1994 PROCEEDINGS

APRES

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Storage, Curing, Processing, & Utilization

Weed Science

POSTERS

PEANUT QUALITY SYMPOSIUM

What is Quality and What are the Problems? From a Grower's View. G.A. SULLIVAN*. Crop Science Department, N.C. State University, Raleigh, NC 27695-7620.
Peanut growers take pride in delivering quality peanuts to the marketplace. From a grower's viewpoint, quality peanuts are those that are fully mature segregation 1 peanuts that have been properly cured to a safe storage moisture, low in loose shelled kernels and foreign material. In areas producing large-seeded Virginia-types for the in-shell market an additional attribute is "bright hulls". Growers also consider flavor and pesticide residues below tolerance to be quality attributes. They assume that if they plant a recommended cultivar, follow recommended cultural practices and have reasonable weather conditions then these attributes are built into their production program. The major quality attribute that growers have control over is maturity of the peanuts. Harvesting mature peanuts with optimum sound mature kernel levels has a major economic impact on grower profits. Therefore it is only fair for growers to equate quality with the economic incentives that return him the highest dollar for his crop. On 50 acres of peanuts that average 3,000 lbs., the value difference between peanuts at 68 percent SMK and 74 percent SMK based on the 1993 loan schedule for VA type peanuts is $4215.00. Growers know that maturity contributes to flavor and market quality, but they can't measure flavor at the farm level. However, they can measure maturity as reflected in the grade, and they do get paid for a higher grade. Most growers recognize that flavor can be affected by curing procedures, and the growers I know are careful to cure their peanuts properly before delivering peanut to the buying point. Growers have difficulty delivering the quality expected because of imperfections in the production system. Most growers have less than optimum soil resources, experience adverse weather, have labor problems and have to produce the peanut crop with imperfect production and harvesting equipment.

Peanut Quality from a Shellers Point of View. JACK SIMPSON* Birdsong Peanuts, Gorman, TX 76454.
There are a variety of factors that peanut shellers feel have an effect on peanut quality. Peanut quality is a team effort which involves plant breeders, farmers, sheller-warehousemen, and manufacturers. A sheller cannot improve the quality of a peanut, but he can try to preserve the quality of the peanut from the time it comes into his possession until it is shipped. Quality begins with the variety chosen to plant by the farmer, a variety into which a plant geneticist has bred good yield and grade potential, disease resistance, desirable flavor, good shelling and blanching capabilities, and extended shelf life. The farmer must use recommended production and harvesting techniques as he readies his crop for market. Our farmer friend has another partner on his team who has a big part in the quality of the peanut crop and that is, Mother Nature. She can definitely be a positive or a negative factor. Now that the farmer has harvested his crop, it is the warehousemen-shellers turn. The warehousemen must use proper drying and handling procedures to insure that the quality received from the producer is maintained until it is time to shell the peanut. Shellers operate in a high risk environment, risks that are associated with quality, economics, market, environmental and regulatory factors. This is evident by the rapid decrease in the number of shellers in the past few years. Shellers must maintain the highest level of handling, storage and shelling techniques possible to assure their part in maintaining quality as they pass the peanuts on to the manufacturer. The manufacturer in turn must serve a final product which meets consumer approval. If the consumer criteria is met, then we as a team have accomplished our respective jobs.

Major Quality Problems of Peanut Manufacturers. Clyde T. Young, Food Science, North Carolina State University, Raleigh, NC 27695-7624.

Peanut manufacturers (peanut butter, roasted peanuts, candies, and inshell peanuts) were surveyed for their definition of quality and their major quality problems. A total of 22 responses were received. As expected, the definition of quality varied, several terms appeared in almost all definitions. **Quality might be defined as consistent conformance to specifications with peanuts that are free of defects and have good peanut flavor that can be maintained over the shelf-life of the finished product.** Other terms used were: delighting your customer, safe, sanitary, meets the consumers expections, no foreign material, no aflatoxins, no off-flavors, free of frost and insect damage, uniform peanut flavor, and bright hulls (for inshell). These manufacturers were asked to list the three major quality problems (in order) and other major problems (in random order). **Most of those responding (64%) listed foreign material, flavor (and/or off-flavors), and aflatoxin as their top quality problems.** Results are:

1 quality problem: foreign material - 8: flavor - 8: aflatoxin - 5: others -1;
2 quality problem: foreign material - 7: flavor - 7: aflatoxin - 6: others - 2;
3 quality problem: foreign material - 4: flavor - 4: aflatoxin - 5: others - 9;
and totals: foreign material - 19: flavor - 19: aflatoxin - 16: others - 12.

Some of the other major quality problems were variability of size, pesticides, splits, shipping, moisture condensation, small kernels, color of hulls, speck count in peanut butter, damaged peanuts, packaging, flavor training, variability in USDA grade certificate results, variability in incoming peanut quality, and shelf-life.

Peanut Quality From a Consumer's View. B. H. OWENS*, Virginia-Carolina Peanut Promotions, Nashville, NC 27856.

In today's world of mega choices in every product category, quality most frequently is the deciding factor in a consumer's purchase decision. To meet the consumer's demand for quality, peanuts and peanut products must consistently be of optimum flavor, fresh-not stale, free of foreign material and attractive in appearance. And to expand (or even maintain) marketshare for peanuts and peanut products, new low fat peanuts and peanut products need to be developed to accommodate the current emphasis on lowering fat intake. Quality factors which need to be addressed by research include the following:

Appearance

eye appeal - consumer buys with eyes.

- consistent color of skins of raw shelled peanuts
- consistent color of roasted peanuts
- inshells bright, free of dark shells
- free of foreign materials (including insects)
- attractive consumer friendly packaging which offers high perceived value as compared to other comparable products

Flavor Attributes

optimum peanutty flavor

- absence of off flavors
- freshness (staleness and rancidity are serious problems; shelf life needs to be extended)

Health/Nutrition

consumers are demanding lower fat foods

- USDA food guidelines suggest reduction of fat in diet of 30% of daily intake (also Heart & Cancer Associations)

Many opportunities exist for research scientists to address these consumer concerns so that the industry may deliver the highest quality peanut products to consumers. After all, it's the consumer who dictates the industry's future.

Peanut Quality Improvement Through Variety Development. D. A. KNAUFT. Crop Science Department, North Carolina State University, Raleigh NC 27695-7620.

When currently grown peanut cultivars are compared with varieties grown prior to implementation of cultivar development programs, it is clear that peanut quality has been improved through breeding. All segments of the peanut industry have benefitted from these breeding efforts. Further improvements in peanut quality can be made through exploitation of variability from cultivated peanut and wild species, as well as through molecular genetics. However, many quality attributes are complexly inherited, difficult to measure, and expensive to evaluate. If a quality characteristic is to be improved, there must be an economic reason to include the trait as an objective of a breeding program. The quality characteristic must have sufficient value to the industry that a grower will realize economic benefit from growing the cultivar and will make a cultivar choice based on that benefit. Without such an economic benefit, the quality characteristic must have sufficient value to the industry that it will support the incorporation of the trait into new cultivars. If quality improvement does not directly affect market share of a cultivar or is not support by the industry, it is unlikely a breeder can afford to include the characteristic in the breeding effort, even if the characteristic would improve peanut quality.

Things That Have Been, Are Being or Can be Done from the Pest Management Perspective to Improve Peanut Quality. T.A. LEE, JR.*, Texas Agricultural Extension Service, Stephenville, Texas 76401.

Many things fall jointly into the have been and are being done category. New disease control chemistry from Ciba and Miles is hitting the market in 1994. This is a result of many years of work and will significantly improve pod and kernel quality and yield. This improved quality will improve shelling and cleaning capacity. Weather monitoring disease forecasting efforts developed over the last several years are being incorporated into systems that are presently available to growers through an 800 telephone number. Improvements in irrigation type, timing, and amounts are being heavily used by growers to reduce several disease problems. In the area of needed development, more attention needs to be paid to a southern corn rootworm problem and a virulent strain of Rhizoctonia both on Texas Panhandle - Plains peanuts. East coast peanut workers feel that additional work needs to be done concerning quality losses from tomato spotted wilt. A better understanding of the damage caused by the feeding of the three cornered alfalfa weevil and potato leaf hopper is needed. The effect of leafspot control on pod and kernel maturity and flavor for the various peanut cultivars needs further study. Much of the industry believes that some type of direct incentive concerning price must be brought to bear if increased quality production is to be achieved. The shelling industry as well as manufacturers and growers must be involved in the incentive pricing of peanuts now or all be willing to live with the situation as it is.

What Has Been, Is Being, or Can Be Done to Improve Quality in Agronomic Practices.

J.P. BEASLEY, JR. The University of Georgia, Cooperative Extension Service, Tifton, GA 31793.

Peanut quality is critical to the marketability of United States grown peanuts. Quality is an important factor at all stages of production, handling, processing and manufacturing. The producer has the initial impact on parameters affecting overall peanut quality. Achieving the highest quality product possible has been a major goal of the peanut industry since 1986. At that time, five factors were identified as being the most important. These factors were: aflatoxin, foreign material, chemical residue, flavor and physiological maturity. There are numerous agronomic practices that affect quality. Quality improvment has been accomplished through new and improved herbicides that help reduce foreign material, reduction of gypsum rocks, and the release of pesticides with lower active ingredient per acre that potentially reduces chemical residues. However, the single most important agronomic practice that has been developed to improve quality is the Hull-Scrape Method for maturity determination. It has had a major bearing on producers being able to deliver mature kernels. Current research that focuses on quality include new irrigation strategies, such as EXNUT, Envirocaster and LEPA, new and more efficient pesticides, aflatoxin resistance and improved harvest equipment. Long-range goals of what can be done to improve quality include aflatoxin elimination through germplasm and cultivar development, reduced foreign material through better herbicides, pest resistant cultivars utilizing intergrated pest management, improvement in maturity and kernel size determination, more efficient harvesting and all peanut acreage on a three-year rotation.

What Has Been, Is Being, or Can Be Done to Improve Quality In Engineering Studies.

P.D. BLANKENSHIP*. USDA-ARS National Peanut Research Laboratory, Dawson GA 31742.

Four areas of post harvest engineering include: 1) foreign material (FM) and loose shelled kernel (LSK) removal, 2) aflatoxin reduction or elimination, 3) automated moisture control and 4) processing &/or handling equipment /systems. Vibrating screens, Farmers' Stock (FS) peanut cleaners and flow pipe extractors have been used to remove FM from FS peanuts before storage and other processes. The belt screen was evaluated by the industry to remove LSK prior to marketing and storage. Other equipment including an orbital screen and multiple separation belt screens are currently being evaluated for FM and LSK removal from FS peanuts. One opportunity for cleaner peanuts is improvement in separation systems of the combine. Methods to reduce aflatoxin have included industry evaluations of quantitative methods of analysis for potential use prior to grading or sorting prior to storage or shelling. Some improvements in machine vision systems (electronic eyes) have recently been made and offer promise for more improvement Properly controlled moisture is mandatory for quality. Systems to assist in moisture control during artificial drying and storage have recently been developed. Because harvesting equipment has become larger with higher flow rates, harvest periods are becoming shorter. Larger or more rapid drying systems are needed. Processing/handling systems being evaluated to improve quality include automated grading systems, specific gravity separation of FS peanuts, potato handling equipment and double roofs for warehouses. Three questions relative to quality improvement include: 1) is technology being transferred appropriately, 2) are scientists adequately relating research to economics and 3) is the peanut industry implementing available technology for quality improvement?

Improving Peanut Quality: What Is Being Done or Can Be Done In Marketing and the Peanut Program.

W. DON SHURLEY. Department of Agricultural and Applied Economics, University of Georgia, Cooperative Extension Service, Tifton, GA 31793.

The U.S. produces the highest, most consistent quality peanuts in the world. The pricing of U.S. peanuts both for domestic consumption and export is tied to the quota, two-tiered price support program. U.S. quality is controlled under USDA Marketing Agreement 146 and carried out by the Peanut Administrative Committee (PAC). The quality concerns most often voiced are aflatoxin and foreign material. In light of the decline in peanut consumption, "quality" must be expanded to include more market and consumer oriented identities such as acceptable fat content, reduced calories and visual attractiveness. In a recent National Peanut Council survey, 61 percent of consumers responding considered peanuts to be high in fat content and only 46 percent considered peanuts a healthy snack. NAFTA and GATT trade agreements and the uncertainty of foreign quality and supply could place a premium on U.S. peanuts even with changes in the price support mechanism. Under the present price support structure, growers receive deductions for foreign material, damage and visual *A. flavus* contamination. Quality begins with the grower. Within production technology and management constraints, growers will respond to economic signals given them. If quality needs to be improved, constraints must be removed and/or economic (price) signals changed such that added revenue equals or exceeds added cost. Despite claims, relatively speaking damage appears not to be a major quality problem at the grower level. Typically less than 1 percent of the U.S. crop is graded Seg 2 (2 percent or more damaged shells). Seg 2 peanuts are discounted $4-10 per ton per point over 1 percent. Discounts of approximately $1 per ton per point are also applied for foreign material over 4 percent. Previous research at the University of Georgia indicates that added chemical expenses can increase grade (% TSMK) and reduce foreign material but the results are very marginal. The present price structure does not reward the highest levels of input use. Seg 3 peanuts (visual *A. Flavus*) also do not present a major problem at the farm level. Seg 3's typically account for less than 2 percent of the U.S. crop. The problem occurs when peanuts graded Seg 1 are later found to contain above tolerance levels of aflatoxin. The economic signal to the farmer is sufficient. The present grading and price support structure, however, is not compatible with chemical testing that would be needed for earlier detection at the buying points. Peanut shellers participate in a self indemnification program. These funds represent benefits that could instead be passed on to the grower in the form of quality premiums and/or used to support chemical testing. Further study is needed to determine price differentials and contract specifications that would improve quality.

The Virginia-North Carolina Peanut Variety and Quality Evaluation Program - Blueprint for a National Program?

R. W. MOZINGO. Tidewater Agricultural Research and Extension Center, Virginia Tech, Suffolk, Virginia 23437.

Peanut production in the Virginia-Carolina area is concentrated in nine southeastern Virginia counties and 14 northeastern North Carolina counties. Since the state line divides this production area almost in half, Virginia Tech and North Carolina State University cooperate jointly to fund the Peanut Variety and Quality Evaluation Program housed at the Tidewater Agricultural Research and Extension Center in Suffolk, Virginia. The program objective is to improve peanut quality through variety development. Advanced breeding lines from the Virginia and North Carolina breeding programs may be entered for testing provided data are submitted by the breeder showing meritorious performance of each line. Tests are located at five sites throughout the Virginia-Carolina production area with all agronomic practices performed by project personnel. An advisory committee, composed of a grower, sheller, manufacturer, extension representative, and research representative from each state, works cooperatively with the project. The duties of the committee are to review data from each segment of the peanut industry, make recommendations concerning new variety releases, advise the program on future directions, and set quality standards to be used in the evaluation of advanced breeding lines. Data collected for review by the advisory committee include: agronomic and grade characteristics, milling characteristics, fatty acid composition and shelf-life, blanchability, oil and protein analysis, processor acceptance, and consumer acceptance. Since all segments of the industry are involved in making recommendations concerning variety releases, the peanut industry can be assured that newly released peanut varieties exhibit acceptable quality standards for the grower, sheller, manufacturer, processor, and consumer.

Domestic and Trade Policies - Implications for the U.S. Peanut Industry. S.M. FLETCHER* and D.H. CARLEY. Dept. of Agricultural and Applied Economics, University of Georgia, Griffin, GA 30223-1797.

The acceptance of the GATT trade agreement will impact on the domestic peanut industry. Based on the proposed tariff schedules and a world price level for shelled peanuts in the range of $600 to $700 mt, it is possible that peanuts above the minimum access would be imported into the U.S. This is based on the assumption that the price support for domestic marketing quota would remain at its current level. Decreasing the marketing quota to adjust to minimum access imports and decreasing the support price to meet world price competition would reduce gross income to peanut farmers. Income reduction to peanut farmers would have an economic impact on rural communities both in income flow and tax base. Quota rental rates would decrease impacting on rental income. The buyer-sheller sector could be impacted by a reduction in peanut production, especially in some less efficient production areas due to possible price reductions. Imported peanuts and price variability will increase their price risk. Inventory flow will become more important. This could lead to a need for changes in marketing methods and strategies, changes in contractual relationships, and increasing emphasis on buying high quality peanuts. With the opening of the U.S. market to imports, peanut product manufacturers would have additional sources for the supplies of peanuts . Manufacturers would need to determine the relative value of peanuts from all sources. Reliable quality and delivery will be very important. Manufacturers will face increased price variability and risk. With potentially decreasing prices over time, they will be faced with adjusting to a price decreasing raw product. Thus, inventory flow will become very important. With a changing competitive environment, pricing methods and marketing strategies will change. As one can see, the U.S. peanut industry is facing a new world. However, we have some excellent peanut leaders. These times remind one of a Winston Churchill quote: "If you don't take change by the hand, change will take you by the throat."

Domestic and Trade Policies: The Future of the U.S. Peanut Industry, J. D. DORSETT, Golden Peanut Company, Atlanta, Georgia.

It is impossible to market the U.S. crop at double the world rice now that the U.S. market is not protected from foreign competition. NAFTA is now the law of the land. Whether or not GATT passes, with NAFTA in effect, 75% of the U.S. peanut market is vulnerable to peanut butter and confections produced from Mexican and other foreign origin peanuts. There is no support price on Mexican grown peanuts, and the Mexican market is about $450.00 per short ton compared to $680.00 per short ton in the United States. This price difference is so compelling that virtually all domestic users of peanut butter will be forced to use only foreign peanut butter or at least a blend of domestic and imported peanut butter. As a result, U.S. farmers will lose their market, and shellers and manufacturers will have to close their domestic factories as the growing, shelling, and manufacturing processes move to foreign origins. The only way to prevent this is to lower the U.S. quota support price in order to make U.S. peanuts competitive with foreign origins. U.S. peanuts do have some advantages in logistics and infrastructure so a maximum of $550.00 support price may do it. The industry can't wait until the imports are streaming in to act. As we leaned from Japan, once the factories and other processes are in place, they won't go away, and they will be competitors forever. There are already factories in Argentina, Canada and China that were built purely for the purpose of exporting to the United States. Let's not subsidize any plants in Mexico. The United States can compete with anyone in the world if we have a level playing field. There are a number of farmers in the U.S. growing export peanuts for $350 who would grow quota peanuts for much less than the current domestic support price of $680.00. If we do not allow our farmers to do so, then we will lose an industry that has been a part of our nation's agribusiness since the turn of the century.

Evaluating Peanut Production Efficiency in a Changing Market Environment. D.H. CARLEY* and S.M. FLETCHER. Dept. of Agricultural and Applied Economics, University of Georgia, Griffin, GA 30223-1797.

Longer-term outlook indicates increasing competition in world peanut markets. Peanut production practices in the United States may need to be adjusted to meet world market competition. World market prices range from \$350 to \$450 per 907 kg farmers' stock basis. Cost of production in China ranges from \$150 to \$240 per 907 kg. Research and extension effort will need to focus on both physical and economic efficiency. Instead of maximizing peanut production per acre, peanut farmers will need to maximize long-term net income per acre. Is it profitable to use additional input to gain additional output? Research has shown that the seeding rate may be decreased without affecting yields. Herbicide application over no application and leafspot control improve yields. However, the quantity of herbicide for acceptable control or the frequency of application of leafspot chemicals as related to yield effect seems open to debate. For each 45 kg increase in yield, the marginal revenue at support price increases \$34. The marginal cost of increasing yield may likewise increase up to the same amount. At a lower peanut price, the marginal revenue to marginal cost relationship is lower resulting in yields being profitable only at lower levels. In a market environment that may result in decreasing prices for peanuts, farmers must seek cost reduction opportunities. The first reduction may be in quota and land rents. Finally input costs become critical. The changing economic relationships will impact on where peanuts are produced. USDA analysis indicates that production costs may vary at least \$100 per 907 kg between regions. Within regions the most economically efficient farmers will remain. Developments from biotechnology such as disease resistance varieties may be one answer. Acceptance of new varieties by manufacturers will be necessary. Policy improvement to enhance the ability to produce and market high quality peanuts will be needed. Teamwork across university research and extension disciplines, by administrators, the USDA, and the total industry will be needed to meet the challenges of the future.

The V-C Perspective on Peanut Production Efficiency in a Changing Market Environment. G.A. SULLIVAN*. Crop Science Department, N.C. State University, Raleigh, NC 27695-7620.

Peanut growers in the V-C area can compete in the domestic and world market if we efficiently utilize our resources and the crop management expertise that is available. The production of quality peanuts will continue to be the most important attribute in competing in the world market. In the early 1960's, the extension services in these states demonstrated to growers the economic advantage of new technology through the use of aptly named all-practice demonstrations. Growers were encouraged to adopt any new cultural or chemical practice that resulted in improved yields. To the credit of influential extension specialists and county agents, over two-thirds of our growers adopted a cookbook approach to peanut culture. Growers quickly learned to use every practice, every chemical and every piece of equipment that tended to improve yields. As recommendations and products have become more refined, growers have been reluctant to shift from the all-practice concept of using everything available to the more conservative approach of precise, site-specific application of crop production inputs. Intensive management will be required to improve the efficiency of peanut production. Growers will need to economically justify each additional unit of production input relative to its marginal return. Growers are likely to use pest advisory services and intensive scouting to identify production risks. New cultivars resistant to production risks will contribute immeasurably to reducing production costs. Growers must substitute crop management for the cookbook approach to farming. New production strategies will be subject to the limitations of management, weather risks and the current knowledge base.

The Southwest Perspective on Peanut Production Efficiency in a Changing Market Environment.

T.A. LEE, JR.,* Texas Agricultural Extension Service, Stephenville, Texas 76401.

Due to differences in production efficiency throughout the various producing areas of the Southwest it appears that a changing market environment might affect different areas in different ways. The most pressing question on everyone's mind in the peanut industry is certainly "What will program changes do to the domestic price?" A price decrease would change many things in the Texas, Oklahoma, New Mexico area. It would have a significant impact on where peanuts are grown in the area. Most of the dryland acreage would probably disappear. Due to expensive water much of the South Texas acreage might change to other crops. If the Plains and South Plains areas are to significantly increase in volume a change to more Spanish and Valencia types would be necessary. These changes would not happen overnight. They would phase in over a several year period. The most important question on everyone's mind in the Southwest is not just what will the price be in the future. We want to know at what price point the Southeastern producers will have better alternatives. We think they might refuse to plant at a significantly higher price than the Southwest because they might simply have a better alternative. Growers, shellers, manufacturers, and allied industry, along with USDA and the university community must redouble our efforts. The future of the peanut industry is much like a giant mountain that we must either climb or go around. Otherwise we will perish.

