characteristic mustard-seed-like sclerotia developing at the base of infected stems. Stem rot can cause severe yield losses if not properly managed with variety selection and fungicide sprays. For information on the susceptibility of commercial varieties, see Peanut Rx ratings at https://peanutrx.org.

Fungicide applications are critical for controlling stem rot, with targeted sprays at approximately 60 and 90 days after planting being essential to suppress disease development. Unlike foliar disease management, effective stem rot management requires fungicides to reach the soil surface, where the pathogen is active. This can be achieved through various mechanisms, including irrigation, rainfall, or nighttime applications, which help move the fungicide down to the base of the plant. Choosing the right timing and method of fungicide application is crucial to ensure optimal protection.

In addition to fungicide programs, cultural practices such as variety selection, crop rotation, deep tillage, and avoiding excessive vine growth can help reduce disease pressure. Because stem rot often develops in fields with high residue and dense canopies, promoting good air circulation and maintaining proper plant spacing can further aid in management. An integrated approach combining fungicide applications with cultural practices is necessary to limit the impact of stem rot on peanut production.

Tomato Spotted Wilt Virus

Tomato spotted wilt virus (TSWV) has significantly influenced peanut production in the southeastern U.S. for over 30 years, leading to major changes in management practices. Although TSWV outbreaks have become less severe over time, the disease can still cause considerable yield losses. The introduction of TSWV-resistant cultivars has been one of the most impactful changes, with modern varieties offering improved protection. Additionally, planting dates have shifted to a later date, now typically between May 10 and May 25, since early planting increases TSWV risk. Planting low-risk TSWV varieties is a best management practice. Higher seeding rates, targeting at least 4 plants per foot of row, help minimize disease severity. Among insecticides, only phorate (Thimet® 20G) has been consistently effective in reducing TSWV risk, not by controlling thrips but through a physiological response in the plant. Twin-row planting and conservation tillage also contribute to lower disease incidence. The use of Classic® herbicide has been associated with increased severity and is generally avoided.

Peanut Rust

Peanut rust, caused by *Puccinia arachidis*, is a foliar disease that can rapidly defoliate plants under warm, humid conditions (e.g., tropical storms), leading to significant yield losses if left unmanaged. It occurs sporadically across Florida's peanut production regions and can be exacerbated by the presence of early and late leaf spot pathogens. Peanut plants are susceptible to rust at any developmental stage, but symptoms typically do not appear until after canopy closure, around 60 to 110 days after planting. Infected plants may initially appear yellowish, and in severe cases, defoliation can cause "burn out" areas in the field. The most distinctive sign of infection is the formation of orange to brown pustules (uredinia) on the lower leaf surface, which produce urediniospores capable of spreading rapidly under favorable conditions.

Management of peanut rust includes cultural practices such as the removal of volunteer peanut plants to reduce inoculum. Fungicides remain an effective tool, with triazole (DMI, FRAC 3) and strobilurin (QoI, FRAC 11) fungicides still providing control. Common active ingredients include cyproconazole, tebuconazole, prothioconazole, and tetraconazole from the triazole group, and pyraclostrobin and azoxystrobin from the strobilurin group. Some commercial fungicides, such as Elatus® and Fontelis®, may also be effective, but data on their performance in Florida is limited due to the sporadic nature of the disease. If peanut rust is detected in a field, it is recommended to integrate these fungicides into a foliar disease management program and consider shortening spray intervals. To prevent resistance development, triazole and strobilurin fungicides should not be used alone, but in combination with other modes of action such as chlorothalonil. An integrated approach, combining cultural and chemical controls, remains the best strategy for managing peanut rust and minimizing its impact on yield.

Aspergillus Crown Rot

Aspergillus crown rot, caused primarily by *Aspergillus niger*, is a significant disease affecting peanut production, leading to seedling damping-off, crown rot, and stand losses under warm and dry conditions. Management strategies often rely on fungicide seed treatments and in-furrow applications; however, resistance to quinone outside inhibitor (QoI) fungicides has been observed in *A. niger* populations, reducing the efficacy of these products. This resistance limits the effectiveness of commonly used fungicides such as azoxystrobin, necessitating the integration of alternative management approaches, including the use of fungicides with different modes of action, resistant cultivars, and improved agronomic practices to mitigate disease impact.