GRADUATE STUDENT COMPETITION

Peanut Variety Growth, Yield and Grade Response to Zorial. H. S. MCLEAN*, J. W. WILCUT, J. S. RICHBURG, III, E. F. EASTIN, and A. C. CULBREATH. Dep. of Crop and Soil Sciences and Dep. of Plant Pathology, Coastal Plain Experiment Station, Univ. of Georgia, Tifton, GA 31793-0748, and Sandoz Agro, Inc., Cordele, GA 31015.

Research conducted in 1992 and 1993 at the Coastal Plain Experiment Station evaluated tolerance of eight peanut varieties to norflurazon (Zorial). The runner varieties evaluated included Florunner, Georgia Runner, GK-7, Southern Runner, and Sunrunner while the virginia varieties were NC-7, NCV-11, and VC-1. These varieties represent approximately 80% of the U. S. plantings annually. Prowl was applied preplant incorporated at 1.0 lb ai/acre to all plots. Norflurazon was applied preemergence at 1.2 lb ai/acre. A nontreated check (received only Prowl) of each variety was included for comparison. The experiments were kept weed-free by weekly hand weedings. Data collection included peanut canopy diameters taken 42 and 55 days after planting (DAP) in 1992 and five biweekly measurements in 1993 starting three weeks after treatment, % visual crop injury, peanut yield, and grade analyses. Percent leafspot infection, tomato spotted wilt virus (TSWV) and white mold incidence were also evaluated to determine if treatment with Zorial influenced disease incidence. Maturity for digging and harvesting operations were determined on nontreated border rows for each variety. Visual injury at 33 DAP in 1992 was less than 9% for all treated varieties with differences between untreated and treated for NCV-11, Georgia runner, and NC-7. Canopy diameters were not different between treated and untreated varieties at 42 and 55 DAP in 1992. Canopy diameters measured at 23, 37, 52, 64, and 77 DAP were not different in 1993 for any variety. The incidence of late leafspot, TSWV, and white mold were not influenced by Zorial treatment for any variety. Yields were not influenced by Zorial application in either year. Percent extra large kernels were reduced (approximately 5%) for NCV-11 in 1992. Percent sound mature kernels were lower for treated Sunrunner, NCV-11, and NC-7 in 1992. These reductions may be the result of determining maturity on nontreated border rows. If maturity had been determined on treated peanut, it is likely that these slight reductions would have been overcome by delaying digging. Grade analyses data is not yet analyzed for 1993 but will be presented at the meeting.

The Behavior of Pursuit and Cadre in Purple and Yellow Nutsedge. J. S. RICHBURG, III*, and J. W. WILCUT. Dep. of Crop and Soil Sciences, Coastal Plain Experiment Station, Univ. of Georgia, Tifton, GA 31793-0748.

Greenhouse studies were conducted to determine the response of purple (*Cyperus rotundus*) and yellow (*Cyperus esculentus*) nutsedge to selective postemergence application of Pursuit and Cadre. Separate experiments were conducted for purple and yellow nutsedge and for Pursuit and Cadre. Early postemergence (EPOST) or postemergence (POST) application of Pursuit or Cadre were applied at 0.064 lb ai/acre in a factorial arrangement with application methods of foliar-only, soil-only, or foliar + soil. A nonionic surfactant (0.25%, v/v) was included for all treatments applied to the nutsedge foliage. Nutsedge shoots were clipped to the soil surface at 28 days after treatment (DAT), dried for 48 h and recorded. Nutsedge plants were allowed to regrow for 14 days and shoots were again harvested (42 DAT). At this harvest, roots and tubers were washed free of soil, dried for 48 h and recorded. A randomized complete block design with five single-pot replicates for each treatment was used, and the experiments were repeated. Shoot dry weight reduction of purple and yellow nutsedge from Pursuit as an EPOST or POST application applied soil-only or foliar + soil was at least 85%, 28 DAT. However, substantial yellow and purple shoot regrowth (32% regrowth) occurred with the soil-only application, 42 DAT. The foliar-only application of Pursuit applied either EPOST or POST was the least effective in controlling shoot regrowth (at least 60% regrowth for both species). Dry weight reduction of yellow and purple nutsedge shoots (28 DAT) and shoot regrowth (42 DAT) with Cadre was 89-100% with all treatments except the POST foliar-only, 42 DAT. The POST foliar-only reduced shoot regrowth 84% with Cadre, 42 DAT. Root-tuber weight reductions and regrowth control followed the same trends as observed in shoots and shoot regrowth. Absorption and translocation data for both herbicides in both nutsedge species also will be presented at the meeting.

Utilization of the NOR Mutants in Assessing Aflatoxin Production in Tamspan 90 Lines. Y. LOPEZ[1]*, O.D. SMITH[1], N.P. KELLER[2], B. SARR[3], and T.D. PHILLIPS[3]. [1]Dept. of Soil & Crop Sciences, [2]Dept. of Plant Pathology and Microbiology, [3]Dept. of Veterinary and Public Health, Texas A&M University, College Station, TX 77843.

Seeds and pods of 38 Tamspan 90 component lines were inoculated in the laboratory and evaluated for A. parasiticus growth and aflatoxin production using Aspergillus mutants. The mutant (SK1) accumulates norsolorinic acid (NOR), an orange colored compound, when it produces aflatoxin. Visual evaluation of the accumulation of NOR was used to determine the amount of aflatoxin produced. Seeds from different stages of development were tested. Fungal growth and NOR production varied with both seed moisture content and developmental stage. Germination inhibited fungal growth and NOR production. Orange coloration was initially most prominent in the intercotyledonary cavity and the interfacial surface of the cotyledons and testa. Pod coloration did not consistently reflect seed infection. Uniform, intensely colored orange pods (indicative that aflatoxin was present in the shells) were predominantly immature. Mature pods varied from no visible orange to extensive, spotty coloration. External pod fungal growth did not always correlate to seed coloration. Responses among the 38 lines for both seed and pod inoculations differed at the $P = 0.05$ level. HPLC analyses for aflatoxin and norsolorinic acid production are in progress and the results will be compared with the visual scores.

Use of Cellophane Surface to Quantify Infection Cushion Formation by Sclerotinia minor. R. K. SOUFI*, H. A. MELOUK and S. S. ABOSHOSHA. Department of Plant Pathology and USDA-ARS, Oklahoma State University, Stillwater, OK 74078-9947, and College of Agriculture, Alexandria University, Egypt.

The root systems of 14-day-old plants were enclosed in wetted 10 x 4.9 cm pouches made of dialysis tubing (12,000 mol. wt. cut off, Sigma cat. No. D 9402) that were closed above the plant crowns with twist ties. Pouches were placed in a 11.5 x 10 cm plastic pots that contained a mix of soil, sand and shredded peat (1:2:1; v/v/v) infested with S. minor. The inoculum was prepared by homogenizing a 2-day-old culture of S. minor from a 9-cm-dia Petri plate containing potato dextrose agar in 50 ml deionized water, the homogenate was then mixed with the top 5 cm of the soil mix. Plants were maintained in a greenhouse. Pouches were removed after seven days of incubation in the S. minor-infested soil mix and carefully washed with cold water to remove soil residue. The portion of the pouch above the soil line was then discarded. A ring was cut at the point of the soil line to a depth of 1 cm from the pouch. Ten cellophane squares (1 cm^2 each) were then cut from the ring, placed on a glass slide with the inner surface of cellophane in contact with the glass, stained with cotton blue, and the number of infection cushions per cm^2 was counted under a light microscope. A Sclerotinia susceptible peanut cultivar 'Okrun', had 23 infection cushions per cm^2 which was significantly higher ($p=0.01$) than the resistant cultivar 'Tamspan 90' or other hosts including wheat, grain sorghum, sudan grass and fallow which had 13, 9, 6, 7 and 4 infection cushions, respectively. This technique may be useful to study the susceptibility of different peanut lines to Sclerotinia or to test the pathogenicity of several Sclerotinia isolates on a given peanut genotype.

Evaluation of Sclerotinia Blight Disease Reaction in a Host Plant Resistance Breeding Program for Runner-type Peanuts. J.J. GOLDMAN*, O.D. SMITH, C.E. SIMPSON, and H.A. MELOUK. Dept. of Soil & Crop Sciences, Texas A&M University, College Station, TX 77843; Texas Agricultural Experiment Station, Stephenville, TX 75401; and USDA-ARS, Department of Plant Pathology, Oklahoma State University, Stillwater, OK 74078.

Evaluating segregating runner x spanish peanut populations for physiological resistance to sclerotinia blight is complicated by the situation that the disease reaction can be affected by canopy density and vine form. Repeated plant-by-plant inspection (PBPI) for assessment of sequence of infection and subsequent area under disease progress curve (AUDPC) calculations is labor intensive and time consuming. Results of visual assessment of plant health and greenhouse screening were compared as replacements for, or supplementation to, PBPI. Visual health (1=healthy, 5=dead) and PBPI evaluations were compared on 287 F_3 to F_6 populations grown under heavy disease pressure at Stephenville, TX. Twenty-one seed of each population (family) were spaced 15 cm in single-row plots planted 91 cm apart. PBPI and visual evaluations were made at weekly intervals beginning immediately following proliferation of the disease. Both systems were used in construction of AUDPC's. Preliminary analyses indicate high correlation (r = 0.81) between the visual and PBPI results. Remnant seed of selections screened for sclerotinia using a greenhouse *in vivo* method were compared under field situation. The most resistant 10%, most susceptible 10% and a random 10% of 277 $F_{2:3}$ lines based on greenhouse screening were field rated using both visual and PBPI evaluations. Overall correlation between the greenhouse and field results was highly significant but moderately low (r = 0.38). The highest correlation among ratings was among the susceptible class (r = 0.43). Field variation among repetitions was high and greenhouse screening to supplement, not replace, field evaluations might be useful.

Potential Use of Rapeseed Meal and Rapeseed Greens as Organic Amendments to Reduce Growth and Sclerotial Viability of *Sclerotinia minor* and *Sclerotium rolfsii*. X.Li*, H.A.MELOUK, J.P.DAMICONE and K.E.JACKSON. Department of Plant Pathology and USDA-ARS, Oklahoma State University, Stillwater, OK 74078-9947.

Decomposition of both rapeseed meal (RSM) and rapeseed greens (RSG) in moist soil produces volatile compounds with biocidal properties. Mycelial growth of *S.minor* and *S.rolfsii*, and the formation of sclerotia on potato dextrose agar (PDA) were greatly reduced by volatile compounds released from soils amended with RSM (containing 36 M/g glucosinolates) at 55 g/Kg soil. Mycelial growth and formation of sclerotia of *S.minor* on PDA were reduced to a greater level by volatile compounds released from soil amended with RSG at 55 g/kg soil. Sclerotia of *S.minor* and *S.rolfsii* placed in cloth pouches were retrieved from moist soil amended with RSM or RSG, at varying concentrations of 0-30 g RSM (RSG)/kg soil, and plated on PDA to test their viability after 10 to 40 days of incubation at 22C. Sclerotial viability of both fungi were reduced with increasing rates of RSM or RSG or with prolonged incubation periods. Several microorganisms colonized the sclerotia of one or both *S.minor* and *S.rolfsii* in soil amended with RSM. These included *Mucor* spp., *Trichoderma* spp., *Penicillium* spp., *Gliocladium* spp., *Bacillus* spp., *Fusarium* spp., and *Erwinia* spp. One isolate of *Gliocladium* sp. and four isolates of *Bacillus* sp. excreted substances that inhibited the mycelial growth of both pathogens on PDA plates as determined by minimal inhibition concentration (MIC) procedure.

Use of Monoclonal Antibody to the Nonstructural Protein of the S-RNA of Tomato Spotted Wilt Virus to Differentiate Viruliferous and Non-viruliferous Thrips [*Frankliniella occidentalis* (Pergandae)]. M.D. BANDLA*, D.E. WESTCOT, T.L. GERMAN, D.E. ULLMAN AND J.L. SHERWOOD. First and last authors: Department of Plant Pathology, Oklahoma State University, Stillwater, OK 74078; Second and Fourth authors: Department of Entomology, University of Hawaii, Honolulu, HI 96822; Third author: Department of Plant Pathology, University of Wisconsin, Madison, WI 53706.

Identifying and differentiating TSWV viruliferous and non-viruliferous thrips would be helpful in development of virus forecasting for a TSWV disease management program. The presence of nonstructural (NS) proteins is indicative of virus replication in thrips and a serological assay based on the detection of a NS protein would identify viruliferous thrips. Among the NS proteins, the protein encoded by small RNA (NSs) is abundant during TSWV replication in thrips. Monoclonal antibodies were produced against NSs by employing antigen coated magnetic beads. The monoclonal antibodies were used to develop an antigen coated plate enzyme linked immunosorbent assay (ACP-ELISA) to identify viruliferous thrips. Nonspecific binding of antibody to insect tissue in ACP-ELISA resulting in high absorbance readings in ACP-ELISA of non-viruliferous thrips was reduced by replacing Tween-20 with Empigen BB (E-BB) at 0.1% (AI) in the antibody dilution buffer. In subsequent ACP-ELISA, absorbance readings (A_{405}) of individual viruliferous thrips ranged from 0.920 to 1.050 compared to 0.135 to 0.180 for non-viruliferous thrips. Hence, in ACP-ELISA with E-BB viruliferous and non-viruliferous thrips could be differentiated which could be useful in developing a forecasting program for TSWV.

A Genetic Study of the Vegetative Interaction Groups of *Sclerotium rolfsii*. F. A. NALIM[1]*, N. P. KELLER[1], J. L. STARR[1], K. WOODARD[2]. [1]Department of Plant Pathology and Microbiology, Texas A&M University, College Station, TX 77843; [2]Texas Experiment Station, Stephenville, TX.

Sclerotium rolfsii causes southern blight of peanuts; 209 isolates of *S. rolfsii* collected from symptomatic plants in four central Texas counties were examined for interaction groups (i-groups) based on the presence or absence of an antagonism zone (a clearing of mycelia) between paired colonies. All isolates could be placed in one of 11 i-groups. I-group 6 was detected most frequently and was identified among isolates obtained from three widely separated fields. The ITS region of the rDNA from several isolates from different i-groups was amplified by PCR and the amplification product digested with the restriction endonuclease MboI. Preliminary data shows that a pattern can be shared by several i-groups, and that isolates within an i-group have the same pattern. Therefore, i-groups and DNA fingerprint patterns were not mutually exclusive. When a 16-base pair oligonucleotide primer was used in PCR, two distinct fingerprint patterns were observed. I-group 6 isolates of *S. rolfsii* had a distinct pattern in these tests.

BREEDING & GENETICS

Ancestral Contributions to Roast Peanut Flavor. T.G. ISLEIB*, H.E. PATTEE, and F.G. GIESBRECHT. Crop Science Dept., USDA-ARS, and Statistics Dept. N.C. State University, Raleigh, NC

Improvement of peanut flavor can be made more efficient by obtaining estimates of the repeatability and heritability of the trait. Repeatability of the roast peanut flavor attribute has been estimated at 9-24% for a single unreplicated observation. In the absence of populations developed to allow estimation of narrow-sense heritability of the trait, an alternative approach was taken to estimate the relative magnitude of additive genetic effects in determining roast flavor. 128 cultivars and breeding lines were evaluated for flavor from 1986 through 1991; samples were obtained from 30 year-location combinations. Samples were roasted to a nearly common color, ground into paste, and submitted to a sensory evaluation panel. Roast peanut flavor was significantly influenced by environment, genotype, degree of roast during sample preparation (measured by CIELAB L* color), and expression of the fruity flavor attribute. Genotypes adjusted for all other effects accounted for 11% of the total variation for the trait. The pedigrees of the 128 lines were traced back to 40 progenitors. The genetic contribution of each progenitor to each line tested for flavor was computed assuming that each of an individual line's two parents made an equal genetic contribution to its ultimate genotype after inbreeding and selection. Multiple regression was used to determine the effects of the progenitor's contributions on the descendants' flavor. Over 50% of the genotypic variation (6% of the total phenotypic variation) could be attributed to the simple (additive) effects of progenitors. Regressions were run with all possible combinations of progenitors to determine which had the most significant effects. Of the progenitors appearing in pedigrees of over 40 lines, Jenkins Jumbo (-1.29) and Improved Spanish 2B (-0.90) had negative effects. Dixie Giant / Small White Spanish 3x-2 (+0.64) had a positive effect on flavor. Jenkins Jumbo and Dixie Giant / Small White Spanish 3x-2 were the first two progenitors selected for inclusion in the model. Other progenitors with negative effects included Atkins Runner, Makulu Red, PI 203396, PI 261976, PI 365553, and Virginia Bunch. PI 109839 had a positive influence on flavor.

An Application of BLUPs in Peanut Breeding. C.A. SALAS, T.G. ISLEIB*, and H.E. PATTEE. Crop Science Dept. and USDA-ARS, N.C. State University, Raleigh, NC.

Best linear unbiased prediction (BLUP) procedures are commonly used in the analysis of mixed models in animal improvement to predict breeding values, particularly of individuals who cannot be measured directly. In plant breeding, it would be useful to have an estimate of breeding value before making crosses to improve a trait. Two NCSU breeding lines, NC Ac's 18423 and 18431, were found to have superior roast peanut flavor. Twenty-three cultivars and breeding lines in the ancestry of those two lines were grown in the field in 1992 for evaluation of yield, meat content, and seed size. Seed samples were then submitted to a trained sensory panel for evaluation of flavor. Coancestries among test entries were calculated and used in the mixed model analysis of means. Predicted breeding values for yield, meat content, roast peanut flavor and sweetness were found to be highly correlated. Jenkins Jumbo, Dixie Runner, and NC 5, common ancestors in virginia and runner populations in the U.S., were found to have negative effects on flavor while Florunner, Florigiant, Florispan, and NC Ac 17921 were found to have positive effects. NC Ac 18423 had higher predicted breeding value for roast flavor and sweetness than NC Ac 18431 and would be the better parent for continued improvement of flavor.

Combining Abilities of Lines Derived from an Interspecific Cross, *Arachis hypogaea / A. cardenasii*. L. BARRIENTOS*, T.G. ISLEIB, and H.T. STALKER. Crop Science Dept., N.C. State University, Raleigh, NC.

As part of a program of introgression of germplasm from wild peanut species into the cultigen, tetraploid lines were developed from a cross between *Arachis hypogaea* and *A. cardenasii*. In addition to being screened for specific pest resistances, the population was subjected to selection at North Carolina State University (NCSU) and the International Crop Research Institute for the Semi-Arid Tropics (ICRISAT) where different selection criteria were applied. Three lines selected for yield and virginia-type pod and seed attributes at NCSU (NC Ac'S 18435, 18451, and 18458) and three selections from ICRISAT (CS 3, CS 6, and CS 9) were intermated in diallel and also crossed in a factorial mating with four virginia cultivars (NC 6, NC 7, NC 9, and NC-V 11). Bulk F_2 and F_3 populations were tested for yield and market grade in 1991 and 1992. Combining abilities for each level of inbreeding, and fixed genetic effects were estimated across the two generations. The NCSU lines were significantly better than the ICRISAT lines for improvement of pod and seed size as well as meat content and pod yield. Genetic analysis indicated a preponderance of additive genetic effects. Non-additive effects (dominance) were found to be significant for pod and seed traits and meat content, but not for pod yield. There was no significant variation among additive effects within groups of *A. cardenasii*-derived parents. The virginia parents used in the factorial mating differed in their additive genetic effects with NC 7 having the greatest positive effect on pod and seed size but the most negative effect on yield.

Use of Somatic Embryogenesis of Mature Embryo Axes as a Strategy in Gene Transformation of Peanut J.A. BURNS[1]*, C.M. BAKER[1], H.Y. WETZSTEIN[1], R.E. DURHAM[2] and W.A. PARROTT[2]. [1]Department of Horticulture and [2]Department of Crop and Soil Sciences, University of Georgia, Athens, GA.

Somatic embryos were produced from the epicotyl portion of axes isolated from mature, dry peanut (*Arachis hypogaea* L.) seed. The use of mature, dry seed for somatic embryogenesis is novel and provides a convenient ready-available explant. The percentage of explants forming somatic embryos varied according to genotype. Some genotypes responded with greater than 90% embryogenesis. Growth regulator concentrations during induction and their influence on somatic embryo frequency and morphology were evaluated. Fertile plants were regenerated following transfer of somatic embryos to germination medium. The effectiveness of NPTII-deactivated antibiotics were assessed for their competence in inhibiting somatic embryo production. Sensitivity and suppression of embryo development were observed with kanamycin sulfate at 200 mg/l, or geneticin at 10 mg/l. The applicability of this system in *Agrobacterium*-mediated gene transformation will be discussed.

Current Taxonomy in Arachis. C.E. SIMPSON*, A. KRAPOVICKAS, W.C. GREGORY, AND J.F.M. VALLS. Texas Agric. Exp. Stn., Texas A&M Univ. Stephenville, TX; Inst. de Botanica del Nordeste, Corrientes, Argentina; North Carolina State Univ. (Emeritus), Alva, FL; and EMBRAPA/CENARGEN, Brasilia, Brazil.