CBR, Rhizoctonia Limb Rot, and Diplodia Collar Rot

Cylindrocladium black rot (CBR), Rhizoctonia limb rot, and Diplodia collar rot are soilborne diseases that can severely affect peanut stands and yield. CBR, caused by *Cylindrocladium parasiticum*, leads to root rot, stem lesions, and plant wilting, often resulting in plant death. Unlike some other soilborne pathogens, CBR does not survive well in areas with cold winters, limiting its geographic distribution. It thrives in warm, moist soils and persists in infested debris for multiple seasons, making crop rotation and resistant cultivars key management strategies. Rhizoctonia limb rot, caused by *Rhizoctonia solani*, results in dark, sunken lesions on stems and pegs, which can girdle the plant and cause limb loss, particularly under humid conditions. Fungicide applications targeting soilborne pathogens can help manage Rhizoctonia limb rot, along with practices such as deep tillage and increased plant spacing to reduce moisture retention. Diplodia collar rot, caused by *Diplodia gossypina*, affects the base of the plant, leading to girdling and eventual collapse. Like CBR, it thrives in moist environments and is often associated with plant stress. Management includes improving drainage, using well-timed fungicide applications, and ensuring healthy plant stands through proper fertilization and irrigation practices. While each of these diseases requires different management approaches, an integrated strategy combining cultural, chemical, and genetic resistance remains the most effective way to mitigate their impacts on peanut production.

Plant-Parasitic Nematodes

Root-knot nematodes (*Meloidogyne arenaria* and *Meloidogyne javanica*) are among the most damaging plant-parasitic nematodes in peanut production, causing significant yield losses by reducing root size and efficiency, leading to stunted plants with fewer pegs and pods. Infection results in characteristic galling on roots, pegs, and pods, often accompanied by secondary fungal infections that exacerbate damage. Nematode populations can increase rapidly, completing multiple generations per growing season, which makes management a critical component of peanut production. Other nematodes, such as sting (*Belonolaimus longicaudatus*) and lesion nematodes (*Pratylenchus* spp.), can also be problematic in peanut. Sampling to confirm which nematodes are present in a field is foundational to managing nematodes. Details about sampling for nematodes and management strategies are provided in EDIS publication ENY069. As with other issues in peanut, an integrated management strategy is necessary to mitigate the impact of plant-parasitic nematodes.

Management of plant-parasitic nematodes in peanuts relies on a combination of cultural, chemical, and genetic approaches. Crop rotation with non-host crops can help reduce nematode populations, and non-host crops will vary by nematode species present. Root-knot nematode-resistant peanut cultivars such as 'TifNV-HighO/L', 'TifNV-HG', and 'Georgia-14N' offer effective suppression of root-knot nematodes but will not help with other nematodes. Chemical control options include soil fumigants such as 1,3-dichloropropene (Telone™ II) and non-fumigant nematicides such as fluopyram (Velum®) or aldicarb (AgLogic), which should be applied according to label instructions to maximize efficacy and minimize environmental impact. Additionally, improving soil health through organic amendments and management of weed hosts can further reduce nematode pressure.

Pest Management and Monitoring

Insects and mites can cause severe economic loss in peanut when populations exceed threshold levels. However, not every field will have pest populations high enough to cause economic loss. While there are many insects in peanut, not every insect is the same in terms of the injury they cause. Identifying and recognizing different insect and mite pests and their associated damage in a peanut field are necessary for pest management decision making. Populations of pests vary throughout the season, field to field, year to year, and across Florida. Much of this variation is due to the biology of different pests but can also be influenced by planting date, row pattern, irrigation, and climatic conditions. Understanding the risk factors that contribute to pest outbreaks and having a structured scouting program to detect pests before reaching threshold levels are key components to a successful insect management program. Described below are the most common/economically important insect and mite pests of peanut and potential conditions for outbreaks and sampling. A full list of insect and mite pests in peanut, economic thresholds, sampling methods, and control options by pest can be found in EDIS publication ENY2101 (Esquivel et al. 2023).

Thrips

Thrips are early-season seedling pests. Peak thrips activity and migration occur from early April through early May in the southeastern U.S., influenced by weather conditions. While there is a complex of thrips species in peanut, the primary thrips of concern is the tobacco thrips (*Frankliniella fusca* Hinds). Thrips feed on developing leaflets, leaving them scarred or deformed in appearance. In high numbers, thrips can cause stunting, where plants recover slowly and are potentially delayed in growth, leading to maturity issues. Thrips feeding seldom causes economic loss on its own. However, tobacco thrips are also a vector for TSWV, which can cause significant economic loss. Thrips occur in almost all fields, but conditions such as early planting, conventional tillage, single row pattern, poor stands, or no at-plant insecticide increase the risk of thrips pressure and subsequent TSWV incidence. Some ways to reduce these risks are to plant into residue (thrips do not like heavy residue), use a twin-row pattern (which allows for quicker canopy coverage), and use Thimet® 20-G (phorate) in-furrow (while others are effective at killing thrips, Thimet® is the only insecticide option that reduces TSWV incidence).

Caterpillars ("Worms")

Many types of foliage-feeding caterpillars infest peanut fields. In an individual field, populations of caterpillars will consist of a complex of two or more different species over the duration of the season. While peanut can handle and recover quickly from some caterpillar defoliation at low populations, significant defoliation from high populations can affect maturity and yield. Thresholds for all caterpillars are 4 to 8 caterpillars per row foot. The lower end of the threshold should be used in the early season when plants are small, and the higher end of the threshold should be used when plants are larger and vigorously growing. Proper sampling is important to monitor populations early before they reach threshold levels. Sampling consists of using a beat sheet to dislodge caterpillars from foliage in 3 feet of row at multiple sites across the field. Proper identification of caterpillars is important for choosing the most economical and effective insecticide active ingredient for control. See EDIS publication ENY2101 (Esquivel et al. 2023) for more information.

Lesser Cornstalk Borer

The lesser cornstalk borer (LCB) (*Elasmopalpus lignosellus*) is a significant pest in the southeastern United States. LCB damages peanuts in all stages of growth and will feed on any part of the plant that touches the soil, including pegs and pods. Feeding characteristics can be seen as wilted areas of foliage caused by the boring into the stems where they touch the soil. Below ground, they can feed on pods and allow a pathway for *Aspergillus* and white mold to colonize. When scouting fields, adult moths and wilting stems or foliage may be a sign of an active LCB infestation. They also favor plants that are isolated, like in a skip or turn row where a plant is surrounded by soil. Sampling is similar to that of other caterpillars. The threshold is when 30% of sites sampled (3/10) have fresh damage and larvae present. LCBs favor hot and dry conditions, as well as well-drained soils. Non-irrigated fields are at greater risk of LCB infestation than irrigated fields and should be scouted appropriately for growing LCB populations.

Two-Spotted Spider Mites

When present, the two-spotted spider mite (*Tetranychus urticae*) can be a significant pest in peanuts. Spider mites feed on the undersides of leaves, starting near the midribs, by slashing leaf tissue and feeding on plant fluids. This results in speckling of the upper leaf surface. As the population increases, leaves turn yellow and die, creating a visible "burn" effect. Spider mites also favor hot and dry conditions, and they multiply rapidly during periods of dry weather. Non-irrigated fields are at the greatest risk of spider mite outbreaks. Infestations often begin near the edge of the field adjacent to dirt roads and borders. Broad-spectrum insecticides such as organophosphates and pyrethroids can flare spider mite populations in favorable conditions because these also kill beneficial insects that keep spider mite populations in check. Only use registered miticides to control spider mite infestations.