The revision of the taxonomy of the genus Arachis will facilitate many facets of peanut research. The monograph compiles data which include descriptions for sixty-nine species assigned to nine taxonomic sections. The sections and number of assigned species are: Trierectoides, 2 species; Erectoides, 13 species; Extranervosae, 9 species; Triseminatae, 1 species; Heteranthae, 4 species; Caulorrhizae, 2 species; Procumbentes, 8 species; Rhizomatosae, 3 species; and Arachis, 27 species. Sections Rhizomatosae and Arachis contain species which are tetraploid (4x=2n=40). All other species are diploid (2n=20). The section Arachis (the youngest section of a very old genus) is of most immediate importance to peanut breeders because it contains the primary and secondary gene pools which are most readily accessible for genetic improvement in the cultigen, A. hypogaea. This cultivated species is divided into two subspecies and six botanical varieties as follows: subspecies hypogaea includes varieties hypogaea (Virginia and runner market types) and hirsuta. The other subspecies, fastigiata, contains varieties fastigiata (valencia market type), Peruviana, aequatoriana, and vulgare (Spanish market type). The distribution of the sections is not so clearly separate as it was thought to be in the early 1980's. We have recently found that sections Heteranthae, Extranervosae, and Arachis grow sympatrically, and the distribution of section Caulorrhizae overlaps with all three. Section Arachis also overlaps with sections Rhizomatosae, Erectoides, and Procumbentes, and has been found growing sympatrically with all three. Section Arachis appears, in many cases, to be invading the distributions of the other sections, especially in the north eastern part of Brazil. This is, in all probability, just an artifact of the evolutionary process. However, we are beginning to see the effects of modern man on the wild Arachis distributions, especially in Brazil.

Introgression from *A. cardenasii* to *A. hypogaea*. H. T. STALKER*, G. M. GARCIA, B. B. SHEW, M. K. BEUTE, T. G. ISLEIB and G. KOCHERT. Depts. Crop Science and Plant Pathology, North Carolina State University and Dept. Botany, Univ. of Georgia.

An interspecific hybrid population derived from an *A. hypogaea* x *A. cardenasii* cross was cytologically analyzed and evaluated for morphological traits during the late 1970s. Superficial morphological evidence for gene transfer from the wild to cultivated species was found in 40-chromosome plants at that time. Selections were made from this population for high yield; large seeds; and resistance to *Cercospora arachidicola*, *Meloidogyne arenaria*, leafhopper, corn earworm, and southern corn rootworm. Evaluations in the field, microplots, and greenhouse indicated that the interspecific hybrid derivatives have significantly higher levels of resistance to all the above pests than the resistant check cultivars. Many of the most resistant lines have small seeds and low yields. Forty-six lines were analyzed with restriction fragment length polymorphisms (RFLPs) and random amplified polymorphic DNA (RAPDs). The molecular analyses indicated that introgression has occurred in 10 of 11 linkage groups with DNA lengths between 10 and 100 cM. Recombination between *A. cardenasii* and *A. hypogaea* chromosomes is believed to be the primary mechanism of introgression but, because two composite linkage groups are larger, translocations also may have occurred. These large *A. cardenasii* chromosome segments subsequently became smaller through recombination with the cultivated peanut. Molecular work is continuing to associate molecular markers with specific disease and insect pests.

Genetic Significance and Implications of Peanut Artifacts Recovered from a Royal Tomb, Sipán, Peru. D. J. BANKS. Pastures Green, P. O. Box 2286, Stillwater, OK 74076.

The gold and silver peanut pod replicas comprising the necklace adorning a warrior-priest discovered by Walter Alva along the northern coast in a burial tomb at Sipán, Peru warrant study and explanation. (See National Geographic 174:510-549, October, 1988). Valid interpretations should be viewed in light of Christopher Donnan's belief that Moche art expresses the religious and supernatural rather than the practical aspects of the culture (National Geographic 177:16-33, June, 1990). Owing to their shape and prominent venation, the pods depicted in the Moche jewelry bear striking resemblances to present-day collections of the distinctive *peruviana* variety found in Peru. Because of its relative early maturity, bunch plant habit, and basal pod cluster, this variety is more easily cultured than the late maturing, semi-prostrate, weak and long-pegged, *hirsuta* variety, the typical pre-Columbian peanut. It is possible that a new, extremely useful peanut genotype was discovered in nature and may have been considered to be a gift from the Gods. Conversely, and more likely, a new, distinctive peanut germplasm may have been obtained as a spoil from an enemy captured in eastern Peru. Aside from the more practical considerations, potential adverse reactions to peanuts by unsuspecting allergic-prone individuals would provide a mystical basis for confusion. Likewise, a poorly understood blood clotting factor, now known to be present in peanuts, might have proven useful during blood letting and blood drinking ceremonies which are known to have been practiced by the Moche elite. For whatever reason, it seems clear that the *peruviana* peanut was selected to be expressly commemorated by the Moche people of that era.

Combination of Early Maturity and Leafspot Resistance within an Advanced Georgia Peanut Breeding Line W. D. BRANCH* and A. K. CULBREATH. Dept. of Crop & Soil Sciences and Plant Pathology, University of Georgia, Coastal Plain Experiment Station, Tifton, GA 31793-0748

In the past, genetic resistance to both early and late leafspot [Cercospora arachidicola Hori and Cercosporidium personatum. (Berk & Curt.) Deighton] has been found to be negatively or inversely correlated with early maturity in the cultivated peanut (Arachis hypogaea L.). For example, the currently available late leafspot resistant cultivar, Southern Runner, is approximately two weeks later in maturity than the susceptible Florunner cultivar. However recently, an advanced runner-type breeding line (GA T-2844) has been developed by the Georgia Peanut Breeding Program which combines early maturity and leafspot resistance. For the past three years (1991-1993), GA T-2844 has been evaluated in replicated field tests without any fungicides. These results show that GA T-2844 has on the average a 30% yield advantage and a 30 day earlier maturity than Southern Runner. Leafspot ratings also showed GA T-2844 to be halfway in between Southern Runner and Florunner. Such a combination of early maturity and leafspot resistance could significantly enhance U.S. peanut production by providing an environmentally safer and cost efficient alternative.

Optimizing Plot Size for Screening Germplasm for Resistance to White Mold. W. F. ANDERSON*, C. C. HOLBROOK, T. B. BRENNEMAN and B. G. MULLINIX. Univ. of Georgia and USDA-ARS, Coastal Plain Experiment Station, Tifton, GA.

Development of resistant cultivars to *Sclerotium rolfsii* is a major control strategy of white mold in peanut. Effective field screening is essential for selection of resistant parental and breeding lines. A two-acre field at the Southwest Branch Experiment Station, Plains Georgia was established with high levels of *S. rolfsii* for screening of peanut germplasm for white mold resistance. During 1992 and 1993, a study was designed and implemented to identify the optimal plot size for screening. Florunner (susceptible) and Southern Runner (partially resistant) were planted in alternating 100-foot, two-row beds. Five-foot increments were measured and flagged. Ratings were performed by recording the number of one-foot row segments with infected plants both prior to digging and after digging. Analysis was performed by combining measurements from 5-foot, two-row bed increments into larger units and conducting a series of ANOVAs to determine plot sizes that showed significant differences between the two cultivars. Consistent significant results were found at plot sizes of 20 feet or greater both years, however, 10-foot plots were determined to be sufficient for preliminary evaluations. Ten-foot plots and 5 replications were used to screen 74 peanut plant introductions (PIs) in 1992 and 35 in 1993 within the same field. Twelve potentially resistant PIs were rescreened in 1993. Two above ground rating systems were performed as well as the aforementioned below ground rating. The PIs were grouped and tested according to time to maturity. A number of accessions had lower, but not significantly better, mean percentages of white mold incidence than Southern Runner. Resistant late and mid-maturing PIs were identified and will be retested in subsequent years.

Southwest Runner - A Small-Seeded Runner for the Southwest. J. S. KIRBY*, H. A. MELOUK, D. J. BANKS, J. R. SHOLAR, and T. E. STEVENS, JR. Dept. of Agronomy and USDA-ARS, Oklahoma State University, Stillwater, OK 74078.

Sclerotinia blight in peanut, caused by Sclerotinia minor, has become a devastating disease in Oklahoma and Texas during the last ten to twelve years. Good chemical control is either not available, or is too costly for the amount of control obtained. The Sclerotinia-resistant spanish variety 'Tamspan 90', released by the Texas AES and the USDA-ARS in 1990, offers one good alternative for peanut producers plagued with Sclerotinia. The peanut improvement program at Oklahoma State University has proposed, to the Oklahoma AES and the USDA-ARS, the release of 'Southwest Runner', a small-seeded Runner peanut cultivar that has resistance to Sclerotinia comparable to that of Tamspan 90. Southwest Runner, tested experimentally as OK CF83-126, originated from a 1973 cross between the 'Comet' and 'Florunner' cultivars, neither of which have usable levels of Sclerotinia resistance. The hybrid population was carried for several years as a bulk population, with obviously diseased plants (mostly pod rot) being discarded and with some mass selection for visual maturity and productivity. From 1981 through 1984, several hundred single plant selections were made from the bulk population, which exhibited considerable genetic variation for plant type, pod type and size, seed size, etc. Southwest Runner traces to a late generation (F_9) single plant selection made at the Caddo Research Station, Ft. Cobb, Oklahoma in 1983. The OK CF83-126 line was originally compared with 'Okrun' and Florunner for three years in an area not troubled with Sclerotinia, and was concluded to yield slightly more than Florunner but a little less than Okrun. In 1990, the line was included in a resistance-screening nursery planted in an area heavily infested with Sclerotinia, and was noted to have an appreciable level of resistance to Sclerotinia. Since that time, data has been collected from tests in Sclerotinia and non-Sclerotinia areas. Data from these tests will be discussed, but, essentially, the data indicates that Southwest Runner is comparable in yield to Okrun and Florunner in non-Sclerotinia areas and yields considerably better in moderate to heavily-infested Sclerotinia areas. Southwest Runner appears to be a week to 10 days earlier than Okrun and Florunner, but tends to average 7-10gms/100 seeds less than Okrun and Florunner.

Resistance to Southern Corn Rootworm in Six Virginia-type Peanuts. T.A. COFFELT* and D.A. HERBERT, USDA-ARS and Virginia Polytechnic Institute and State University, Suffolk, VA 23437.

Southern corn rootworm (SCRW) (*Diabrotica undecimpunctata howardi* Barber) is the most damaging soil insect to peanut (*Arachis hypogaea* L.) in the Virginia-North Carolina production area. New cultivars and advanced breeding lines have not been evaluated for resistance to SCRW. The objectives of this study were to evaluate three new cultivars (NC-V 11, VA-C 92R, and AgraTech VC-1) and an advanced breeding line (VA 861101) for resistance to SCRW. NC 6 and NC 9 were used as resistant and susceptible checks, respectively. Field experiments were conducted for 3 years (locations) in Suffolk, VA, having Myatt LS, Dendron LS, and Tomotley FSL soil types. A randomized complete block, split-plot design with 4 replications was used. Cultivars were whole plots and chemical control (with or without chlorpyrifos) the split plots. Pod damage, yield, market grade, and dollar value were obtained for each plot. AgraTech VC-1 and VA 861101 had less total pod damage due to SCRW than NC 6 or NC 9, while NC-V 11 and VA-C 92R were intermediate. VA 861101 had significantly higher yields and value per hectare than all cultivars. Chlorpyrifos-treated plots had significantly higher value per hectare and lower total pod damage. Results from this study indicate that VA 861101 may be an acceptable replacement for NC 6. VA 861101 appears to have higher yields on soil types conducive to SCRW damage than newly released cultivars. AgraTech VC-1 is the most resistant of the newly released cultivars, but this is not reflected in higher yields.

Response to Selection for High Oleic Acid Peanut Oil. K. M. MOORE* and J. E. HARVEY. AgraTech Seeds Inc., Peanut Research, Ashburn, GA.

The oleic acid content in most peanut lines is a quantitative characteristic and ranges from 35% to 70% among genotypes. Typical commodity peanuts currently available to manufacturers average 48-52% oleic acid. Peanut product manufacturers would like to have peanuts with higher oleic acid content to increase their product shelf-stability. Information such as response to selection and realized heritability would be helpful in developing new peanut varieties with higher oleic acid content. A cross was made between two peanut lines with oleic acid contents near each end of the range. The lines crossed were a low oleic acid (less than 45%) breeding line and the germplasm line, Jenkins Jumbo, which has 65% oleic acid. Fatty acid analysis was performed on the F_2, F_3, and F_4 generations. From each generation, selections were made for low, intermediate, and high oleic acid content. Response to selection was determined and the realized heritability calculated. Results indicate that selection for high oleic acid can be effective in early generations.

Effect of Fatty Acid Composition on Preharvest Aflatoxin Contamination of Peanut. C. C. HOLBROOK[1*], J. E. HUNTER[2], D. A. KNAUFT[3], D. M. WILSON[4] and M. E. MATHERON[5]. [1] USDA-ARS, Coastal Plain Exp. Sta., Tifton, GA; [2] The Procter & Gamble Co., Cincinnati, OH; [3] Dept. of Crop Sci., NCSU, Raleigh, NC; [4] Dept. of Plant Path., Univ. of GA, Tifton, GA; [5] Dept. of Plant Path., Univ. of AZ, Sommerton, AZ.

Preharvest aflatoxin contamination (PAC) is one of the most serious challenges facing the U.S. peanut industry. The development of peanut cultivars with resistance to PAC would be a valuable tool in helping to alleviate the problem. Previous research has indicated that the linoleic acid content of a substrate can affect aflatoxin production by Aspergillus. Recently, peanut breeding lines with reduced linoleic acid content have been developed. The objective of the present study was to examine the effect of reduced linoleic acid composition on aflatoxin contamination of peanut. The level of aflatoxin contamination in seven breeding lines with reduced linoleic acid content (less than 5% of total fatty acid composition) was compared to the check cultivar, Florunner, in field and laboratory tests. The genotypes were grown in 1993 in a RCB with ten replications at Yuma, AZ and Tifton, GA. The plots were inoculated with a mixture of A. flavus and A. parasiticus about 60 days after planting and subjected to drought stress for the 40 days immediately preceding harvest. Aflatoxin contamination levels were greater in Yuma than in Tifton, however, the genotypes*location interaction was not significant. Averaged over locations, Florunner exhibited a PAC level of 3022 ppb. All of the seven breeding lines with low linoleic acid exhibited a PAC level of less than 50% the level observed in Florunner. The breeding lines F1344 (45ppb), F1315 (50ppb) and F1316 (137ppb) had significantly ($p \leq 0.05$) lower PAC levels than Florunner.

A review of the Potchefstroom Peanut Breeding Programme in South Africa. PJA VAN DER MERWE* and HLN JOUBERT. Agricultural Research Council, Oil and Protein Seed Centre, Potchefstroom, South Africa.

The Potchefstroom peanut breeding programme is regarded as one of the older projects of the Grain Crops Institute. Until recently this programme was the only breeding programme on peanuts in South Africa. The programme was started by the Department of Agriculture before the Second World War. Since 1993 the Agricultural Research Council has been responsible for the project. The cultivar Natal Common was the first commercial Spanish type produced in South Africa and was selected by JPF Sellschop. A further phase of the programme was the release of the cultivar Sellie. Sellie became popular throughout the Southern African Region. An important development of the project was the release of cultivars with resistance to black pod rot (*Chalara elegans*). These cultivars (Harts and Norden) fundamentally influenced peanut production under irrigation. Genetic material with resistance to nematodes (*Ditylenchus destructor*) was recently also identified. The yield reliability concept which is based on the regression analysis was developed from data and results of this project. The yield reliability is currently used in all cultivar evaluation programmes of the Grain Crops Institute. Recently four new peanut cultivars were released for production in South Africa. Presently all the released commercial cultivars of South Africa were developed from the Potchefstroom breeding programme. The main objective for the future will be improved yield stability, grading quality, disease resistance and fatty acid composition.

ECONOMICS

Economic Performance Characteristics of Bahiagrass-Peanut Rotations Relative to Continuous Peanuts. W. A. Miller* and T. D. MAHONEY. Auburn University Wiregrass Experiment Station, Headland, AL 36345.
The results of the experimental production of peanuts in 1992 behind 1-4 years of bahiagrass were evaluated relative to continuous peanut production. The rotation tests were conducted in both nonirrigated and irrigated blocks. The objective was to determine whether peanut yield and grade responses to the rotation treatments were sufficient to make bahiagrass-peanut rotations economically competitive with continuous peanut production. In 1992, peanut yields were observed for each of the rotation treatments. The yield responses observed in the nonirrigated test following 1-4 years of bahiagrass, respectively, were -673 lbs./acre, +577 lbs./acre, +339 lbs./acre, and +958 lbs./acre higher or lower than the continuous peanut yield of 3,136 lbs./acre. Peanut yields following the 2 and 4 year bahiagrass treatments were significantly higher than the continuous peanut yield ($p=.05$). The yield responses observed in the irrigated test following 1-4 years of bahiagrass, respectively, were -4 lbs./acre, +567 lbs./acre, +255 lbs./acre and +739 lbs./acre as compared to the continuous peanut yield of 2,657 lbs./acre. Again the 2 and 4 year bahiagrass treatments were associated with significantly higher peanut yields ($p=.05$). Graded quota peanut values observed in the nonirrigated test following 1-4 years of bahiagrass, respectively, were -\$25.43/ton, -\$42.30/ton, +\$3.50/ton and +\$10.94/ton relative to the \$703.17/ton value of the continuous peanuts. The graded values of peanuts produced following 1 and 2 years of bahiagrass were significantly lower ($p=.05$) than the graded value of the continuous peanuts. Comparable figures for peanuts in the irrigated test following 1-4 years of bahiagrass, respectively, were +\$5.11/ton, +\$12.95/ton, +\$19.79/ton and +\$14.18/ton relative to the \$694.07/ton value of the continuous peanuts. The graded values in all of these bahiagrass rotations were significantly higher than the graded value of the continuous peanuts ($p=.05$). The average annual net returns to land and management from peanut production in each rotation (after deducting bahiagrass establishment and maintenance costs) were \$2.69/acre, \$55.36/acre, \$24.96/acre and \$33.94/acre for one crop of peanuts following 1-4 years of bahiagrass, respectively, in the nonirrigated test and -\$15.58/acre, \$8.36/acre, -\$35.35/acre and -\$22.12/acre in the irrigated test.

Analysis of a No-Net Cost Provision for Peanut Program Improvement. D.H. CARLEY* and S.M. FLETCHER. Dept. of Agricultural and Applied Economics, University of Georgia, Griffin, GA 30223-1797.
Pressures to reduce government expenditures for farm programs will be an important issue in the 1995 farm program debates. Even though net expenditures for the peanut program have averaged only \$15 million annually since 1980, the \$40 to \$50 million outlays in fiscal years 1991 and 1992 and potential higher costs makes the program vulnerable. A no-net cost provision, in which peanut growers pay for program costs except for administration, is a method that would reduce or limit government expenditures. Several factors impacting on government costs need to be taken into account so that the cost to farmers would not become prohibitive. Domestic food use as a percent of the peanut quota marketed has been decreasing, primarily as a result of the decrease in shelled peanut use in peanut butter. Along with the increasing variability in peanut production, it has become more difficult to establish marketing quotas that are in line with the domestic use of peanuts. The world trade picture is changing with the trade agreement settlements. Peanut butter imports into the U.S. have become a serious issue. With quotas that are too high and the probability of increased imports, projections show that government costs could increase to a range of \$50 to \$75 million annually. Government expenditures for the peanut program vary widely among the three peanut producing areas. Including a producer cross compliance provision would place the burden of losses on peanut producers who place quota in the loan. This provision would discourage putting quota in the loan, therefore resulting in a decrease in government costs. With some basic changes in the peanut program that would tend to limit or reduce government expenditures, a no-net cost provision could be funded with an initial 2 to 3% assessment on the gross receipts of quota and additional peanuts. To establish an initial producer fund, an assessment could be collected for 2 or 3 years, and then thereafter on a year-by-year basis as needed.

Potential Impact on Peanut Farmers and Food Manufacturers from Changes in Peanut Prices. S.M. FLETCHER,* P. ZHANG, and D.H. CARLEY. Department of Agricultural and Applied Economics, University of Georgia, Griffin, GA 30223-1797.

The price support program within the peanut farm program faces serious challenges. The peanut support price at the farm level could probably decline if current suggested modifications in the peanut program occur as well as to the potential impact of GATT and NAFTA. This study analyzed the impact of changes in the peanut price support on peanut farmers' and food manufacturers' income based on peanuts used in peanut butter. Assuming the price support was reduced to various levels, total revenues for both peanut farmers and peanut butter manufacturers were simulated using hypothesized price elasticities for peanut butter and price transmission elasticities. The simulation results throughout the range of values used showed varying impacts on peanut farmers' and peanut butter manufacturers' revenues as the price support level changed. For example, with full price transmission and unitary price elasticity for peanut butter, if the support price decreased from the current average value of $678/ton to $400/ton, there would be no change in revenue for peanut butter manufacturers, but the total revenue for peanut farmers would decrease approximately 28%. Using the price elasticity for peanut butter (1.15) and price transmission elasticity (0.22) estimated from our ongoing studies, the income for peanut farmers would decrease while the income for peanut butter manufacturer would increase if the support price was lowered. The argument that both peanut farmers and food manufacturers would benefit by taking advantage of "the economy of scale," i.e., lowering peanut prices and increasing the sales volume, lacks empirical support. The different potential financial impacts on peanut farmers and peanut butter manufacturers associated with a lower peanut price reflect the different positions taken by these groups in the current peanut program debate.

The Demand for Peanuts in Peanut Butter. P. ZHANG,* S.M. FLETCHER, and D.H. CARLEY. Department of Agricultural and Applied Economics, University of Georgia, Griffin, GA 30223-1797.

The derived elasticity for peanuts used in peanut butter was estimated using quarterly data from 1984 to 1993. The two-stage price transmission approach utilized makes it possible to consider the asymmetric change in peanuts demanded resulting from an asymmetric farm-retail price transmission. Results showed that the price transmission between the price of peanuts at the wholesale level and the price of peanut butter at the retail level is symmetric although not complete. The incomplete price pass-through suggests that consumers will not receive the full benefit if the peanut price was lowered resulting from suggested changes in the government peanut program or trade liberalization. The results furthermore indicated that the initial price response of peanut butter price to a reduction in peanut prices occurs later than the response to an increase in peanut prices. The symmetric price transmission implies that the concentrated processing and retailing industries are relatively more competitive for peanuts than for other farm products such as fresh vegetable and dairy products. The estimated elasticity for peanut butter was price inelastic in the short-run (-0.64) and price elastic in the long-run (-1.15). This result implies that total revenue from sales of peanut butter would increase in the long-run if the price of peanut butter was reduced. In contrast, the derived demand elasticity for peanuts used in peanut butter at the farm level was price inelastic in both the short-run (-0.03) and the long-run (-0.25). This implies that farm income would consequently decrease if the peanut price was reduced as a result of modifications in the peanut program currently under discussion even though retail sales would increase.