Weed Management

Weed control is very important for obtaining maximum economic yields. All-season weed control is necessary because weeds present in the beginning of the season can cause difficult crop emergence and establishment, and weeds present at peanut digging and harvest can disrupt these operations, resulting in yield losses. Exploring crop rotation can be a valuable practice in weed management in peanuts. Palmer amaranth, sicklepod, Benghal dayflower, and annual morning glory species are a few broadleaf weeds that are persistent in peanut production and may be controlled by herbicides that can be used in the previous crop such as corn. Many growers have stopped using tillage after planting even if tillage was done to prepare a seedbed. Researchers have reported that each cultivation can result in the loss of 1 inch of soil moisture, which can have a major impact on peanuts in a dry year without irrigation (Faircloth et al. n.d.). However, tillage may be an effective tool for controlling weeds that emerge between rows. Cover crops may be an important cultural practice for weed management purposes in peanut. Recently, cover crops have demonstrated to increase early-season weed suppression, reducing the need for heavier herbicide inputs during the crop establishment phase without compromising digging and harvest. Chemical control is the only practice capable of providing higher levels of season-long weed control. Also, proper use of herbicides could provide the necessary weed control and eliminate the need for cultivation. Residual programs must address the weeds present in the fields. A few preemergence herbicides include chemistries from groups 2 (acetolactate synthase inhibitors), 3 (microtubule assembly inhibitors), 12 (phytoene desaturase inhibitors), 14 (protoporphyrinogen oxidase inhibitors), and 15 (very long chain fatty acid inhibitors). In general, herbicide groups 12 and 14 will be more effective in larger-seeded species than chemistries from group 15. In postemergence, paraquat (group 22) is labeled at the cracking stage. At later stages, a few options include herbicides from groups 2 (ALS inhibitors; i.e., imazapic, diclosulam, chlorimuron), 4 (auxin mimics; i.e., 2,4-DB), 6 (photosystem II inhibitor; i.e., bentazon), and 14 (PPO inhibitors; i.e., lactofen, acifluorfen). Graminicides (group 1, acetyl-CoA carboxylase inhibitors; i.e., clethodim, fluazifop-P-butyl) can also be used postemergence. Note that these postemergence herbicides can be included in a tank mix for applications at the cracking stage, and that this application is important and highly effective against Palmer amaranth, sicklepod, Florida beggarweed, and other species that are difficult to control. Overlapping residuals in postemergence applications with herbicides from group 15 are recommended to prevent the occurrence of late-emerging flushes. Importantly, for chemical weed control, applications of the labeled rates at the right stages and during proper weather conditions are a must to ensure efficacy.

Irrigation

In the southeastern United States, peanuts are typically irrigated using overhead systems such as center pivot or linear move irrigation. Peanuts thrive on sandy soils and exhibit some tolerance to drought at specific growth stages. They are less vulnerable to drought during planting, as they can emerge from depths of up to 2 to 3 inches. However, sufficient moisture is essential to achieve uniform stands. Certain growth stages require higher soil moisture levels; otherwise, yields, quality, and grades may suffer. Water stress in early growth stages can impede seed growth by limiting peg penetration into the soil, affecting emergence and initial growth.

The peak water demand occurs during the pod development stage, typically between 55 to 100 days after planting. In the southeastern U.S., pod development spans from late July through early September. During this growth stage, the daily crop water requirement can reach up to 0.20 inch (Sharma et al. 2020). Adequate irrigation during pod development is crucial for transporting calcium through the soil solution to the pegs. However, excessive moisture or irrigation beyond crop requirements during this growth stage can elevate the risk of soilborne diseases.

Between 105 and 140 days after planting, as pods mature, crop water demand decreases. Water stress at this stage can cause pod detachment from stems (Sharma et al. 2020), while excessive soil moisture or late-season irrigation may exacerbate diseases such as CBR, Sclerotinia blight, and leaf spot diseases. In dry years, irrigation can mitigate outbreaks of spider mites and lesser corn stalk borers, facilitate digging, and reduce aflatoxin contamination risk. Table 2 illustrates peanut growth stages and the plants' water requirement during each growth stage.

Determining Maturity

Determination of optimum peanut maturity can be done in several ways, but pod blasting (pressure washer with a rotating turbo nozzle) to strip away the outer pod layer to expose colors indicative of the maturity stage has become the primary method. Pod blasting is widely used and sample evaluations are common practice at many UF/IFAS Extension offices. This process saves considerable time and improves the accuracy over hand-scraping for determining the pod maturity profile. A pressure washer and wire basket serve as an inexpensive, quick way to determine maturity. The key to a pressure washer's effectiveness during pod blasting is a rotating turbo nozzle. The turbo nozzle takes a 0-degree jet stream, which has the highest stripping power of any nozzle, rotates it, and spreads it out over a wide area. An electric pressure washer providing 1.5 GPM at 1300 PSI is adequate. In higher-capacity, engine-driven models, pressure should be reduced to approximately 1000 PSI with the pressure regulator or by throttling down the engine to prevent shredding pods.