Economic Benefits of Including SM-9, an Oxyethylene Non-ironic Surfactant, in Peanut Pest Management Programs. P. B. HANEY* and G. M. HUDDLESTON. Ag. Field Research, 319 Industrial Dr., Ashburn, GA 31714, and Nematologist, DeLeon, TX 76444.

Surfactants are commonly used in agriculture pest management programs to improve physical and chemical properties of the spray solution, to enhance pesticide uptake, and to affect spray retention and droplet spreading. Although recent research by several authors indicates that oxyethylene surfactants can alter cuticular permeability and affect the absorption of active ingredients by the plant, very little is known about surfactant enhancement of pesticides that have been incorporated into the soil. A better understanding and more effective utilization of the varied properties of oxyethylene surfactants can help enhance pesticide application efficiency while simultaneously leading to a marked reduction in the amount of active ingredient applied, and can also provide substantial environmental and economic benefits. Four replicated studies were conducted in commercial peanut fields in 1993 to examine enhancement of both foliar applied and soil applied materials. Three of the fields were located in Georgia; one was located in Texas. Average per-acre net returns in the plots where SM-9 was included in the pesticide application program were $10, $105, $60 and $50 higher than net returns in the plots where SM-9 was not included. Average pere-acre yields in the same four fields were 57, 127, 164 and 175 lbs. higher in the SM-9 plots than average yields in the non-SM-9 plots. The higher net returns were derived from a combination of several factors, including either 1) reduced material and application costs, 2) enhanced disease management, 3) enhanced weed management, 4) better grade, and/or 5) increased yield.

Impact of Critical Statutory Provisions on the Peanut Program Costs. R.H.MILLER.* USDA-ASCS, Tobacco and Peanuts Analysis Division, Washington, D.C. 20013.

To reduce government costs for the peanut program, beginning with the 1978 crop, Federal law has provided for a minimum national poundage quota and a minimum level of support for quota peanuts with annual changes to reflect changes in the cost of production. Quota support has increased 61 percent since 1978, from $420 to $678 per short ton in 1994. Over half of the increase was required by the 1981 and 1985 omnibus farm legislation. Since 1986, the peanut quota supporthas increased less rapidly than the indexes of prices paid by farmers and wholesale food prices, and much less rapidly than retail food prices. Component changes in the Department of Agriculture's estimates of peanut production costs are summarized. The 1994 marketing quota was setat the statutory minimum of 1,350,000 short tons. Without statutory authority to further reduce the poundage quota or import controls under Section 22 to prevent rising imports of peanut butter/peanut paste, the net realized loss to Commodity Credit Corporation is estimated to rise from$29 million in fiscal year 1995 to $168 million in fiscal year 1999. An assessment plan is reviewed, but such a plan is unlikely to generate sufficient funds to offset the projected program costs without additional statutory changes.

The Theories of Marginal Cost and Opportunity Cost Applied To Peanut Production: The Case of Additional Peanuts With Implications For Peanut Acreage and Marketing. W. DON SHURLEY. Department of Agricultural and Applied Economics, University of Georgia, Cooperative Extension Service, Tifton, GA 31793.

In the Southeastern U.S., most additional peanuts are produced by growers of quota peanuts. Peanut investments such as machinery, equipment and irrigation are made for production of quota peanuts. Additional or non-quota peanuts are produced as an alternative to other crop enterprises. The economic concepts of marginal cost and opportunity cost may, therefore, be applied to production of additional peanuts. Alternatives to additional peanuts include corn, cotton, and soybeans. The planned acreage of additional peanuts in Georgia has declined approximately 60 percent since 1991. Despite the reduction in acreage and supply of Southeastern additionals, contract prices have not increased. Additional peanuts are produced primarily for the world export market. Contract prices are determined by world competitiveness with a premium in some markets for U.S. quality. Unless contract prices improve, however, permanent shifts could occur in the regional location of additionals production within the U.S. Contract prices during the 1992-94 crop years have not been competitive with other crop enterprises available to Southeastern farmers. The profitability of additional peanuts depends on the marginal costs of production, contract price, the ratio of additionals to quota specified by the contract, expected yields, and the proportionate amount of irrigated and non-irrigated land available for peanut production. An analysis of peanut contracts reveals that while the overall contract may be profitable (may produce positive net returns above marginal cost) in many instances profit on quota production is offset by losses on additionals. Enterprise alternatives can be constrained, however, by participation in government programs for other crops such as corn and cotton. Additional peanuts can be a viable enterprise depending on the opportunity cost of other crops and provided contracts offer the opportunity to cover marginal costs. Probability distributions of net returns were developed for contracted and uncontracted additional peanuts, corn, cotton and soybeans. Contracting reduces risk in growing additionals but may not provide greater expected net returns and may not reduce risk below that of other enterprises.

ENTOMOLOGY

Contraindications of Insecticide Use Relative to Vector Control and Spotted Wilt Disease Progress in Peanut. J. W. TODD*[1], A. K. CULBREATH[2], D. ROGERS[3], and J. W. DEMSKI[4]. [1]Departments of Entomology and [2,4]Plant Pathology, [1,2,4]University of Georgia, [1,2]Tifton, GA 31793, [4]Griffin, GA 30223, [3]Miles, Inc. Tifton, GA.

Attempts to manage insect vectors of plant viruses with insecticides as a mean of controlling virus epidemics in agronomic and horticultural crops have been largely unsuccessful or uneconomical. Numerous studies on a variety of crops have shown relatively small reductions (ca. 50%) in virus disease incidence from multiple applications of foliar insecticidal sprays directed toward control of insect vector species. *Frankliniella fusca* (Hinds) and *Frankliniella occidentalis* (Pergande) are two of seven thrips species known to vector tomato spotted wilt tospovirus (TSWV). Both species are found in peanut, although *F. occidentalis* has not been shown to reproduce on peanut. Adult populations of *F. occidentalis* seem to be only transitory in peanut, whereas adult and larval populations of *F. fusca* are found at low levels for the remainder of the growing season after peaking 4 to 6 weeks after planting. TSWV is acquired only by the larvae and is spread mainly by adults. Application of certain efficacious systemic insecticides directed primarily toward control of larval thrips populations result in much reduced levels of thrips feeding damage to seedling peanut, but have not reduced final TSWV incidence. Imidacloprid is a systemic insecticide with a potentially wide range of applications. Soil, foliar and seed applications have been shown to be highly active against a wide range of insects and is particularly promising for species with piercing, sucking mouthparts including viral vector species. Repellency as well as mortality have been shown to contribute to insect control and plant protection. Two formulations of imidacloprid, Gaucho seed treatment and Admire in-furrow spray at-planting, were evaluated along with aldicarb and acephate for thrips control and TSWV incidence. In three field tests conducted in 1993, average incidence of spotted wilt was significantly higher in all Admire treatments than in non-treated plots with increases ranging from ca. 30% to 67% among treatments and tests. In 2 of 3 tests, Gaucho treatments contained significantly higher incidence of TSWV than the non-treated with increases ranging from 20 to 200%. On most observation dates, significant control of larval thrips populations was achieved with all treatments. Also, significantly less larval feeding was noted in all tests.

Effects of Soil Texture and Drainage on Peanut Pod Damage by Southern Corn Rootworm. B. N. Ang, D. A. Herbert, Jr.* and W. J. Petka. Dept. of Entomology, Virginia Polytechnic Institute and State University, Tidewater Agricultural Research and Extension Center, Suffolk, VA.

Soil moisture is a key factor determining survival of corn rootworm egg and larval stages. Studies were conducted to determine the effects of soil texture and drainage classification on damage to peanut pods by southern corn rootworm (SCR) in field cages in 1993. Three topsoil textures (loamy sand, fine sandy loam and loam) and four drainage classes (well, moderately well, somewhat poorly and poorly drained) representative of the peanut soils of the Virginia-North Carolina peanut belt were used. SCR were introduced as adults into cages on 28 June, or as eggs into microplots/cages on 29 June and repeated on 6 August to coincide with the phenology of field populations. Pod production, percent mature and immature pods scarified or penetrated by SCR, and percent pod damage by all other pests were assessed on 15 September. Topsoil texture, drainage class and their interaction significantly affected damage due to SCR and pod production, but had no effect on damage by other pests. Based on the sum squares values from analysis of variance, drainage and the interaction of topsoil texture with drainage was more important than texture in determining damage on pods. Immature pod production in loam texture was higher than that in loamy sand and fine sandy loam texture. Damage to immature pods by SCR from introduction of both adults and eggs was higher in poorly drained soil than the other three drainage classes. There were no differences between the three topsoil textures in damage to immature pods from introduction of eggs. However, damage was higher in loam topsoil than loamy sand and fine sandy loam from introduction of adults.

Peanut Maturity and Yield Responses to Tobacco Thrips and Herbicide Injury.

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NC7 virginia-type peanuts were stressed in a field test with postemergence herbicide treatments and feeding injury by tobacco thrips, *Frankliniella fusca*. Peanuts were planted May 12, 1993 using 36-inch (91.4 cm) row spacing; plots were 4 rows by 40 feet (12.1 m); a split plot experimental design was used with 4 replicates. Plant nutrients and diseases were managed according to Virginia Cooperative Extension recommendations; nematodes were suppressed with ethoprop (Mocap 10G) at 2 lb a.i. per acre. Feeding injury by thrips was managed with aldicarb (Temik 15G) at 1 lb a.i. per acre, or an untreated control. The insecticide was applied into the seed furrow at planting. Paraquat (Starfire 1.5SC) at 0.128 lb a.i. per acre was applied at late ground cracking (LGC), about two weeks after planting. Injury by thrips feeding and herbicides was rated subjectively using damage rating scales. Plant canopy height and width, peg and flower number, and yield were determined using objective measurement systems. Aldicarb (Temik 15G) at 1 lb a.i. per acre + paraquat (Starfire 1.5SC) at 0.128 lb a.i. per acre had significantly better plant lengths and heights, flower and peg numbers than paraquat (Starfire 1.5SC) at 0.128 lb a.i. per acre. Three digging dates were used: Sep 22, 24 and Oct 15. Pod color was determined using the Hull-Scrape maturity assessment system. Results showed that aldicarb treatments suppressed thrips injury and resulted in significantly less root-knot nematode larvae and significantly higher yields and value than untreated controls. Digging date also significantly affected yield with the highest yield at the middle date. Aldicarb treatments had significantly more black colored pods (indicating maturity). Digging date also had a consistent effect on hull color. Higher percentages of white, yellow and orange colored hulls were associated with earlier dates; higher percentages of brown and black colored hulls were associated with later dates.

Relative Effects of Thrips Damage and Thrips Insecticide Treatments on Florunner, Southern Runner and Georgia Runner Peanut Cultivars. S. L. BROWN. Entomology Department, The University of Georgia, Tifton, GA.

Recent studies have demonstrated the importance of thrips control on peanut, especially when small plants are damaged by paraquat herbicides. Thrips control options differ in efficacy, phytotoxicity,and effect on peanut growth. In Georgia, growers are familiar with the response Florunner to thrips damage and the insecticides commonly used for their control. This study investigates the thrips and insecticide responses of two newer varieties, Southern Runner and Georgia Runner, relative to Florunner. Southern Runner was selected for its slow growth early in the season, whereas Georgia Runner was selected because of its rapid growth habit. In 1993, the effects of aldicarb, phosmet, and disulfoton on peanut emergence, thrips damage, canopy width, phytotoxicity and maturity date were recorded. In 1994, the same cultivars were evaluated, but an acephate hopper box treatment was substituted for disulfoton and yield data was also collected. In 1993, Florunner emergence was slightly reduced by all three in-furrow insecticides. All three treatments reduced thrips damage and increased canopy width at 42 days after planting. With the exception of disulfoton on Georgia Runner, all treatments resulted in an earlier maturity date than that of the untreated control.

Summary of Field Research with Alternative Control Practices of Tobacco Thrips in Peanut. D.A. HERBERT, JR. Tidewater Agricultural Research and Extension Center, Virginia Polytechnic Institute and State University, Suffolk, VA.

Efficacy of insecticides applied as liquids, in-furrow or foliar, or as seed treatments has been compared to in-furrow application of granular insecticides for control of tobacco thrips in a series of field tests using Virginia-type peanut. A summary will be presented with special emphasis on 1993 seed treatment tests. Insecticides included imidacloprid (Gaucho 480S), acephate (Orthene 80S, 75S & Payload 15G) and aldicarb (Temik 15G). Vitavax PC was applied to all treatments, but at different rates. Gaucho and certain Orthene treatments were applied commercially by Gustafson, Inc., Plano, TX. Other treatments were applied commercially by Severn Peanut Co., Severn, NC. With 'preblend' treatments, Vitavax and insecticides were preblended at designated rates before application to seed. With 'overtreat' treatments, Vitavax was applied to seed at the designated rate, then the insecticide was applied. A 'hopper box' treatment was included with product and seed layered and gently mixed in the planter box just before planting. Aldicarb (Temik 15G) was applied in-furrow to one treatment at planting as a standard for comparison. A randomized complete block experimental design was used with 4 replicates; plots were 4 rows by 12.2 m. Treatments were evaluated by determining plant injury based on a 0-10 scale, where 0 = no injured leaves and 10 = 100 percent leaves injured. Plant stand counts were made 17 and 27 days after planting. Thrips injury peaked (8.0) in the untreated control on 21 Jun. All treatments had significantly less injury than the untreated control until 28 Jun. In general, 'overtreat' or 'hopper box' treatments provided better control than 'preblend' treatments unless they were boosted by additional in-furrow applications. Plant number ranged from 145 to 220 per 24.4 m of row, but data was difficult to interpret. In general, counts of less than 160 plants per 24.4 m of row were found only in treatments where Vitavax PC was applied at 2 oz/cwt of seed or less, or where Payload 15G was applied in-furrow at higher rates. Low rates of Vitavax PC could have resulted in stand loss due to seed or seedling disease.

PHYSIOLOGY AND SEED TECHNOLOGY

Chemical Composition of *Arachis hypogaea* var. *hirsuta* Peanuts. D.T. GRIMM*, T.H. SANDERS, H.E. PATTEE, D.E. WILLIAMS, and S. SANCHEZ-DOMINGUEZ. USDA-ARS, Market Quality and Handling Research, Box 7624, NCSU, Raleigh, NC 27695; USDA-ARS, Beltsville, MD; Departamento de Fitotecnia, Universidad Autonoma Chapingo, Chapingo, Mexico.

The biochemical composition of peanut seed collected from six landrace accessions of *Arachis hypogaea* var. *hirsuta* cultivated in Mexico was investigated. Florida-grown runner- (Florunner) and virginia-type (NC 7) seed were used as comparative controls. Free amino acids, free sugars, and tocopherols were analyzed by high-performance liquid chromatography. Fatty acid methyl esters were prepared from hexane-extracted oil and analyzed by gas-liquid chromatography with flame ionization detection. Oil stability was determined using oxidative stability instrumentation which measures the rate of accumulation of volatile lipid decomposition products. In general, var. *hirsuta* peanuts contained more free sugars (141.2-178.5 micromoles/g defatted meal) and free amino acids (18.5-37.2 micromoles/g defatted meal) than Florunner (126.6 and 20.1 micromoles/g defatted meal free sugars and free amino acids, respectively) or NC 7 (121.5 and 20.3 micromoles/g defatted meal). Tocopherol levels (in oil) ranged from 295 to 377 ppm, which was lower than Florunner (425 ppm) but roughly equal to the level found in NC 7 (303 ppm). Total oil content ranged from 34%-45% for var. *hirsuta* seed compared to 46% and 45% for Florunner and NC 7, respectively. Oleic acid/linoleic acid ratios ranged from 0.76-0.95 for the var. *hirsuta* peanuts compared to runner (2.1) and virginia (3.1) controls. These oil quality characteristics were reflected in the much shorter lipid decomposition times for var. *hirsuta* seed (7.5-8.0 h) compared to Florunner (11.2 h) or NC 7 (14.7 h).

Descriptive and Sensory Evaluation of Six Landrace Accessions of Arachis hypogaea var. hirsuta Kohler Cultivated in Mexico. H. E. PATTEE*, D. E. WILLIAMS, and S. SANCHEZ-DOMINGUEZ. U. S. Department of Agriculture, ARS, Department of Botany, North Carolina State University, Raleigh, NC; U. S. Department of Agriculture, ARS, Beltsville, MD; Departamento de Fitotecnia, Universidad Autonoma Chapingo, Chapingo, Mexico.

Six landrace accessions of Arachis hypogaea var. hirsuta Kohler were collected from farms located in the states of Puebla and Guanajuato, Mexico during November, 1993. Approximately twenty-five kg in-shell lots of each accession were air expressed to Raleigh, NC and placed in storage at 4-5 C and 55-60% R. H. until shelled and roasted. The six accessions are identified by plant introduction numbers PI 576633, PI 576634, PI 576635, PI 576636, PI 576637, and PI 576638. Florunner and NC 7 peanuts grown at Gainesville, FL during 1993 were used as comparative controls. Descriptive profiles for the eight samples were developed by the Sensory Evaluation Panel at the Department of Food Science, NCSU using roasted peanut paste samples with a CIELAB L* value between 56 and 58. No differences in descriptive attributes were identified between controls and Mexican accessions. Significant differences in sensory attribute intensities were found between the controls and the Mexican accessions and within these accessions. The affect of these intensity differences on the roasted peanut attribute intensity obtained and the potential level of the roasted peanut attribute will be discussed.

Effect of Cultivar and Production Location on Tocopherol Concentration, O/L Ratio, and Oil Stability of Six Peanut Cultivars T.H. SANDERS*, W.D. BRANCH, C.E. SIMPSON, and T.A. COFFELT. USDA, ARS, Market Quality and Handling Research, Box 7624, North Carolina State University, Raleigh, NC; University of Georgia, Coastal Plain Exp. Station, Tifton, GA; Texas Agric. Exp. Station, Stephenville, TX; USDA, ARS, Tidewater Agric. Exp. Station, Suffolk, VA.

Tamspan 90, Starr, Marc I, Florunner, NC 7, and Florigiant peanuts grown in Georgia, Texas and Virginia as part of the National Uniform Peanut Performance Tests were evaluated for cultivar and production location effects on tocopherol content and other oil quality characteristics. Oils from three replicates of each cultivar were examined for O/L ratios, free fatty acid (FFA) content, tocopherol content, and oil stability index (OSI). All analyses were conducted on oil pressed from 25 g ground seed. Cultivar, location, and cultivar X location interactions were significant for all oil quality factors except FFA. Differences in FFA were inconsequential as the highest value was 0.15%. O/L ratios were highest in samples from Georgia where the highest mean temperatures occurred. Tocopherol concentration was similar for Georgia- and Texas-grown seed except in the spanish market types. Marc I and Florunner contained significantly more tocopherol at all locations. OSI was positively correlated to O/L ratio $r^2 = 0.80$.

Response of Peanut Germplasm to Different Drought Intensities Imposed by an Irrigation Gradient System. A. M. SCHUBERT*, O. D. SMITH, and G.E. AIKEN. Texas A&M Univ. Agric. Research & Extension Center, Lubbock TX 77401-9757, Department of Soil and Crop Sciences, Texas A&M University, College Station, TX 77843-2474, and South Central Family Farm Research Center. USDA-ARS, Booneville, AR 72927-9214.

Twelve selected peanut cultivars and germplasm entries were field-tested for performance under a line-source irrigation gradient system during the 1989, 1990, and 1991 crop years at the Texas A&M University Agricultural Research Station at Yoakum. Sprinkler spacing along the irrigation lines was 4.57 m that was 20% of the diameter of the sprinkler pattern. Irrigation lines were oriented perpendicular to the rows that were planted in a northwest to southeast direction. The prevailing winds were from the south. Water levels were determined using rain gauges at 3 m intervals perpendicular to the irrigation line. Water supply decreased from the highest amounts in plots closest to the irrigation lines to rainfall only in the most distant plots. Peanut entries were divided into four tests based on expected growth duration and direction from the irrigation line in relation to prevailing wind: LATE-NORTH; EARLY-NORTH; LATE-SOUTH; and EARLY-SOUTH. In 1992, nine entries were tested under the line gradient system; entry selection was based on observations made in the 1989-1991 experiments. Entries were compared for yield, grade, grade components, regression of peanut yield on water supply, and crop measurements that included leaf relative water content (RWC), leaf water status by hydraulic leaf press (HL), soil water content, canopy/ambient temperature differences by infrared thermometry. All genotypes responded positively to water supply over the multi-year tests. Various performance indices were constructed using regression of response on water supply to help in interpreting data. Some indices provided significant differences among entries in some tests.

PLANT PATHOLOGY

Effect of Temperature on Stability of Components of Resistance to *Cercospora arachidicola* in Peanut. F. WALIYAR[1], B.B. SHEW*, H.T. STALKER, T.G. ISLEIB, R. SIDAHMED, and M.K. BEUTE. ICRISAT Sahelian Center[1], Niamey, Niger; Departments of Crop Science and Plant Pathology, North Carolina State University, Raleigh NC 27695-7616.

Environmental parameters may influence expression of resistance to *Cercospora arachidicola* in peanut, resulting in the potential for unpredictable performance in diverse geographic locations. Stability of resistance was evaluated in six peanut genotypes selected by ICRISAT in Niger, West Africa and in seven genotypes selected in North Carolina. The test genotypes had various levels of resistance to early leafspot and were inoculated with a North Carolina isolate of *C. arachidicola*. Stability of various host-resistance components was evaluated under day/night temperatures of 24/24, 26/20, 32/26, 38/26, and 38/32 C, which simulate the conditions in Niger (high temperatures) and North Carolina (lower temperatures). Lesions were formed under all temperature regimes, but numbers of lesions were inversely related to temperatures. Lesion numbers and infection frequency increased over time (in days after inoculation). Incubation time and temperature effects accounted for 90% or more of the variation in lesion number and infection frequency for 12 of 13 genotypes. Values for most resistance components (numbers of lesions, infection frequency, incubation period, lesion diameter and necrotic area diameter) depended on both temperature and genotype. However, several peanut lines expressed resistance to *C. arachidicola* across all temperature regimes. The North Carolina line 91 PA 150, derived from the wild diploid species *A. cardenasii*, was ranked as resistant for all components in all temperature regimes. Several other lines also were partially resistant to *C. arachidicola* at all temperatures: NC Ac 17894, PI 274194, NC Ac 18045 and 91 PA 131. Another group of genotypes, including GP-NC 343, NC 6, NL92069L, and NC Ac 18011A were moderately resistant. PI 476033 and NC 7 were highly susceptible at all temperatures and NL92064L varied in ranking for components across environments.

Machine Vision Measurement of Leafspot Incidence on Leaflets of Various Peanut Cultivars. S.H. DECK*, D.M. PORTER, and F.S. WRIGHT, Tidewater Agricultural Research and Extension Center, Virginia Polytechnic Institute and State University and USDA-ARS, Suffolk, VA 23437.

Early leafspot, caused by *Cercospora arachidicola*, is a major peanut plant disease. Traditionally, peanut plant leaflets are visually inspected by a plant pathologist who records an integer ranging from 1 to 10 representing severity. This subjective severity number is presently accepted as a gage in determining leafspot severity. The use of machine vision technology is a way to improve the accuracy and reduce subjectivity in measuring leafspot severity. The objectives of this study, conducted during the 1993 growing season, were to 1) compare the results of the traditional leafspot severity index method with the machine vision approach for several cultivars and 2) use a repeatability index to help determine the best machine vision leafspot indicator. The peanut cultivars NC 7, NC 9, NC-V 11, VA-C 92R, and VA 93B were evaluated to determine resistance to the early leafspot disease. The machine vision system was used to measure the average number of leafspot lesions, lesion size, and leaflet area. The percent lesion area was calculated from this data for each leaflet. Cultivar groupings were determined for the leafspot severity data and average leafspot lesion number, size, and percent area. Leafspot severity was ranked from least to most severe using the traditional method as NC-V 11, VA 93B, NC 7, NC 6, and VA-C 92R. Of the three machine vision measurements evaluated, average percent lesion area ranked the cultivars most closely to the traditional method grouping and had the best repeatability value. The average percent leaflet lesion ranking from least to most severe was NC-V 11, NC 7, VA 93B, NC 6, and VA-C 92R with a repeatability value of 2.64 percent. The results of this experiment indicate that the machine vision and traditional methods are comparable with the machine vision method having the advantage of greater reliability.

Effect of Foliar Application of Bravo on the Foliar Diseases of Peanut. A. K. SINHA*, N. McANDREW, and M. LINDO. Caribbean Agricultural Research and Development Institute, Belmopan, Belize.

Peanut production in Belize is constrained by several factors including the severity of two foliar diseases, leaf spot and rust. Both diseases have been observed to develop late in the growing season which allows the early maturing cultivars to escape the high levels of leaf fall associated with epidemics of the diseases. Timely foliar fungicide applications could possibly reduce both incidence and severity of the diseases and allow plants to mature with a higher percentage of intact foliage, consequently improving crop yield. Four peanut cultivars, Kidang, ICGV-87184, ICGV-88403 and ICGV-88407 were subjected to post flowering treatments of the foliar fungicide Bravo (chlorothalonil) at 2.01/ha every 2 weeks in a tank mix with Bayfolan foliar fertilizer at 2.01/ha. Kidang, an early maturing cultivar, is highly susceptible to both leaf spot and rust. The results showed that plants of all four cultivars had a lower percentage of leaf fall at maturity and yielded higher when treated with the fungicide. The post flowering applications of the fungicide every 2 weeks reduced the incidence and effect of the foliar diseases on peanuts planted in both the November and June crop seasons. Treated plants retained a higher percentage of their foliage through harvest, especially those planted in November. Yields were higher when plants were treated with fungicide in both June and November crop seasons.

Comparison of Systemic and Protectant Fungicides Applied on Advisory Schedules for Management of Early Leafspot of Peanut. J.P. DAMICONE*, K.E. JACKSON, and J.R. SHOLAR. Department of Plant Pathology and Department of Agronomy, Oklahoma State University, Stillwater, OK.

Applications of 1.12 lb/A chlorothalonil on 14-day and advisory schedules were compared to 0.12 lb/A tebuconazole on advisory schedules for early leafspot (*Cercospora arachidicola*) management from 1991-1993. Additional advisory treatments were propiconazole at 0.11 (1992) and 0.07 (1993) lb/A and tank mixtures of 0.25 lb/A benomyl or 0.34 lb/A thiophanate-methyl plus 1.5 lb/A mancozeb (1992). Treatments were applied to separate but adjacent plantings of the spanish cultivars Spanco (1991-1992) and Tamspan 90 (1993) and the runner cultivar Okrun grown under irrigation at Burneyville, OK. The first applications for both advisory and 14-day schedules were made 40-55 days after planting. Thereafter, subsequent sprays were scheduled with the Jenson & Boyle model in 1991 and 1992 and the Virginia model with a threshold of 48 infection hours in 1993. Reductions in the number of sprays per season with the advisories ranged from 1-4 per season with a mean of 2.2. There were no differences ($P \leq 0.05$) in yield between advisory and 14-day schedules of chlorothalonil. However, the area under the disease progress curve (AUDPC) for the percentage of leaflets with leafspot or defoliated was greater ($P \leq 0.05$) for advisory compared to 14-day schedules of chlorothalonil in all trials with spanish cultivars and in 1992 and 1993 with Okrun. Final disease incidence on spanish cultivars exceed 70% in all trials for advisory schedules of chlorothalonil. AUDPC, final disease incidence, and defoliation at harvest for advisory schedules of tebuconazole did not differ from or were less ($P \leq 0.05$) than those of the 14-day chlorothalonil treatments in all trials for both cultivar types. Propiconazole also provided better leafspot control than advisory schedules of chlorothalonil, but was not as effective as tebuconazole in 1993 when the lower (0.07 lb/A) rate was used. Yields of tebuconazole-treated plots were higher ($P \leq 0.05$) than chlorothalonil only in 1992 with Okrun. Final disease incidence and defoliation were greater and yields were less ($P \leq 0.05$) for the tank-mix treatments compared to the 14-day chlorothalonil treatment in 1992. The improved performance of tebuconazole and propiconazole in advisory schedules, which was attributed to their post-infection activity observed following the first application on Spanco in 1992, should be useful in reducing risks associated with using a leafspot advisory.

Forecasting Peanut Late Leaf Spot with the EnviroCaster®: Commercial Application.

N. LALANCETTE, Neogen Corporation, Lansing, MI 48912.

The efficiency of on-farm disease management practices can be greatly improved by utilizing real-time environmental information to predict the occurrence of disease outbreaks. Since environmental factors are often the limiting agents in epidemic development, predictive software models can be created which determine the optimum timing of control practices based on microclimatic data. In 1986, Neogen Corporation began cooperating with University of Georgia researchers in the development of a peanut late leaf spot forecasting model to be deployed in the EnviroCaster. The resulting model analyzes EnviroCaster's hourly weather data to determine disease-favorable environmental periods. Each period is assigned a severity value called an ECI (EnviroCaster Index), which ranges from 0 to 10. When a total of 10 ECIs have accumulated, a fungicide spray is advised. After spraying, the user enters into the model the date of application and the number of protection days afforded by the fungicide. ECI accumulation for the next spray advisory begins when the protection period has ended. Using this approach, the model was tested at three experimental test sites in Georgia during 1988 and 1989. Results from both years indicated that by using the model to time spray applications, a total of three to five sprays can be saved relative to a standard 14-day calendar schedule. Model sprayed plots had statistically similar yield to standard schedule plots, while a significant yield loss occurred on non-sprayed controls. A similar savings of three sprays, with no loss in yield, was also achieved at two cooperating grower sites in 1989. Following this successful field validation, the model was released for commercial use in 1990 and starting in 1991, Neogen initiated its OmniService customer service program which provided a mechanism for downloading data from all commercial EnviroCasters. Examination of the late leaf spot model data revealed that growers were obtaining spray reductions similar to that achieved during the validation studies. In 1991, 1992, and 1993 growers applied from three to seven sprays for the entire growing season, with 65%, 67.5%, and 68% of the growers, respectively in each year, applying five or fewer sprays. Given farm sizes ranging from 200 to 2000 acres and an estimated cost of $10 per acre for material, fuel, labor, etc..., yearly cost savings when using the model ranged from $4,000 to $80,000 per farm.

Variation in Susceptibility to Tomato Spotted Wilt Virus Among Peanut Genotypes.

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Epidemics of spotted wilt, caused by tomato spotted wilt tospovirus (TSWV) were monitored in peanut (*Arachis hypogaea* L.) at Attapulgus, GA in each year during 1990 through 1993. A total of 42 different genotypes, including cultivars, advanced breeding lines, and peanut introductions, were evaluated in one or more of the four years. The cultivars Florunner and Southern Runner were used as standards in all tests. Final incidence of spotted wilt, area under the disease progress curve, and pod yields were compared for entries in all experiments. The range of average final percent incidence of spotted wilt among entries was 2.2 to 15.6% in 1990, 0.5 to 6.5% in 1991, 0.2 to 6.4% in 1992, and 5.2 to 23.7% in 1993. Several lines had average incidence of spotted wilt as low as or lower than that of the moderately resistant cultivar, Southern Runner, in one or more years. Final incidence of spotted wilt in Georgia Browne was similar to that of Southern Runner in each year in which it was tested. In 1993, final incidence of spotted wilt in advanced breeding lines, GA T-2846, UF 84x1B-9-1-1-, UF 84x1A-7-2-1-1-, and, GA T-2844 was 5.2, 6.8, 8.3, and 10.0%, respectively, compared to final incidence of 9.9% in Georgia Browne, and 10.0% in Southern Runner. There were no significant differences in incidence among these six genotypes. Pod yields of all four of these advanced lines were as high as or higher than those of industry standard Florunner. The relative performances of most genotypes have been consistent across years with both light and moderate levels of disease incidence. Based on four years of evaluations, considerable variability in apparent resistance to TSWV exists among advanced breeding lines from programs in both Georgia and Florida.

Plant Spacing and Tomato Spotted Wilt Virus. D.W. GORBET* and F.M. SHOKES. University of Florida, North Florida Research and Education Center, Marianna, FL.

In recent years tomato spotted wilt virus (TSWV) has become a more damaging disease problem on peanut (*Arachis hypogaea* L.) in the Southeastern U.S. Management tools currently recommended to minimize crop damage include avoidance of very early or very late planting dates, avoid poor/weak plant stands, and plant resistant cultivars, if available. Studies were conducted in 1991-93 at the North Florida Research and Education Center at Marianna, Florida, to evaluate disease (TSWV) incidence, pod yields, and grades of Sunrunner (susceptible) and Southern Runner (partially resistant) cultivars grown at five in-row plant spacings, namely 7.6, 15.2, 30.5, 45.7, and 61.0 cm between plants. The studies were conducted as a RCB, split-plot design with cultivars as mainplots and spacing as subplots, with two harvest dates for each treatment combination. There was a progressive increase in percent of plants with TSWV symptoms as in-row plant spacing increased for both cultivars and in all three years. Mean values across years for percent TSWV (based on symptoms) for Sunrunner at the five spacings were 9, 22, 55, 67, and 70%, respectively. Southern Runner had 5, 10, 22, 36, and 45%, respectively, for the five spacings. Southern Runner produced greater pod yields than Sunrunner at all spacings, averaging 4952 vs. 3651 kg ha^{-1}, respectively, across all tests. Sunrunner pod yields were consistently lower at the two wider spacings, ranging from 4258 to 2928 kg ha^{-1} as in-row spacings increased, compared to 5051 to 4610 kg ha^{-1} for Southern Runner. Spacing had no significant effect in Southern Runner yields in 1993. Grades of Southern Runner were generally not affected by spacing but seed size and TSMK values were lower for the wide spacings on Sunrunner. Difference in TSWV incidence, pod yields and grades were evident for in-row plant spacings and genotypes in these studies.

Effects of Seeding Rate, Irrigation, and Cultivar on Spotted Wilt, Rust, and Southern Blight Diseases of Peanut. M. C. BLACK*, H. TEWOLDE, C. J. FERNANDEZ, and A. M. SCHUBERT. Texas A&M University, Dept. of Plant Pathology and Microbiology, Uvalde, TX 78802-1849, Dept. of Soil and Crop Sciences, Uvalde, TX 78801-6205 and Lubbock, TX 79401-9757.

Spotted wilt disease, caused by tomato spotted wilt virus (TSWV), was recognized as an important peanut disease in South Texas in the mid-1980's. The disease was subsequently observed throughout the USA peanut belt. High seeding rates were recommended for Florunner and other spotted wilt-susceptible cultivars in high risk South Texas counties following observations of high disease incidence in areas of fields with poor stands. Moderate and high levels of TSWV resistance were documented in the late 1980's for GK-7 and Southern Runner cultivars, respectively. Southern Runner also has partial resistance to rust, caused by *Puccinia arachidis*. Uniform plant spacing with vacuum precision planters allows reduced seeding rates without yield reduction, but there is no information on the effect of reduced seeding rate on spotted wilt and rust diseases. A split-plot experimental design was used to test the effect of seeding rate on spotted wilt, rust, and southern blight (caused by *Sclerotium rolfsii*) of GK-7 and Southern Runner. Cultivars were main plots and seeding rates were sub-plots (45, 65, 110 lb/ac; 2.2, 3.3, and 6.2 seeds/row-ft on 36-inch row spacing). Differential irrigation was imposed with a line-source impact-sprinkler irrigation system in which each sub-plot received irrigation ranging from 7 to 30 inches in 1992 and from 1 to 28 inches in 1993. Rainfall accumulations during the 1992 and 1993 seasons were 10 and 13 inches, respectively. Spotted wilt ratings at digging for GK-7 and Southern Runner, respectively, were 29 and 20% row feet with symptoms in 1992 ($P \leq 0.01$) and 23 and 16% in 1993 ($P \leq 0.05$). Seeding rate did not affect spotted wilt in either year for these two cultivars. Spotted wilt in both years increased from the lowest irrigation level, peaked at 21 (1992) and 23 inches (1993) of irrigation, and decreased slightly at higher irrigation levels. Rust (ICRISAT 1-9 scale) was affected by seeding rate, with lowest rust ratings at 45 lb/ac in 1992 ($P \leq 0.01$), but not in 1993. GK-7 had higher rust ratings than Southern Runner in 1992 ($P \leq 0.01$) and 1993 ($P \leq 0.01$). Rust increased with increasing irrigation in both years. Southern blight increased with increasing seeding rate in 1993 ($P \leq 0.02$).

A Six-year Benefit Assessment of Fluazinam for Control of Sclerotinia Blight of Peanut in Virginia.

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Sclerotinia blight of peanut poses a serious threat to the livelihood of an increasing number of peanut growers in Virginia. Surveys of growers, clinical records and county agents indicated that as much as 60% of the acreage was infested with the disease in 1990, and the lack of effective control measures has allowed disease spread to continue unchecked. Applications of iprodione (Rovral® 50W and 4F) at 1 lb a.i./A at the initial onset of disease and 4 weeks later have been used commercially for control of sclerotinia blight since 1985. Fluazinam, a new experimental fungicide, was observed in 1987 to have exceptional activity in control of sclerotinia blight of peanut. From 1988 to 1993, fluazinam at 0.5 lb a.i./A and iprodione at 1 lb a.i./A were compared in fields with a history of sclerotinia blight. Treatments were applied according to the recommended method for applications of iprodione using one 8010LP nozzle centered over each row. Spray volume was 40 gal/A. The first spray was applied at the initial appearance of disease and ranged from 65 to 120 days after planting (DAP). The first spray in 1993 was 28 or more days later than the application in other years due to severe drought and the resulting unfavorable conditions for disease. Disease incidence at harvest was suppressed by an average of 65 and 23% over the 6-year period by sprays of fluazinam and iprodione, respectively. Fluazinam suppressed disease incidence significantly (P=0.05) in all trials, whereas iprodione showed significant disease suppression only in 1988 and 1991. Fluazinam and iprodione increased yield by an average of 1208 lb/A (51%), and 526 lb/A (25%), respectively. The gross value of harvested peanuts was increased by $358/A with fluazinam and $152/A with iprodione. Yield and value were improved significantly by fluazinam in four of the six trials, whereas iprodione showed significant improvements in only one year. These data provide profiles of performance under a wide array of conditions, which included a year with record high yields (1991) and a year with disastrous drought conditions (1993). ISK Biotech Corp. is actively seeking to fulfill all data requirements necessary for registration of fluazinam to control sclerotinia blight and other soilborne diseases of peanut.

An Assessment of Environmental Conditions Preceding Outbreaks of Sclerotinia Blight of Peanut in Virginia.

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Records of environmental conditions and outbreaks of sclerotinia blight in peanut fields at the Tidewater Center in Suffolk were summarized over a 13-year period (1981-93). Environmental data included rainfall, air temperature and soil temperature at a 4-inch depth adjacent to fields. These data were from records of a National Weather Service Observation Station and a USDA-ARS/Virginia Tech environmental monitoring station. Fields selected for this study had an established history of corn/peanut rotations and were managed according to recommended practices for peanut production in Virginia. Peanut cultivars included Florigiant, NC 7 and NC 9 which have similar levels of susceptibility to sclerotinia blight. Planting dates over the 13-year period ranged from May 1 to May 20 and averaged May 10. Initial outbreaks of sclerotinia blight were determined through intensive scouting of fields at weekly intervals. First occurrences of sclerotinia blight ranged from July 10 to September 7 or 62 to 120 days after planting (DAP). The mean and median dates of initial disease outbreaks were July 28 (79 DAP) and July 25 (76 DAP), respectively. All outbreaks were observed after vines were within 6 inches of touching between rows (36-inch spacing) or after vines lapped between rows. Under these conditions, a canopy of dense foliage shaded the soil surface and infection sites inside rows from direct sunlight. Weekly rainfall averaged 0.87, 1.85, 0.73 and 0.62 inches in the first, second, third and fourth week prior to disease appearance, respectively. Maximum and minimum air temperatures averaged 88.7 and 68.0, 89.4 and 68.0, 89.1 and 65.4, and 88.9 and 66.1 F in the first, second, third and fourth week prior to disease onset, respectively. Soil temperatures at the 4-inch depth showed an average maximum and minimum of 85.5 and 77.3, 85.0 and 76.8, 84.4 and 75.7, and 83.1 and 73.7 F in each of the 4 weeks before disease onset, respectively. These data provide fundamental knowledge for development of fungicide application strategies and weather-based advisory programs for improved disease control. Vine growth and rainfall appear to be the most important prerequisites to disease onset in peanut fields. Soil and air temperatures in Virginia appear to have a lesser role, based on data collected during this study.

Utilization of PCNB Alone or in Combination with Iprodione for Control of Sclerotinia Blight of Peanut. K.E. JACKSON* and J. P. DAMICONE. Dept. of Plant Pathology, Oklahoma State University, Stillwater, OK 74078-9947.

In 1993, field tests were conducted at two locations, Ft. Cobb and Gerty, OK to determine the effectiveness of combining PCNB 10G and iprodione 4F for increased control of Sclerotinia blight caused by *Sclerotinia minor*. Two levels of the combination treatment were tested. The high level consisted of PCNB at 10 lb ai/A plus three sprays of iprodione at 1 lb ai/A. The low level utilized 5 lb ai/A of PCNB plus two sprays of iprodione at 1 lb ai/A. At Ft. Cobb, both levels of treatment on the susceptible cultivar 'Florunner' were compared to PCNB at 10 lb ai/A, iprodione at 1 lb ai/A (applied three times), the experimental fungicide fluazinam at 1 lb ai/A (two applications), and the resistant cultivar Tamspan 90 and breeding line CxF 126 that received no fungicide. At Gerty, the high level of PCNB plus iprodione, PCNB alone, and iprodione alone were compared on the susceptible cultivar 'Okrun'. The first application of iprodione was made according to a Texas-developed-weather-based threshold utilizing soil temperature and rainfall, with subsequent applications at 21-day intervals. PCNB was applied prior to canopy closure 63 days after planting (DAP) at Ft. Cobb and 69 DAP at Gerty. Fluazinam was applied at 60 and 90 DAP. All treatments significantly reduced the incidence of Sclerotinia blight and increased yield when compared to untreated susceptible cultivars. At Ft. Cobb, the treatments of CxF 126 breeding line, the fungicide fluazinam, and resistant cultivar Tamspan 90 had the lowest incidence of Sclerotinia blight of 9, 10, and 11%, respectively. Fluazinam resulted in the highest yield (4100 lb/A) followed by the high level of PCNB plus iprodione (3660 lb/A). Both the low and high levels of PCNB plus iprodione significantly increased yield (560 - 930 lb/A) and the high combination level significantly reduced the disease incidence (27%) when compared to iprodione alone. PCNB was applied 7 days before the threshold was triggered at Ft.Cobb and was more efficacious than at Gerty where PCNB was applied 7 days after the threshold was triggered. The registered fungicides, PCNB and iprodione, applied to susceptible runner cultivars were more profitable than no fungicide treatment, however, the genetic resistance of Tamspan 90 and CxF 126 was more profitable than the registered fungicide treatments.

Effects of Various Phenotypic and Mechanically Altered Peanut Canopies on Sclerotinia Blight and Efficacy of Fungicide Applications. T. M. Butzler*, J.E. Bailey, and M.K. Beute. North Carolina State University, Raleigh, NC.

Sclerotinia blight is not usually a major problem until vines meet in the row middles and a dense canopy develops. This new microclimate, with high humidity and cool temperatures, is conducive to rapid growth of Sclerotinia minor. Removal of excess foilage before and during a sclerotinia blight epidemic on the susceptible genotype NC7 has been shown to reduce the rate of disease progress. A field test in 1993 examined control of Sclerotinia blight with four peanut genotypes, (NC 7,Va 91212, Nc Gp 18016, and Tamspan) with diverse canopy morphologies. Each cultivar was either pruned (top 1/3 of the canopy removed with a bushhog on August 16) or left unpruned. Applications of fluazinam (4.17 lb ai/ha) were imposed on the genotype X pruning treatments. Microclimate data within each pruned and unpruned genotype were monitored for soil temperature (5 cm deep) changes. Disease data was collected weekly by counting the number of feet of row exhibiting active (visible fungus growth) lesions. Pruning reduced disease and yield ($P \leq 0.01$) and increased the efficacy of fluazinam ($P \leq 0.05$). Two of the genotypes with open canopy characteristics (VA 91212 and Tamspan) had significantly less disease than NC7 and NC Gp 18016, however; NC7 was the highest yielding of the four genotypes. Pruning measurably affected soil temperature approximately two weeks following pruning. A separate field trial was conducted to determine whether plant debris left from pruning would influence the incidence of severity of S. rolfsii in the field, however; disease development was limited in this test due to drought.