Prior to blasting, pick all pods off plants for samples of about 200 pods from different locations in the field. Place pods in a wire/mesh basket and place it in a 5-gallon bucket to prevent splashing. The bucket should be equipped with a drain to prevent water buildup. Hold the pressure washer nozzle approximately 12 inches away and blast while vigorously shaking the basket. Watch the pods carefully. Stop after approximately 30 seconds and remove the immatures (yellows) before they disintegrate. Place the more advanced pods (orange to black) back into the basket and blast until the entire outer pod layer has been removed. The entire process should be completed within three minutes or fewer. Blasted pods can be put on a maturity profile board to classify and rank the fields for time to harvest. For more in-depth information on maturity sampling and evaluation, refer to EDIS publication SS-AGR-408 (Carter et al. 2023).

Peanut Harvest and Grades

One of the most critical parts of growing peanuts is timing harvest to maximize grade and yield. Two measurements are made from a sample taken directly out of the drying wagon. Foreign material (FM) denotes the percent or amount of plant material, rocks, or soil that is in a load of peanuts. Foreign material increases if soils are either too wet or too dry during digging, or if peanut vines are not properly cured. Peanut combines can be adjusted to some extent to blow more air or less air to help reduce the trash along with having the vines in the proper condition when harvesting. Loose shelled kernels (LSK) are the percent of peanut shelled during the harvest process, which may be due to excessively high picker speed, too much air blowing peanuts against something sharp in the combine, or aggressively set picker fingers.

A sample is then taken from wagons or trucks after harvest and shelled, and the following are determined on a percentage basis: Sound mature kernels (SMK) are the percentage of those peanut that are shelled for grading and determined to be mature, while sound splits (SS) are the percentage that are good peanuts but are split. Other kernels (OK) are the percentage of other kernels that may be immature or very small. Extra-large kernels (ELK) are the percentage of extra-large kernels that ride over a certain screen size that manufacturers may use for special candy purposes. Certain peanuts have a tendency to have larger seed than others, but growers are seldom paid for this. Damaged kernels (DK) are kernels that are damaged due to disease, insects, or other factors. Grades are based mostly on total sound mature kernels (TSMK+SS). Grades in the mid-70s are considered good and are indicative of optimum timing on inverting. If the SMK were 73% and SS were 2%, the grade would be 75%. The other 25% would be shells and OK or DK. Some peanut varieties have thicker shells and will have lower grades than other varieties. Many growers may start inverting too soon if they have large acreages, and the first few loads of peanuts will grade in the upper 60s or low 70s. Low grades can also be caused by periods of drought when pegs did not set. This could lead to "split" crops of peanuts, one that sets early and one that sets later when moisture returns. This makes it difficult to determine when to invert because there will be some very mature peanuts along with some very immature peanuts that were set later. With irrigated peanuts, it is usually easier to determine the proper digging date because moisture can be supplied for a continuous set of peanuts. However, other factors such as disease control and weather conditions can influence digging date and often cause yield losses. Vines should be kept disease free as much as possible in case weather forces you to delay digging by a week or more. Healthy vines will retain mature peanuts better than diseased vines. Digging peanuts a week early or a week late can make a difference of 500 lb/acre or more in yield and several points in grade. Five hundred pounds of peanuts are worth about $90, and the difference between a grade of 69 and 75 on a 4000 lb/acre peanut crop is worth about $50. One key for high yields and profit is to keep vines healthy and to dig on time.

Management Tips

- Because peanuts require a high level of management, many decisions are necessary while growing the crop. Fortunately, most of these decisions can be made prior to planting. For example, land selection, variety, and crop rotation are of vital importance in preventing many weed, insect, disease, and nematode problems. If all pest problems in a field are monitored for the crop grown each year, then the selection of pesticides is much easier and many problems can be averted.
- Whether or not to irrigate is a major decision because good yields cannot be maintained during dry years. If irrigation is utilized, a grower must be knowledgeable and prudent in use of supplemental water. White mold and pod rots are diseases that can be made more severe with poor irrigation management.
- Gypsum can be used to supply calcium to peanuts. Calcium is needed by the peanuts to ensure well-filled pods, reduce pod rots caused by imbalances in other nutrients, and improve germination of peanuts produced for seed. The need for gypsum can be determined by soil tests. If needed, the gypsum should be applied no later than early flowering. Gypsum should be considered on all non-irrigated fields.
- Insecticide applications to the peanut foliage should be determined by scouting procedures that include insect counts of various species. Other insect pests, such as lesser corn stalk borers and cutworms, may attack belowground peanut parts and thus require scouting techniques unique to peanuts.
- Fungicide applications are generally required for high peanut yields. Leaf spot is usually the major disease of the crop. Normally, fungicide applications must be