Epidemiological Aspects of Minimum Tillage and Incidence of Disease Caused by Three Soil-Borne Pathogens of Peanut.

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Microplot and field studies were conducted to determine the effects of minimum tillage on disease incidence of CBR, Sclerotinia blight and southern stem rot of peanut in the N.C. production region. Maintaining soil surface coverage of organic material, as in reduced tillage, alters soil temperature and moisture levels. In 1992 and 1993, the influence of surface plant debris on disease incidence was evaluated in microplots. Soil in microplots was infested with either *Cylindrocladium parasiticum*, *Sclerotium rolfsii*, or *Sclerotinia minor* and plots were planted with NC 7 or NC 10C. Wheat straw was applied to selected microplots, simulating 80-90% soil surface coverage. Disease incidence data were collected bi-weekly in 1992 and weekly in 1993. Debris had minimal influence on southern stem rot. At low inoculum densities, CBR was enhanced by the addition of wheat straw in 1993, particularly early in the growing season. Sclerotinia blight was suppressed by the addition of wheat straw. Soil temperatures and moistures were monitored in 1993 using a Campbell 21X Micrologger. Soil at a depth of 0-2cm in straw-amended microplots was cooler than in unamended plots. This cooling effect may be particularly important early in the season before plant canopies shade the soil. Field tests conducted in 1993 showed reduced yields with no-till compared to conventional methods. However, reduced tillage with Vapam fumigation for CBR control yielded as well as conventional tillage with Vapam treatment. Enhancement of growth and infectivity of some soil-borne pathogens may occur with minimum tillage practices.

The Evaluation of Chemical or Cultural Practices in Combination with Resistance for Control of Cylindrocladium Black Rot in Georgia.

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Cylindrocladium black rot (CBR), caused by *Cylindrocladium parasiticum* Crous, Wingfield, Alfenas, is a disease of increasing importance in Georgia's peanuts. The devastating potential of CBR was recognized the previous three years (1991-1993), with reductions to peanut value ranging from 2 to 2.5% statewide. Experiments were conducted to evaluate the effectiveness of metam sodium or bed configuration for the management of CBR in peanut (cv. 'Florunner' and/or 'NC10C'). Metam sodium (10 gal/ac) was injected 10 inches deep into the intended row, 2 weeks prior to planting. Bed configuration studies consisted of flat or raised bed plots planted to either variety. Plots were monitored periodically during the growing season and CBR was rated at digging or two weeks prior to digging. To confirm visual ratings, plants were collected from plots and taken to the laboratory for isolation of *C. parasiticum*. Severe CBR epidemics did not develop in the bed configuration experiments and no differences were detected between raised or flat beds. Because of low disease pressure further evaluation of bed configuration will be necessary. Despite the dry weather, CBR epidemics did develop at some locations where metam sodium was evaluated. Peanut ('NC10C') planted in plots treated with metam sodium had 64% less CBR and yielded 696 lb more, compared to peanut planted in nontreated areas. Initial results look promising for the use of metam sodium and resistance for managing CBR in Georgia.

Influence of Cropping Pattern on the Severity of Soilborne Diseases of Peanut.

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On-farm trials were conducted in 16 fields in 1991, 21 fields in 1992, and 23 fields in 1993 to assess the severity of southern stem rot (Sclerotium rolfsii), Rhizoctonia limb rot (Rhizoctonia solani), Cylindrocladium black rot (Cylindrocladium crotalariae), Aspergillus flavus infection and populations of peanut root knot (Meloidogyne arenaria) juveniles as influenced by the frequency of peanut production. Cropping patterns were as follows: continuous peanut production (three year minimum); peanut every other year behind cotton, corn or clean fallow; peanut after two to three years of corn or cotton; and peanut after bahiagrass (five year minimum). Incidence of southern stem rot, the predominate soilborne disease of peanut in Alabama, was significantly influenced by cropping pattern. Peanut cropped behind bahiagrass suffered almost no southern stem rot damage. Peanut yield for this cropping pattern averaged 4327, 4495, and a drought-reduced 3351 kg/ha, respectively, in 1991, 1992, and 1993. Yields of peanut cropped after bahiagrass and two to three years of corn/cotton generally were significantly higher than those reported for the other two cropping patterns. Incidence of southern stem rot was highest in all three years for peanut grown every other year and two of three years of continuously cropped peanut. Except for 1991, yields in continuous peanut and in peanut cropped every other year were similar. When southern stem rot was controlled with Moncut 50W, applied at 1.1 kg/ha, yields among cropping patterns did not significantly differ. Frequency of peanut production influenced root-knot juvenile populations but not the occurrence of Rhizoctonia limb rot, Cylindrocladium black rot, or the incidence of A. flavus in seed.

Optimal Planting Decisions as Influenced by Control of Southern Stem Rot on Alabama Peanut Farms.

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Southern stem rot (caused by Sclerotium rolfsii) is the most damaging disease of peanuts in Alabama, causing annual losses estimated at 20% of expected yields. Moncut, a fungicide not currently registered for use on peanuts, effectively controls this disease and increases peanut yields. An increase in yields at the farm level could result in increased national production of "additional" peanuts, putting downward pressure on the price of additionals. Conversely, given higher yields, farmers might reduce plantings, satisfying quota with lower overall acreage. To analyze the overall effects of registration of Moncut for peanuts, research results concerning yield effects of Moncut were incorporated into a farm-level dynamic programming (DP) model of a representative Alabama peanut farm. To assess the yield effect of Moncut, trials were conducted in 16 farm fields in 1991, 21 farm fields in 1992, and 13 farm fields in 1993. Cropping patterns used were: continuous peanuts; peanuts every other year behind corn; peanuts following two to three years corn; and peanuts behind bahiagrass (five year minimum). Six nontreated control plots were paired with treated plots. Treatments were applied approximately 60 to 70 days after planting with Moncut 50W at 1.1 kg/ha as a full canopy spray. Compared to the controls, Moncut treated plots averaged 12.3% higher yields across all three years. Best results occurred on the every other year rotation, where yields increased 20.9%. The standard deviation of yield, averaged over three years, did not change with use of Moncut. The DP model was developed to maximize twenty years of discounted farm income for a representative peanut and corn farm in the Wiregrass region of Alabama. Stochastic representation of yields was included in the model to reflect a variety of possible growing conditions. Quota prices were fixed, based on current national policy, while prices of additionals were determined from appropriate economic variables. Rotational effects for peanuts following one year of corn and two years of corn were incorporated into the model as were stochastic price expectation functions. Results of the DP model indicate that, with Moncut, producers would likely reduce peanut acreage, reducing the anticipated problems with oversupply.

Effective Methods for In-field Evaluation of Resistance to Southern Stem Rot in Peanut. F. M. SHOKES*, University of Florida, Quincy, FL,; D. W. GORBET, University of Florida, Marianna, FL; and T. B. BRENNEMAN, Georgia Coastal Plain Experiment Station, Tifton, GA.

Screening peanut for resistance to *Sclerotium rolfsii* is difficult due to erratic epidemics, potential for disease escape, and variability in the data. Reliable methods are needed to make progress. Over the past ten years we have looked at various methods of inoculating peanut to prevent disease escape and to insure an epidemic. A three-tiered system of screening has been developed: 1) Genotypes may be pre-screened in one row unreplicated plots inoculated with a composite of at least three pre-tested isolates. Inoculum is grown on autoclaved oat seed, dried, bulked with equal parts rolled oats and cracked corn, and applied at about 160 ml per 5 m row. 2) Selected genotypes are space-planted 25 cm apart with 10-12 plants/row and every other plant is hand inoculated with a 1-cm PDA agar plug with a germinated sclerotium and mycelium. Plants are marked with flags and inoculum is placed on the crown of plants at soil level. Individual plants are evaluated three to six times using a 1-5 scale; 1 = healthy and 5 = >50% of stems dead or dying. 3) Two inoculated rows of selected genotypes are paired with two uninoculated rows. Inoculum is applied in the same manner as indicated at level one. Severity of stem rot is assessed on inverted plants and pod yield and grade are determined. For all levels of testing, plants are inoculated about 45 days after planting and irrigation is applied before inoculating and for two days thereafter. These methods are being used in the Florida breeding program and appear to have good potential for success.

Effect of Seeding Rate of Florunner Peanut on Severity of Southern Stem Rot in Georgia. F.D. SMITH*, T.B. BRENNEMAN, and B.G. MULLINIX. University of Georgia, Coastal Plain Experiment Station, Tifton, GA 31973.

Seeding rate is one of many factors that may influence the severity of southern stem rot of peanut, caused by the fungus *Sclerotium rolfsii*. A study was initiated in 1993 to evaluate the effect of four seeding rates of peanut on disease progression throughout the growing season. Seed of Florunner peanut were planted at 37.5, 75, 112.5, and 150 lb/A, which was achieved by hand placing 2, 4, 6, and 8 seeds per ft, respectively. Plots were 25 ft long and consisted of two single rows. A randomized complete block design with seven replications was used. The peanuts were managed according to standard production techniques, but no fungicides were applied for control of stem rot. The plots were examined weekly for infection sites caused by *S. rolfsii*. The first signs of the pathogen were detected on 16 Jul 1993. At the final above-ground rating for stem rot 9 wk later, the average number of infection sites per plot (hits) was 4.6, 10.7, 14.7, and 15.9 for plots seeded at 37.5, 75, 112.5, and 150 lb/A, respectively. The average length of hits was 13.7 inches in plots seeded at 37.5 lb/A and ranged from 18.6 to 19.6 inches in other plots. The average number of below-ground hits was 9.4, 20.0, 21.6, and 25.0 for plots seeded at 37.5, 75, 112.5, and 150 lb/A, respectively. The plant architecture was also affected by the seeding rate. For plants in these respective plots, the average height of the main stem was 10.7, 12.9, 14.5, and 15.9 inches. Peanut yields were low due to hot temperatures, dry conditions, and presence of tomato spotted wilt virus (TSWV). Severe symptoms of spotted wilt were observed on an average of 22.1, 22.6, 18.3, and 18.3 plants per plot seeded at 37.5, 75, 112.5, 150 lb/A, respectively, and these values represented 22, 12, 6, and 5% of total plants. Yields of peanut pods were 1630, 1854, 1830, and 1543 lb/A from plots seeded at 37.5, 75, 112.5, and 150 lb/A, respectively. The results suggested that wide spacing of peanut plants reduced incidence and spread of stem rot but that spotted wilt may have limited the yield benefit. Regression of seeding rate on yield produced the quadratic equation: $y = 1873.9 - 0.7633(x-93.75) - 0.0907(x-93.75)^2$. The optimum seeding rate in this field under disease pressure from *S. rolfsii* and TSWV was calculated to be 90 lb/A or 4.8 seeds per ft. This spacing agrees with the Univ. of Ga. Extension Service recommendation for a seeding rate of 4 to 6 seeds per ft. Higher seeding rates appear to increase stem rot incidence and are an unnecessary expense.

Effects of Rotation with Tifton 9 Bahiagrass on Peanut Diseases, Soil and Shell Mycoflora, and Pod Yield. T. B. BRENNEMAN*, D. R. SUMNER[1], R. E. BAIRD[2], G. W. BURTON[3], and N. A. MINTON[3]. [1]Dept. of Plant Pathology, University of Georgia, Tifton, GA 31793, and [2]Botany and Plant Pathology Dept., Purdue Univ., Vincennes, IN 47591, and [3]USDA-ARS, Coastal Plain Experiment Station, Tifton, GA 31793.

Florunner peanut was grown from 1990 to 1993 under irrigation following one, two or three years of Tifton 9 bahiagrass, or in alternating years with bahiagrass. Controls consisted of plots in continuous peanut production for four years either treated with flutolanil (4.48 kg/ha) to control soilborne pathogens or left nontreated. Other management practices were according to standard recommendations. Stem rot (*Sclerotium rolfsii*) incidence was 4, 18, 19 and 44% in 1990-1993, respectively in the continuous peanut with no treatment, versus 0, 4, 10 and 17% with flutolanil. Stem rot incidence in 1993 was 39, 29, 17 or 23% for plots in the third, second, first or alternating year of peanut, respectively. Rhizoctonia limb rot (*Rhizoctonia solani* AG-4) severity was low to moderate. Flutolanil suppressed limb rot but rotation had little effect on the disease. Although all plots received chlorothalonil (1.25 kg/ha), leafspot (*Cercosporidium personatum* and *Cercospora arachidicola*) was present and was more severe in the nonrotated plots. In 1993, plots in continuous peanut production were 35% defoliated whereas those in peanut for the first time were only 7% defoliated. Pod yields in 1993 for continuous peanut were 3700 and 2747 lb/A for flutolanil treated and nontreated, respectively. Pod yield in 1993 was 2718, 3229, 4060 and 3502 lb/A for plots in the third, second, first or alternating year of peanut, respectively. Longer rotations and treatment with flutolanil both tended to increase peanut grades and reduce the percent damaged kernels. Soil populations of *Rhizoctonia solani* AG-4 were low throughout the study in all rotations. *Pythium* populations were variable from year to year but were not altered by rotation. A diverse mycoflora was isolated from shells, but the frequency of isolations of fungi was generally not altered by rotations.

Additive Effects of Root-Knot and Southern Blight on Peanut Yields. J. L. STARR*, M-Y SHIM, C. E. SIMPSON, and T. A. LEE, Jr. Dept. Plant Pathology and Microbiology, Texas A&M University, College Station, TX; Texas Agricultural Experiment Station, Stephenville, TX, and Texas Agricultural Extension Service, Stephenville, TX.

Root-knot nematodes (*Meloidogyne arenaria*) and *Sclerotium rolfsii* (incitant of southern stem blight) are both important pathogens of peanut and it is not uncommon to find fields infested with both pathogens. To examine the potential interaction of these pathogens, three factorial experiments were conducted in field microplots in 1992 (one experiment) and 1993 (two experiments). Treatments were three initial densities of sclerotia of *S. rolfsii* and four or five initial densities of *M. arenaria*, with five replications of each treatment in a randomized complete block design. Incidence of southern blight increased with increasing initial numbers of sclerotia per microplot in all tests ($P = 0.01$). In one test, increasing initial densities of nematodes also increased the incidence of southern blight ($P = 0.01$) but no interaction between *S. rolfsii* and *M. arenaria* was observed. Increased numbers of nematodes and sclerotia also decreased pod yield in 2 of 3 experiments with only *S. rolfsii* being significant in the third experiment. In no case was an interaction between nematodes and sclerotia observed with respect to pod yield. These data are evidence that increased incidence of southern blight and decreased pod yields in fields infested with both pathogens are due to additive affects and not an interaction.

Evaluation of Sesame for Control of *Meloidogyne arenaria* and *Sclerotium rolfsii* in Peanut.

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Sesame (*Sesamum indicum* L.) was evaluated in a six-year field experiment as a rotation crop for the management of root-knot nematode (*Meloidogyne arenaria*) and southern blight (*Sclerotium rolfsii*) in 'Florunner' peanut (*Arachis hypogaea*). The experiment was initiated in 1988 in an irrigated field with severe *M. arenaria* and *S. rolfsii* infestation which had been in peanut production with winter fallow for 10 years. Rotations with bahiagrass were included as positive controls. *Meloidogyne arenaria* juvenile densities in soil were reduced in plots with sesame or bahiagrass, while aldicarb applied to monoculture peanut failed to reduce juvenile densities in all but 1 year. Incidence of southern blight was lowest in peanut following 2 years of bahiagrass, while disease incidence in peanut following one year of bahiagrass was equivalent to that in peanut monoculture. Cropping systems with sesame had no consistent effect on southern blight. Yield of peanut without nematicide following 1 year of sesame was higher than yield from continuous peanut without nematicide in 2 out of 3 years. Yield of peanut following 2 years of sesame was higher than monoculture peanut with no nematicide. The relationship between *M. arenaria* juvenile population density and peanut yield was not influenced by cropping system and was significant for all years except 1990. Peanut yield was inversely and linearly related to the number of southern blight disease loci, and the relationship between these two variables was unaffected by cropping systems but was influenced by production year.

those schedules with more tebuconazole applications resulted in less white mold and higher yields than schedules with few or no tebuconazole sprays.

Evaluation of Rotations with Tifton 9 Bahiagrass for the Control of the Southern Root-knot Nematode.

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The effects of rotating Tifton 9 bahiagrass with either peanut or cucumber and snapbean on the population densities of *Meloidogyne incognita* (southern root-knot nematode) in the soil and on root damage due to the nematode were determined at Tifton, Georgia in 1990-93. The Tifton sandy loam in which the experiment was conducted had been planted to lupine in the fall of 1988 and peanut in the spring of 1989 and was infested with a low level of *M. incognita* in the spring of 1990 when the experiment was begun. Continuous peanut, peanut preceded by 1, 2 or 3 years of bahiagrass and peanut planted in alternate years after bahiagrass did not increase soil population densities of *M. incognita* juveniles. However, the low level of juveniles present in these rotations at the inception of the experiment remained relatively stable in both peanut and bahiagrass throughout the experiment. Conversely, *M. incognita*-susceptible cucumber (spring crop) and snapbean (fall crop) following 1 or 2 years of bahiagrass increased dramatically the numbers of nematodes in the soil. Roots of cucumber and snapbean were severely galled following 1 year of bahiagrass but galling was less severe on these crops following 2 and 3 years of bahiagrass. Gall suppression on cucumber and snapbean following 2 years of bahiagrass was of only 1 year duration. No galls were found on peanut roots, pods and pegs.

Coastal Bermudagrass, Cotton, and Bahiagrass as Rotation Crops for the Management of Root-knot and Southern Blight in Peanut. P.S. KING*, R. RODRIGUEZ-KABANA, L.W. WELLS, D.G. ROBERTSON, and C.F. WEAVER. Department of Plant Pathology, Auburn University, Alabama Agricultural Experiment Station, Auburn, Alabama 36849.

The efficacy of coastal bermudagrass (*Cynodon dactylon*) as a rotation crop for control of the root-knot nematode (*Meloidogyne arenaria*) in 'Florunner' peanut (*Arachis hypogaea*) was studied for 3 years in a field experiment at the Wiregrass Substation, near Headland, Alabama. Coastal bermudagrass-peanut rotations (CBP) were compared with continuous peanut without nematicide [P (-)] and peanut monoculture with at-plant applications of aldicarb at 3.0 g a.i./10 m row [P (+)]. The performance of CBP rotations was also compared with two other crop rotation systems: 'Pensacola' bahiagrass (*Paspalum notatum*)-peanut (BP) and 'Deltapine 50' cotton (*Gossypium hirsutum*)-peanut (CP). In each system the rotation crop was grown for 2 years (1991, 1992) and peanut was planted without nematicide application on the third year (1993). Each year the field was left fallow during the winter. In 1993 lowest numbers of *M.arenaria* juveniles in soil at peanut harvest were in plots with CP and BP. These rotations resulted in the highest peanut yields. CBP failed to increase yield, and resulted in the highest soil populations of *M. arenaria* juveniles. Aldicarb reduced numbers of *M. arenaria* juveniles but did not increase yields. BP and CP reduced incidence of southern blight (*Sclerotium rolfsii*), but neither CBP nor aldicarb had any effect on the disease.

Partridge Pea as a Rotation Crop for the Management of *Meloidogyne arenaria* in Peanut. C.F. WEAVER*, R. RODRIGUEZ-KABANA, N.KOKALIS-BURELLE, D.G. ROBERTSON and L.W. WELLS. Department of Plant Pathology, Auburn University, Alabama Agricultural Experiment Station, Auburn, Alabama 36849.

The value of partridge pea (*Cassia fasciculata*) as a rotation crop for the management of root-knot nematode (*Meloidogyne arenaria*) in 'Florunner' peanut (*Arachis hypogaea*) was assessed in a 6-year field experiment at the Wiregrass Substation, near Headland, Alabama. Partridge pea did not support significant numbers of *M. arenaria* juveniles in soil. When peanut followed partridge pea the numbers of juveniles were always lower than in plots with continuous peanut. Aldicarb applied to peanut following 2 years of partridge pea resulted in increased yields over continuous peanut without nematicide. When the nematicide was applied to peanut following 1 year of partridge pea yields were improved in 2 out of the 3 years when peanuts were planted in this cropping system. Peanut without nematicide following 1 year of partridge pea yielded more than peanut monoculture in only 1 out of 3 years. Yields of peanut without nematicide following 2 years of partridge pea were higher than those obtained with continuous peanut in 1 out of the 2 possible years when plots with this rotation were in peanut. Application of aldicarb to continuous peanut failed to increase yields in all but 2 years of the study. Partridge pea had no effect on the incidence of southern blight (*Sclerotium rolfsii*) in peanut.

Diplodia Collar Rot of Peanut—a Reoccurrence. D.M. PORTER*, and P.M. PHIPPS. USDA-ARS and Tidewater Agricultural Research and Extension Center, Virginia Polytechnic Institute and State University, Suffolk, VA.

Diplodia collar rot of peanut occurs sporadically throughout the world. Typically, only a few scattered plants are noted exhibiting symptoms in infested fields. Infected plants usually sucumb rapidily. In 1993, collar rot was observed in several peanut fields in Virginia and North Carolina. At field sites in Suffolk, Virginia, and Northampton County, North Carolina only a few diseased plants were noted. However, at some farm sites in Dinwiddie County, Virginia, the disease was severe over areas exceeding one acre in size. In these areas, plants were either dead or dying. Collar rot is usually associated with hot, dry conditions. Such conditions prevailed throughout most of the peanut production areas of North Carolina and Virginia in 1993. These conditions are thought to predispose peanut plants to the collar rot pathogen. Over a 10-year period (1984-1993) air and soil temperatures were highest and relative humidity and rainfall were lowest in 1993. Infection sites began in the crown of plants and diseased plant parts (roots and stems) turned slate gray to black and shredded easily. Black, erumpent pycnidia were often observed on infected plant parts. Isolates of the pathogen obtained from each field site exhibiting collar rot symptoms did not differ in mycelial growth rate or pycnidia and spore production on agar and stem tissues. Two types of pycnospores were produced by all isolates: 1) single-celled hyaline (immature spores) and 2-celled dark brown spores (mature spores). Mature pycnospores did not have striations, a taxonomic criterion characteristic only of *D. gossypina*. *D. gossypina* was isolated at a frequency of over 10% from seed (sized over a 16 x 64-inch screen with discolored seed removed) from fields exhibiting severe symptoms. At locations exhibiting minimum disease, *D. gossypina* was isolated from seed at a frequency of about 1%. Seed treatment with Vitavax PC at 4 oz./cwt reduced the incidence of *D. gossypina* in peanut seed but did not eradicate the fungus. Isolates of *D. gossypina* were obtained more frequently from cut seed (cut latitudinally into apical and basal parts) than from noncut seed. *D. gossypina* was also isolated from seed in which the testa had been removed. It appears that *D. gossypina* can be seed transmitted since the fungus can apparently be borne internally.

Biological Control of Preharvest Aflatoxin Contamination of Peanuts with Combinations of Nontoxigenic Strains of Aspergillus flavus and A. parasiticus. J.W. DORNER, R.J. COLE and P.D. BLANKENSHIP. USDA, ARS, National Peanut Research Laboratory, Dawson GA 31742.

Tests were conducted during 1993 in the National Peanut Research Laboratory environmental control plots to determine the effectiveness of combinations of nontoxigenic strains of *Aspergillus flavus* and *A. parasiticus* as biological control agents against preharvest aflatoxin contamination of peanuts. Five environmental control plots (12.2 m x 5.5 m) were divided with a partition so that soil in half of each plot was treated with the biocontrol fungi while the other half of each plot served as a control. Three plots were used to test a combination of wild strains of *A. flavus* and *A. parasiticus* that do not produce aflatoxin. Two plots were used to test a color mutant of *A. flavus* used in combination with a color mutant of *A. parasiticus*. Fungi were grown on rice to serve as soil inoculum and treated soils were inoculated 51 days after planting. Peanuts were subjected to drought and heat stress for the last 45 days of the growing season. Treatment with biocontrol fungi had an effect on wild populations of *A. flavus/parasiticus* in the soil and on aflatoxin accumulation in peanuts. In soils treated with the color mutants, soil populations of wild *A. flavus/parasiticus* decreased over the course of the growing season from a mean of 1250 CFU/g at planting to a mean of 211 CFU/g at harvest. In control soils, populations of wild *A. flavus/parasiticus* increased from a mean of 312 CFU/g to a mean of 5490 CFU/g over the same period. Aflatoxin concentrations in edible category peanuts from plots treated with the nontoxigenic wild strains of *A. flavus* and *A. parasiticus* were 2.2, 1.8, and 5.5 ppb compared with 21.8, 122.5 and 124.3 ppb in respective control plots. Concentrations in edible peanuts from plots treated with the color mutant combination were 10.0 and 0.5 ppb compared with 157.2 and 43.0 ppb in respective control plots. The mean for all treated plots of 4.0 ppb was significantly less ($P = 0.009$) than the mean of 93.8 ppb for all control plots.

PRODUCTION TECHNOLOGY

Yield Response of Two Spotted Wilt-Resistant Peanut Cultivars to Seeding Rate and Irrigation. H. TEWOLDE*, M.C. BLACK, C.J. FERNANDEZ, and A.M. SCHUBERT. Texas A&M Univ. Agric. Research and Extension Center, Uvalde and Lubbock, TX.
Irrigated peanuts have traditionally been planted with conventional planters at rates higher than necessary in order to minimize risks of poor stand and reduced yield. Use of vacuum or air planters that place seeds more uniformly for depth and spacing compared to conventional planters has increased in recent years. However, the minimum seeding rate has not been established when planting with precision planters. A study was conducted in 1992 and 1993 in South Texas to determine whether low seeding rates reduce pod yield and to test the advantage of low seeding rates when irrigation is below the optimum. GK-7 and Southern Runner, relatively new peanut cultivars that are resistant to tomato spotted wilt virus, were planted with a precision vacuum planter at 45, 65, and 110 lbs/acre seeding (2.2, 3.3, and 6.2 seeds/row-ft on a 36-inch bed) in a split-plot arrangement. Differential irrigation was imposed with a line-source irrigation system in which each sub-plot received irrigation ranging between 7 and 30 inches in 1992 and 1 and 28 inches in 1993. Total rainfall received during the growing season was 10 inches in 1992 and 13 inches in 1993. Maximum pod yield averaged across seeding rates and cultivars was 4058 lbs/acre at 27 inches in 1992 and 3410 lbs/acre at 28 inches in 1993. Seeding rate significantly ($P \leq 0.05$) affected pod yield in 1993 but not in 1992. Pod yields of the low seeding rates (45 or 65 lbs/acre) were as good as or better than yield of the high seeding rate (110 lbs/acre) in both years. Individual plants in the 45 lbs/acre treatment in 1993 produced three times as much pod yield as plants in the 110 lbs/acre treatment. Seeding rate did not significantly affect grade (percent sound mature kernels and sound splits), but there was a significant cultivar effect and cultivar by irrigation interaction. Decreasing irrigation resulted in a large yield and grade decline, but the interaction of irrigation with seeding rate was not significant. There was no yield benefit of low seeding rate with irrigation below optimum. Pod yield of both cultivars planted at 45 lbs/acre did not increase when irrigation exceeded 21 inches in 1992 and 23 inches in 1993.

An Analysis of Pesticide Use and Benefits in U.S. Grown Peanuts. D. C. BRIDGES, C. K. KVIEN*, J. E. HOOK, and C. R. STARK, JR., Department of Crop and Soil Sciences, The University of Georgia, Tifton, GA.
Pest management costs compose a larger portion of the variable production costs for peanuts than any other production cost. Pest management costs (including pesticide, non-chemical control and application costs) per pound of peanut production in the VC, SW and SE are $0.105, $0.109 and $0.116, respectively. The average farm-gate price per pound of peanut is $0.29. Pesticide material costs and quantities were $177, $81 and $129, and 35, 10 and 17 pounds ai per acre for the VC, SW and SE markets, respectively. This assessment was developed with input from over 30 pest management experts over the three peanut producing regions. The model developed to assist in this assessment is both rapid and accurate in picking the best short-term replacements for single pesticides, and it looks at more than pesticide-based pest control methods. Because of its structure, the model can be used to determine the impact of a new pest management procedure on current practices and help determine what, if any, practices this new practice might replace. Updating is relatively fast and easy.

Evaluation of Chemical and Non-Chemical Management of Major Peanut Pests in Alabama. J. R. WEEKS*, A. K. HAGAN and L. WELLS. Department of Entomology, Plant Pathology, and Wiregrass Experiment Station, respectively, Auburn University, AL 36849.

Studies were conducted in 1993 at the Wiregrass Experiment Station in Headland, AL to evaluate the effects of planting date, peanut (Arachis hypogaea L.) cultivars and pesticide treatments on thrips damage, stem rot and peanut root-knot nematode damage. Peanut cultivars Andru 93, Florunner and Southern Runner were selected as representing early, normal and late maturing runner varieties, respectively. Peanuts were planted on April 14, 28 and May 14. Pesticide treatment regimes included Temik 15G at 1.0 lb. ai/A in-furrow for thrips control, Temik 15G at 1.5 lb. ai/A banded at-plant and 1.5 lb. ai/A at pegging for nematode control and a non-treated control. Thrips damage to peanuts was reduced by both pesticide treatments and for peanuts planted May 14. Southern stem rot damage was reduced in peanuts planted on the last two planting dates as well as in the cultivar, Southern Runner. Root-knot nematode damage was reduced by both pesticide treatments, but increased in the Southern Runner and in peanuts planted on May 14. Peanut yield responses reflected the pest damage, cultivar selection and the date of planting. Cultivar selection, date of planting and pesticide regimes can be useful tools in managing these major peanut pests.

Digging Date and Leafspot Control Influence on Peanut Production. J.R. SHOLAR*, K.E. JACKSON, J.P. DAMICONE, J.K. NICKELS, and J.S. KIRBY, Dept. of Agronomy and Dept. of Plant Pathology, Oklahoma State University, Stillwater, OK 74078.

Field experiments were conducted from 1991 to 1993 to investigate the effects of three digging dates and two leafspot, *Cercospora arachidicola*, control systems on peanut (*Arachis hypogaea* L.). Pod yield, grade, and disease reaction for a spanish cultivar, 'Spanco', a full season runner cultivar, 'Okrun', and two short season runner cultivars, 'AT 127' and 'Marc I' were compared. The experiment was conducted on a Galey fine sandy loam soil. Digging dates averaged 127, 144, and 160 days after planting. The two leafspot control systems consisted of either three or six fungicide applications per season. Marc I produced the highest pod yields over all digging dates followed in declining order by Okrun, Spanco, and AT 127. Okrun yields increased in all years by delaying digging. In two of three years, pod yields of all other cultivars increased from the first digging date to the second but declined between the second and third digging dates. Grades consistently increased for all cultivars as digging was delayed. Gross returns followed the same trend as pod yields. There were no differences in pod yield, grade, or gross returns due to the leafspot control systems.

Interaction of paraquat and chlorothalonil with respect to weed and disease control in peanut. J. CHOATE* and G. WEHTJE. Dept. of Agronomy and Soils. Auburn University, Auburn, AL .

Application timing of paraquat and chlorothalonil overlap. Paraquat is a commonly-used, contact-type herbicide, chlorothalonil is a fungicide which is applied repeatedly during the season for the control of leaf spot. Growers have questioned the possibility of either combining these two pesticides, and/or omitting the first scheduled application of chlorothalonil. Studies were initiated to examine the interaction of paraquat and chlorothalonil with respect to both weed and disease control. Two formulations of chlorothalonil were included, Bravo 720 (liquid) and 825 (dry flowable). Greenhouse studies revealed that the addition of either formulation of chlorothalonil to paraquat did not significantly alter the expected activity of paraquat on peanut, sicklepod, smallflower morningglory and Florida beggarweed. Laboratory studies using ^{14}C-paraquat revealed that paraquat adsorption and translocation were not altered significantly by the addition of either chlorothalonil formulation. Disease control was evaluated with field studies. Growing conditions in 1993 were not conducive for extensive disease development; however, the treatment receiving no fungicide had the highest amount of defoliation and lowest yield. Combining the first chlorothalonil application with paraquat (i.e. tank mixing) did not affect either defoliation or yield.

Influence of planter type and seeding rate on yield and disease incidence in peanut. G. WEHTJE*, R. WEEKS, M. WEST, L. WELLS and P. PACE. Dept. of Agronomy and Soils, Auburn University, Auburn, AL.

Variability of peanut (Arachis hypogaea L.) seedling spacing, disease occurence and yield were compared for a conventional and a vacuum-type planter in field studies conducted in 1991 and 1992. Vacuum-type planters have an improved seed metering system and are considered to be more precise. This added precision may compensate for lower than normal seeding rates. Seeding rates evaluated decreased in a step-wise manner from the normal range of 123 to 101 kg/ha, to a minimum of 34 kg/ha. Spacing between individual seedlings was measured after emergence. The occurrence of tomato spotted wilt (TSWV) and southern stem rot were also determined. In 1991, across all seeding rates, variability in seedling spacing (i.e. standard deviation) was identical between the two planters. In 1992, at 3 of the five seeding rates (34, 56, and 101 kg/ha), standard deviation was less with the vacuum planter. In both years yield and disease occurrence were influenced only by seeding rate and were independent of planter type. TSWV was inversely related to seeding rate, while the opposite relationship occurred with southern stem rot. Maximum yield was achieved with a seeding rate of 101 kg/ha.

Effects of High Residue Cultivators on Yield of Peanut Planted by Conventional or Strip Tillage Methods. J.A. BALDWIN* and M.J. BADER, University of Georgia Cooperative Extension Service, Tifton, GA 31793.

Until recently, cultivators were not available which could be used in high-residue, reduced tillage systems. Several cultivators have been developed by commercial companies for use in conservation tillage. These implements may be utilized for precision cultivation of peanut (Arachis hypogaea L.). They may also improve digging efficiency and reduce harvest losses. An on-farm demonstration was conducted in 1993 comparing no cultivation, a Buffalo cultivator, and a Brown ChiselVator in both a strip-till system and conventional system planted to peanut following wheat (Triticum aestivum). The tillage treatments were arranged in a randomized complete block design containing three replications. In the conventional system, a KMC row-crop cultivator was compared to the two high-residue cultivators. All plots were cultivated at a later date using the KMC cultivator. Yield of peanuts in the conventional system averaged 4035 pounds/A and an average grade of 74% TSMK. The strip tillage system across all treatments yielded 3870 pounds/A with an average grade of 70% TSMK. No differences in yield were observed due to tillage treatments in either tillage system. The Brown ChiselVator plots had a grade of 71% vs. 69%, and harvest losses of 810 pounds/A compared to 1010 and 1100 pounds/A for the Buffalo cultivator and no cultivation respectively in the strip-tillage system.

The Influence of Furrow Diking on Peanut Yield in 1993. M. J. BADER*, and J. BALDWIN. University of Georgia Extension Service, Tifton, GA.

A study was conducted in Georgia in 1992 and 1993 evaluating the effectiveness of furrow diking. Furrow diking is an interrow tillage technique which forms small dikes in the furrow approximately every five feet. The small dikes restrict rainfall or irrigation water from flowing to a different location in the field. In 1992, six replicated field demonstrations were conducted with average plot yields of 121 pounds/acre higher for the diked than the non-diked plots. However, the difference in yields was not statistically significant at the 0.05 percent level. In 1993, the influence of furrow diking on yield was demonstrated in three irrigated and two non-irrigated fields. The field demonstrations were conducted in Terrell County, Georgia. Plot yields in this study were greater in the diked plots. The irrigated plots had an average increase in yields of 115, 193, and 198 pounds per acre. The difference in the diked and non-diked plots was statistically significant at the 0.05 percent level. However, the average yield increase of 91 pounds per acre due to diking in the non-irrigated plots was not statistically different. Data on one of the non-irrigated plots were not obtained. Results indicate that diking may be beneficial and the study needs to continue to evaluate the effects of different weather conditions on diking. This study will be repeated in 1994 to determine if the same differences occur.

Utilization of the Sunbelt Agricultural Exposition Farm for Extension Demonstrations, Field Days, Agent Trainings and Applied Research on Peanut. J.P. BEASLEY, JR.* J.A. BALDWIN, S.L. BROWN, S.M. BROWN, G.B. PADGETT, M.J. BADER and W.D. SHURLEY, The University of Georgia, Cooperative Extension Service, Tifton, GA. 31793
The Sunbelt Agricultural Exposition is a three-day farm show held every October at the Sunbelt Expo Farm on Spence Field near Moultrie, GA. It is the largest farm show held in the United States at which crop and equipment demonstrations are conducted in a field setting. The remainder of the year, the 550 acre farm is used for crop demonstrations and field testing. Crops tested on the Sunbelt Expo Farm include peanut (Arachis hypogaea), corn (Zea mays), cotton (Gossypium hirsutum), soybean (Glycine max), grain sorghum (Sorghum bicolor), canola (Brassica napus), sunflower (Helianthus annuus), perennial peanut (Arachis glabrata) and kenaf (Hibiscus cannabinus). The University of Georgia Extension Peanut Team has worked with the Farm Manager and staff of the Sunbelt Expo Farm in establishing numerous field demonstrations and applied research since 1986. These demonstrations are showcased for producers, county Extension agents and agri-business personnel at a Crops Field Day in late June and the Farm Show in October. Two Extension agent trainings were held on weed control and peanut harvest losses at this farm site. The Sunbelt Expo Farm was used as the site for a peanut quality seminar at which over 300 producers attended to examine harvest techniques and production factors that improve quality. The Georgia Peanut Tour made stops at the Sunbelt Expo Farm in 1992 and 1993 as part of a focus on Extension demonstrations that highlighted quality. Peanut demonstrations conducted by The University of Georgia Extension Peanut Team over the past eight crop years include: cultivar response to different planting dates, row patterns, soil insect damage, in-furrow insecticides and rotations; conservation tillage; weed control and herbicide comparisons; foliar fungicide and spray advisory comparisons; irrigation techniques and computerized weather station monitoring. This farm site was also noted by Extension specialists as having high levels of thrips (Frankliniella sp.) and tomato spotted wilt virus which precipitated a joint field research project between research and Extension faculty from Entomology, Plant Pathology and Crop Sciences. Results from this work will be very helpful in identifying production practices to reduce potential damage from these pests. Use of this farm site for disseminating research-based peanut production information has been successful.

A Method for Estimating Yield and Quality Losses in Peanut Fields. J.I. DAVIDSON, JR.* and M.C. LAMB. USDA, ARS, National Peanut Research Laboratory, Dawson GA 31742.
The estimates of the yield and quality losses in a field that account for the differences between the "attainable" and "actual" is very important to evaluating and improving farm management practices. There are pod addition losses and pod abscission losses. Addition losses result from poor stands, poor fertility, weeds, insects (LCB, wireworms, SCRW), disease (TSWV, white mold, nematodes, leafspot), hardpan, drought, excessive water, and other poor management practices (e.g. improper practices relative to planting date, irrigation practices, use of herbicides and tillage. Abscission losses result from weeds (usually at digging), insects (e.g. LCB, wireworms, SCRW, spider mites, foliage feeders) disease (e.g. white mold, CBR, nematodes rhizoctonia, TSWV, leafspot), drought, excessive water, inclement weather at harvest, and poor management practices (e.g. improper timing of harvest, errors by tractor driver in digging peanuts, and improper maintenance and operation of diggers, digger blades and combines). A method has been developed that uses models, regression curves, formulas, and expert knowledge to estimate these losses. Accuracy of pod addition loss estimates depends primarily upon the accuracy of scout and expert field reports that describe and map the field conditions from planting to harvest. Accuracy of abscission losses depends primarily upon accuracy of losses measured at or near harvest. Use of this method in estimating these losses will be demonstrated using actual data from 1993 peanut fields to evaluate the performance of expert management systems.

Development of a Knowledge Base for "DRYNUT", an Expert System for Managing Dryland Peanut Production. R.B. MOSS*, P. O. Box 67, Plains GA

The objective of DRYNUT is to minimize the environmental and economic risks in dryland peanut production while maximizing the economic return and to enhance peanut quality. The DRYNUT knowledge base addresses a high economic risk because of the uncertainty of weather with associated field problems and pest activity. Cooperative Extension Service experts and research scientists have compiled information from the literature and their knowledge into a written document (approximately 100 pages) that will be used to develop DRYNUT. In using this knowledge base, DRYNUT will require extensive input resource data. If DRYNUT users are utilizing other expert systems such as PNTPLAN, TILNUT and MNUT on the specific field in question, much of the data can be retrieved from their respective data files. The DRYNUT knowledge base has the following seven applicable program modules: (1) Irrigation feasibility option; (2) time period prior to planting (preplant); (3) time period from planting to emergence; (4) time period from emergence to fruit initiation (prior to fruit initiation); (5) time period during primary fruiting (primary fruiting); (6) time period after primary fruiting (maturation); and (7) time period during harvest (harvest). From this knowledge base, flow charts are being developed to cover all known if-then management decisions that must be made within each module. These flow charts will then be used to program DRYNUT. Two versions of DRYNUT will be developed. The "extension" version will contain those decisions approved by the Extension Service. The "research" version will contain decisions approved by the research scientists that will be tested, evaluated and compared to the "extension" version to determine what research is ready for technology transfer. Some of the expert knowledge unique to this knowledge base will be discussed.

Influence of Calcium on Agronomic Characteristics of VA-C 92R Peanut. R. W. MOZINGO* and N. L POWELL. Tidewater Agricultural Research and Extension Center, Virginia Tech, Suffolk, Virginia 23437.

Research data show that VA-C 92R absorbs calcium more readily and has a higher seed calcium content than other large-seeded, virginia-type, peanut cultivars. A study was conducted to determine if calcium rate could be reduced for this cultivar without adversely influencing yield and grade characteristics. Field tests were conducted in Northampton County, North Carolina, Sussex County, Virginia, and the City of Suffolk, Virginia in 1991, 1992, and 1993. Application rates were 0, 200, 400, 600, and 800 lb/a of bagged landplaster (25% calcium) applied in an 18-inch band over the row. Three-year averages show no significant differences among the 400, 600, or 800 lb/a rates for yield, value, or grade characteristics. The 600 lb/a rate in an 18-inch band is the current recommended rate. Data from individual years varied depending on the rainfall for a particular year. In 1992 with above normal rainfall, no differences were found among any of the rates. Differences were observed among treatments for yield, value, and grade in other years with normal or below normal amounts of rainfall. It is felt that seed quality will be affected by calcium rate, especially in years with below normal rainfall. Based strictly on agronomic data collected in this 3-year experiment, one could conclude that landplaster rate could be reduced from the recommended rate of 600 lb/a for the VA-C 92R cultivar without reducing yield, value or grade characteristics.

Reduced Tillage for Peanuts Following Bahiagrass. J.F. ADAMS and D.L. HARTZOG. Agronomy and Soils Department, Auburn University, AL.

Peanuts in Southeast Alabama are increasingly being rotated with bahiagrass. Farmers traditionally disk once or twice before using a moldboard plow and then disk approximately twice after plowing to prepare a seedbed. Five on-farm experiments were conducted from 1992-1993. Alternative tillage schemes were compared to conventional tillage (moldboard plow and disking) to determine if less soil disturbance would reduce yield. Treatments in two experiments consisted of rototilled strips, disking, chisel and disking, and conventional tillage. In the other three experiments treatments were inrow subsoiling (Brown-Harden rotilled), disking, chisel and disking, and conventional. In every experiment the disking and chisel treatments had equal or higher yields than the conventional tillage treatment. Peanut grades were unaffected by tillage treatments. Penotrometer readings were taken to a depth of 50 cm to determine the effects of tillage treatments on compaction. Rototilled and disk treatments had higher penotrometer readings than conventional or disk plus chisel from 10 to 50 cm depth. This increased compaction occurred in the row as well as in the middles. The Brown-Harden rotill treatment had less compaction than the conventional tillage to a depth of 50cm.

Poultry Litter Effects on Yield and Grade of Runner Peanuts. D. L. HARTZOG* and J. F. ADAMS, Dept. of Agronomy, Auburn University, AL.