made on 10- to 14-day intervals, but it is recommended that growers consider information from disease-risk models and weather-based disease forecasts. The decision on which fungicides to use should be based on the disease history of the field, cultivar being grown, crop rotation history, prevailing weather, and several other environmental factors.

- Most weed problems in the growing crop can be controlled by herbicide applications. Timing is of critical importance in these herbicide applications. In some instances, cultivation, hoeing, and/or removing by hand would be the preferred means of weed control on herbicide-resistant weeds. If cultivating, do not throw dirt on the peanut vines because white mold problems can increase if the vines are partially covered with soil.
- Because all pods do not mature at the same time, one of the most difficult problems in producing peanuts is determining when to harvest. Runner peanuts normally mature approximately 135–155 days after planting. However, if Valencia peanuts are grown for boiling purposes, they may mature in as few as 75 days from planting in midsummer. The same variety may take 15 to 30 days longer to mature when planted in early or late season. Therefore, it is not possible to accurately predict at planting when a peanut crop will be ready to harvest. For commercial growers, the peanut maturity profile is the preferred method to check pod maturity. Years of experience on a particular variety will also help growers determine when to start looking for maturity.
- After inverting, peanuts have a moisture content of 25%–50% and must be dried unless they are for consumption as boiled or green peanuts. Most peanuts are left in the field to dry for 3–5 days prior to combining for a moisture content close to 10%. After harvesting, artificial drying is normally used overnight to finish drying peanut to about 8% moisture. Harvest and dry peanuts carefully, because the fungus that causes aflatoxin development is favored by poor drying techniques.
- Peanuts should be stored in an insect-free area. An insecticide is normally sprayed on the stored peanuts to prevent insect infestations. The moisture content of the peanuts should be below 10% for safe, long-term storage. The storage facility should be one that prevents moisture accumulation in or around the peanuts.

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Tables

Table 1. Low, medium, and high disease risk index values for Peanut Rx.

<table>
<tr><th rowspan="2"></th><th rowspan="2">Spotted Wilt Points</th><th rowspan="2">Leaf Spot Points</th><th colspan="2">Soilborne Pathogen Points</th></tr>
<tr><th>White Mold</th><th>Limb Rot</th></tr>
<tr><td>High risk</td><td>=115</td><td>65–100</td><td>55–80</td><td>To be determined</td></tr>
<tr><td colspan="5">High risk for fungal diseases: Growers should always use a full fungicide input program in a high-risk situation.</td></tr>
<tr><td>Medium risk</td><td>70–110</td><td>40–60</td><td>30–50</td><td>To be determined</td></tr>
<tr><td colspan="5">Medium risk for fungal diseases: Growers can expect better performance from standard fungicide programs. Reduced fungicide programs in research studies have been successfully implemented when conditions are not favorable for disease spread.</td></tr>
<tr><td>Low risk</td><td>=65</td><td>10–35</td><td>10–25</td><td>To be determined</td></tr>
<tr><td colspan="5">Low risk for fungal diseases: These fields are likely to have the least impact from fungal disease. Growers have made the management decisions that offer maximum benefit in reducing the potential for severe disease. These fields are strong candidates for modified disease management programs that require a reduced number of fungicide applications.</td></tr>
</table>

Table 2. Critical periods for soil moisture for peanuts (Sharma et al. 2020).

Week of Growth	Growth Stage	Water Requirements (inch/day)
Weeks 1–2	Planting to emergence	0.04–0.07
Weeks 3–8	Emergence to pegging/flowering	0.07–0.17
Weeks 8–15	Pod development	0.12–0.20
Weeks 16–22	Pod maturity	0.011–0.04

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