The poultry industry is rapidly expanding in Southeast Alabama. The increase in production has resulted in large amounts of litter being applied on agricultural land. Traditionally, peanuts have not had litter application since nitrogen is not recommended and only little phosphorus and potassium are required, but application of litter to peanuts is increasing. Two on-farm poultry litter experiments were initiated in 1993 to determine the effect of litter applied to peanuts. Experiment one had poultry litter applied at 0, 1, 2, 4 ton/acre plowed down and a two ton rate disked after turning. Experiment two had 0, 2, and 4 ton/acre plowed down. The litter treatments in both tests were compared to a commerical fertilizer of phosphorus and potassium at a rate of 80 lb/acre of P_2O_5 and K_2O, respectively. In both experiments, poultry litter treatments had a higher yield than the control. In one experiment all the litter treatments were equal to the P & K treatment while in the other experiment, litter treatments had higher yields than the commerical fertilizer. SMK's ranged from 71 to 74% and were not significantly different in one experiment and 65-70% in another with the fertilizer having the highest grade. Little work has been done to elucidate the beneficial effects of poultry litter on peanuts.

Phosphorus Efficiency in Peanuts. K. R. KRISHNA. ICRISAT, Patancheru, India. Peanut (*Arachis hypogaea* L.) yield depends on efficient absorption and use of nutrients, particularly phosphorus (P). Inherent soil P and that applied as fertilizer often becomes unavailable because of slow diffusion and chemical fixation. Therefore efficient absorption and utilization of P by peanut is required. Genetic variation for magnitude of P uptake and utilization occurs in many agricultural crops but remains under utilized in crop breeding and improvement programs, and is unexplored in peanuts. This paper deals with genetic variation for P uptake and utilization among peanut genotypes. A glasshouse trial with 25 peanut genotypes of wide genetic variation aimed at detailed analysis of roots and root related characters involved in P efficiency. Four other field location trials were conducted using different genotypes and check varieties, to assess P efficiency. Peanut genotypes differed significantly in their root characters such as root length and rate of P uptake per unit root length. Also, significantly differed for leaf and pod characters such as P accumulation, and drymatter and/or yield produced per unit P translocated i.e. 'phosphorus efficiency ratio' (PER). These individual genetic/physiological markers occuring in shoot, root and pod together contributed to the total P efficiency of the genotype. Our studies indicated that identification of groundnut genotypes with increased P uptake as well as higher seed yield/dry matter per unit P absorbed is possible. Results from field tests indicated that certain genotypes sustain higher P efficiency ratio at both low (<8.0 ppm Olsen's P; ph 7.0) and high (>13.0 ppm Olsen's P; ph 6.5) soil P availabilities. Results are discussed with a view to identify and breed for P efficiency in peanuts; develop a computerized data base for P efficiency related characters, and utilize isozyme patterns and restriction fragment length polymorphism (RFLP) techniques to achieve rapid identification of genotypes with P efficiency.

STORAGE, CURING, PROCESSING, & UTILIZATION

Effect of High Moisture Foreign Material on Aflatoxin in Storage. F. E. DOWELL* and J.S. SMITH, JR. USDA, ARS, National Peanut Research Laboratory, Dawson, GA 31742.
Studies were conducted in 1992 and 1993 to determine how high moisture content foreign material (HI MC FM) may contribute to aflatoxin in storage. Four types of HI MC FM, gherkins, maypops, briarballs, and citrons, were collected and placed in warehouses during the 1992 and 1993 storage seasons. Samples were prepared by placing the HI MC FM in the center of about 2.5 lbs of peanuts in a small mesh bag. This sample was then placed in the center of about 35 lbs of peanuts in a large mesh bag which was then buried below about 5 to 20 feet of peanuts in a conventional warehouse. The large bag provided a buffer between the HI MC FM and the peanuts in the warehouse. After storage, aflatoxin levels were measured using about 100 g from each sample to determine how much aflatoxin was generated during storage by the HI MC FM. Initial moisture of the HI MC FM was 80-90% while final moistures were 12-14%. Only samples with gherkins had significant (> 10 ppb) amounts of aflatoxin for the 1992 tests. Other samples in this test may not have been contaminated with aflatoxin since samples were placed in storage late in the year when temperatures were cooler, thus *Aspergillus flavus* did not grow and produce aflatoxin. For the 1993 tests, samples with gherkins, maypops, and citrons had significant (> 10 ppb) amounts of aflatoxin in the 2.5 lb samples. These samples were placed in storage earlier in the season while temperatures were still high, and thus conditions were more conducive for growth of *A. flavus* and aflatoxin production. Neither test showed significant amounts of aflatoxin in samples containing briarballs. Briarballs are much smaller than the other types of FM in this test, thus the amount of moisture that can be released is much less. Total contributions of this FM to aflatoxin in a warehouse could be predicted if the total number of pieces of gherkins, maypops, and citrons could be accurately estimated.

Update on An In-bin Moisture Sensor for Curing Farmers' Stock Peanuts. C.L. BUTTS*. USDA, ARS, National Peanut Research Laboratory, Dawson GA 31742.
An in-bin sensor developed for measuring moisture content of walnuts and macadamia nuts was modified and installed in peanut drying trailers in 1990. Calibration data was collected during the 1990-1993 harvests. Linear and quadratic calibration curves developed using least squares regression analysis had a standard error of prediction of ±1.8% wet basis (wb). These calibration curves are applicable for pod moistures ranging from 12 to 25% wb. However, the meter was insensitive to changes in pod moisture content below approximately 12% wb. Sensors were installed in approximately 1000 trailers at ten peanut buying points in Georgia and Alabama. Experiences of buying point operators will be discussed.

Improving Peanut Quality, Maturity and Reducing Aflatoxin Risk by Sorting on Pod Density.

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Peanut maturity and peanut quality are closely related. An examination of peanut physical properties revealed that by sorting farmer-stock peanuts into pod density classes before shelling, the maturity distributions within shelled-stock classes can be manipulated. An unsorted sample of farmer-stock peanut having an initial maturity distribution in No. 1 kernels of 66% immature, 23% mid-mature and 11% mature was sorted into four pod-density fractions ranging from 98% immature and 2% mid-mature in the least dense fraction to 8% immature, 43% mid-mature and 48% mature in the most dense fraction. Along with improvements in maturity, we also found that the higher pod density groups have less foreign material, aflatoxin and damaged kernels. Many density sorting devices were tested, including air columns, pod cleaners, and gravity tables. All of these devices were capable of sorting pods into maturity groups, with the gravity table giving the most precision.

Rapid Headspace Analysis of Off-Flavors of Peanuts and Peanut Products.

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A better understanding of how off-flavors develop in peanuts and peanut products is essential for producing quality consumer products. Peanuts (*Arachis hypogaea* L.) are high in lipid materials (~50%) and are very susceptible to deterioration. Lipid oxidation leads to serious off-flavor problems in both peanuts and peanut products. Additionally, sulfur compounds, probably from amino acids and/or proteins, also play a major role in the production of off-flavors. Both headspace analysis [flame ionization (FID) and sulfur (FPD) detectors] and sensory testing [consumer and flavor profile panels] have been used for ten years to establish chemical-sensory relationships for off-flavors such as abusive drying, musty flavor, musty aftertaste, aging, tongue or throat burn and green/beany. Sulfur compounds, such as hydrogen sulfide and methane thiol, also produce unpleasant aromas. Most recently, other detector systems [such as nitrogen (FTD), electron capture (ECD) and photoionization (PID)] have been tested in our laboratory to measure and understand the origin of these off-flavors. This study describes the current methodology and includes recent findings from this laboratory.

Image Analysis as a Research Tool for Color Evaluation of Roasted Peanuts.

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True Color Image Analysis (TCIA) is a unique research tool that increases the flexibility and capability for color evaluation as a measure of the extent of roasting of peanuts. The flexibility relates to the fact that the sample can be prepared exactly as it will be viewed by the consumer: butters, grinds, single cotyledons, or intact kernels. Peanut grinds/butters provide a measure of the average color throughout the nut over the entire population of the nuts in the sample, which does not correspond to the consumer perception of the surfaces of whole roasted peanuts. The capability relates to the fact that a population of kernels, or a single kernel, or a single region on the surface can be measured. The IBM/PC system includes a CCD color camera equipped with three separate primary color signals: red, green, and blue. Intact peanuts are placed under the camera, which transmits an image to the PC for analysis, and simultaneously displays the image on a TV monitor. The software provides quantitative values for red (R), green (G), and blue (B) light reflected from the surface of the peanut. Total light reflectance (sum of the RGB values) is defined as "paleness" and used to measure the extent of roasting. The TCIA paleness scale (0 to 765) provides greater resolution than the familiar L scale (0 to 100) of conventional reflectance instruments. Light-roasted nuts have higher paleness values than dark-roasted peanuts. Image analysis can be used to a) correlate visual color magnitude with extent of roasting, b) correlate visual color quality resulting from differences in Maillard reaction chemistry with roasting conditions, and c) quantitate variation in color among intact peanuts WITHIN a sample, rather than provide "average color" of a ground sample. Sub-optimum roasting conditions generate a wide variation in both color magnitude and quality within a single production lot. These peanuts can be visually segregated by color into three subpopulations and labeled pale-, medium- and dark-roasted. Each subpopulation is then evaluated for color magnitude, quality, and variation by TCIA. Overall paleness is directly related to extent of roast, from pale- to dark-roasted. Reflectance of blue light changes the most from pale- to dark-roasted.

Analysis of Peanut Flavor Volatiles by Static Headspace / On-Column Injection / Gas Chromatography / Mass Spectrometry Technique.

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A sensitive and reproducible analytical method has been developed to monitor the volatile compounds of peanuts and other related nuts. The method is used to study flavor formation during nut processing and product development, to screen for product off-flavor, for shelf-life studies (rancidity, staleness), and for QA/QC methods. During analysis, samples are ground and placed in a flask (usually a 500 mL ground-glass neck Erlenmeyer). The glass container is sealed with a custom-made Teflon stopper to adapt a high pressure stopcock for capillary needle insertion. Ten mL of the headspace gas are collected after a 90-minute thermal equilibration period at 50 C (static headspace) and directly injected into a fused-silica capillary column with cryogenic trapping. Volatile components are separated by gas chromatography and quantitated by mass spectrometry, using a mass selective detector (MSD) operated under single ion monitoring (SIM) mode. This system has been used to quantitate over forty peanut flavor volatiles by monitoring mainly their MS base peak ions. The method has been designed to achieve limits of detection of 10 ppb for most of the screened volatile chemicals. In this work, the method was used to follow the changes of flavor volatiles in relation to peanut roasting time (3, 7, and 11 minutes) and temperature (305, 325, and 345 F). The results of this study will help understand the relationship between aroma generation and protein breakdown during thermal processing, as well as identifying the chemicals responsible for peanut flavor descriptors.

WEED SCIENCE

Applications of Chloroacetamide Herbicides or Chlorimuron Do Not Increase Stem Rot of Peanut. W. C. JOHNSON, III*, T. B. BRENNEMAN, and B. G. MULLINIX, JR. USDA-ARS and Univ. of Georgia, Coastal Plain Exp. Stn., Tifton, GA 31793.

Field studies were conducted at Plains, GA from 1991 through 1993 to determine if peanut treated with single or sequential applications of chloroacetamide herbicides or chlorimuron had more stem rot (Sclerotium rolfsii Sacc.) than nontreated peanut. Weed-free studies were conducted in a field with a history of severe stem rot created by peanut monoculture for nearly 25 yr. A split plot design was used with four replications. Main plots were a factorial arrangement of seven levels of chloroacetamide herbicide treatment and two levels of chlorimuron treatment . These included alachlor (3.4 kg ai ha^{-1}) preplant incorporated (PPI), alachlor (2.2 kg ha^{-1}) at vegetative emergence (VE), alachlor PPI followed by alachlor VE, metolachlor (2.2 kg ai ha^{-1}) PPI, metolachlor (2.2 kg ha^{-1}) VE, metolachlor PPI followed by metolachlor VE, and nontreated. Chlorimuron levels were one application (0.009 kg ai ha^{-1}) 60 days after emergence (DAE) and nontreated. Subplots were two levels of fungicide treatment for stem rot control; one application of MON24017 (0.6 kg ai ha^{-1}) 60 DAE and nontreated. Parameters measured were stem rot counts at mid-season and late season, biweekly radiometer readings throughout the season, and peanut yield. Stem rot incidence was not affected by either single or sequential applications of chloroacetamides. Similarly, applications of chlorimuron did not increase stem rot. MON24017 effectively controlled stem rot. Peanut yields were not reduced by either chloroacetamide herbicides or chlorimuron. MON24017 increased peanut yields an average of 1020 kg ha^{-1}. Regression analysis of radiometer data indicated temporary reductions of peanut growth from chloroacetamides and chlorimuron. However, injury from chloroacetamides and chlorimuron did not alter either stem rot incidence or peanut yield.

Weed Control in Texas Peanut with Cadre. W. J. GRICHAR*, A. E. COLBURN, AND P. R. NESTER. Texas Agricultural Experiment Station, Yoakum, TX 77995; Texas Agricultural Extension Service, College Station, TX 77843; and American Cyanamid Company, The Woodlands, TX 77381.

Field tests were conducted from 1991 through 1993 in central and south Texas to evaluate Cadre applied alone and in various mixtures for weed control, peanut tolerance, and pod yield. Cadre was applied at rates varying from 0.032 to 0.063 lb ai/A on various weed species found throughout South and Central Texas. Purple nutsedge (Cyperus rotundus) control with Cadre at the 0.048 or 0.063 lb ai/A rate applied POST was 95% or better while yellow nutsedge (Cyperus esculentus) control with the 0.032 or 0.048 lb ai/a rate was variable. Cadre at 0.063 lb ai/A provided 80% or better yellow nutsedge control. Palmer amaranth (Amaranthus palmeri) control with Cadre at 0.032 to 0.063 lb ai/A applied to less than 8" tall pigweed provided 97 to 100% control regardless of rate. Eclipta (Eclipta prostrata) control was less than 70% with all Cadre rates when rated prior to peanut harvest. Cadre did provide approximately six weeks of good Eclipta control (>80%) after the POST application but late season control was poor at all locations. Blazer and Butoxone improved Eclipta control with Cadre by 10 to 20% while Tough plus Cadre improved Eclipta control by 30% at one South Texas location. Prowl at 1.0 lb ai/A applied PPI followed by POST applications of Cadre at 0.032, 0.048, or 0.063 lb ai/A resulted in 88 to 100% eclipta control. Hophornbeam copperleaf (Acalypha ostryifolia) control was less than 70% with Cadre at 0.032, 0.048, and 0.063 lb ai/A while the addition of Tough, Butoxone, or Blazer to Cadre improved control to greater than 90%. Southern crabgrass (Digitaria ciliaris) control with Cadre POST was rate dependent while Texas panicum (Panicum texanum) and broadleaf signalgrass (Brachiaria platyphylla) control was greater than 80%. Pitted morninglory (Ipomoea lacunosa) and ivyleaf morninglory (Ipomoea hederacea) control was greater than 85% with Cadre at 0.048 or 0.063 applied early POST or late POST. Peanut yields with Cadre were comparable to the standard herbicide treatment.

Potential Fit of Cadre Herbicide in Peanuts in the Southeast. S.M. BROWN. University of Georgia, Tifton GA 31793.

Cadre (AC 263,222), an imidazolinone herbicide which has been evaluated extensively in peanuts since 1989, is expected to be commercially available by the 1995 or 1996 growing season. Cadre has significant activity on numerous common and troublesome weeds in the Southeast, including yellow and purple nutsedge, Florida beggarweed, sicklepod, coffee senna, morningglories, cocklebur, pigweed, bristly starbur, wild poinsettia, wild radish, johnsongrass, and many annual grasses. Tropic croton, hophornbeam copperleaf, and hemp sesbania are among the weeds that routinely escape Cadre. Cadre will not replace the use of the preplant incorporated dinitroaniline herbicides. Though the product has both residual and postemergence activity, its greatest utility appears to be as a postemergence treatment applied when weeds are small. Cultivation often improves overall weed control. Cadre will likely be used in one of two regimes: (1) The first is as an early post treatment within 10 to 14 days after crop emergence at rates of 0.047 to 0.063 lb/A. This approach provides the most broad spectrum weed control and is particularly important for nutsedge control. Timing is critical--efficacy on several hard-to-control broadleaf weeds declines as weeds exceed 2 inches in height. (2) The second is as a follow-up treatment in sequential programs with early post applications of Starfire. Cadre applications should follow when weeds approach 2 inches. This regime extends the residual effects of Cadre further into the season, and given the competitive nature of the crop, additional weed control efforts are often unnecessary. The efficacy of Cadre on Florida beggarweed warrants special consideration. Early post applications have provided season long control in some trials but not in others. Again, timing is an essential aspect of maximizing activity of the product. Florida beggarweed greater than 2 inches may be only temporarily suppressed by Cadre. A rate of 0.063 lb/A with early post treatments is necessary for acceptable Florida beggarweed control. In the sequential regime described above, reduced rates of 0.032 to 0.047 lb/A have provided adequate Florida beggarweed control in several experiments. The residual efficacy of Cadre on Florida beggarweed is probably 2 to 4 weeks. The two greatest limitations for Cadre use on farms in the Southeast will be the cost of the product and potential rotational injury to crops such as cotton.

Weed Control in Peanut With Cadre as Influenced by Adjuvants. P.R. NESTER*, K. MUZYK, K. KALMOWITZ, F.B. WALLS, and G. WILEY. American Cyanamid Company, The Woodlands, TX, Columbia, SC, Brandon, FL, Goldsboro, NC, and Tifton, GA.

Studies were conducted throughout the southern peanut growing area in 1993 to evaluate weed control as influenced by adjuvants in postemergence applications of Cadre herbicide. Extremely hot and dry conditions prevailed during the 1993 growing season. These conditions allowed evaluation of certain additives for aid in increasing weed control. Cadre was applied at rates varying from 0.032 to 0.063 lb ai/acre. In five studies postemergence Cadre herbicide solutions were mixed with either a non-ionic surfactant (X-77) at 0.25% v/v or a crop oil concentrate (Agridex) at 1 qt/acre, with and without a liquid fertilizer (28-0-0) at 1 qt/acre. Averaging the weed control over all Cadre rates from all locations indicated that 30-45 days after treatment (DAT), no control differences were seen whether X-77, X-77 + 28-0-0, Agridex, or Agridex + 28-0-0 was added to Cadre. When weed control was averaged over the additives, control slightly increased as CADRE rate increased. In those studies where sicklepod (*Cassia obtusifolia*) was present Cadre at 0.063 lb ai/acre + X-77 gave 90% control. If 28-0-0 was added to the mixture 87% control of the sicklepod was achieved. Cadre at 0.063 lb ai/acre + Agridex with and without 28-0-0 gave 93% control of sicklepod. In a Cadre (0.063 lb ai/acre) postemergence study in Texas where non-ionic surfactants (Triton AG-98, X-77, Induce) were compared to crop oil concentrates (Agridex, Prime Oil) and vegetable oils (Sunit Oil II, Hasten), the oil mixtures (1 qt/acre) gave an average 80% control of sicklepod and 85% control of morningglories (mixture of *Ipomoea hederacea* and *I. lacunosa*), 30 DAT. The non-ionic surfactants (0.25% v/v) gave 72% control of sicklepod and 77% control of the morningglories, 30 DAT. The vegetable oils increased the efficacy of Cadre from 2-5% over the crop oils. It can be surmised from these studies that a non-ionic surfactant and crop oil concentrate perform similarly with postemergence applications of Cadre. Though in some situations one may be preferred over the other. The addition of a liquid fertilizer does not aid nor impede weed control.

Weed Management in Reduced Tillage Peanut Production in Georgia. J. W. WILCUT*, J. S. RICHBURG, III, and G. WILEY. Dep. of Crop and Soil Sciences, Coastal Plain Experiment Station, Univ. of Georgia, Tifton, GA 31793-0748 and American Cyanamid Corp., Tifton, GA 31794.

Studies conducted in Attapulgus, GA in 1992 and Tifton in 1993 evaluated different weed management systems for reduced tillage peanut production. Rye was planted in the fall of the preceding year and killed with Gramoxone Extra at 0.5 lb ai/ac approximately 3 wks before planting. Florunner peanut was planted with a Brown Harden Ro-Till planter. Weed management systems included a factorial arrangement of early postemergence (EPOST), POST, and late postemergence (LPOST) herbicide applications. EPOST herbicide options included 1) none, 2) Cadre at 0.064 lb ai/ac, 3) Starfire at 0.125 lb ai/ac + Basagran at 0.25 lb ai/ac, or 4) Starfire + Pursuit at 0.064 lb ai/ac. POST options were 1) none or 2) Starfire + Basagran at 0.5 lb/ac + Butyrac at 0.25 ai/ac. LPOST options included 1) none, 2) Select at 0.1 lb ai/ac, or 3) Poast Plus at 0.188 lb ai/ac. All applications were applied with a nonionic surfactant at 0.25% (v/v). A nontreated weedy check was included for comparison. Cadre applied EPOST controlled Texas panicum (87%), large crabgrass (74%), southern crabgrass (100%), crowfootgrass (100%), sicklepod (92%), Florida beggarweed (87%), common cocklebur (100%), and Florida pusley (86%) and yielded 3,680 lb/ac. Starfire + Basagran applied EPOST yielded 2,610 lb/ac and Starfire + Pursuit applied EPOST yielded 2,790 lb/ac. Weed control from these two EPOST systems generally did not provide control equivalent to Cadre applied EPOST. Applying Basagran + Starfire + Butyrac POST following the EPOST Starfire mixtures improved yields for these systems but did not improve yields from Cadre applied EPOST. Systems which used two applications of Starfire mixtures applied EPOST and POST provided yields equivalent to Cadre applied EPOST. Select and Poast Plus applied LPOST provided equivalent annual grass control. Postemergence graminicides did not improve peanut yield for any EPOST herbicide application but did improve annual grass control.

Growth and Development of Wild Poinsettia (Euphorbia heterophylla L.) Selections in Peanut. B.J. BRECKE, University of Florida, Jay, FL.

Wild poinsettia is a serious weed problem in several crops including peanut grown in Florida and Georgia. Previous research has indicated that there may be ecotypic differences between wild poinsettia growing in Georgia and Florida. A study was conducted over 3 years at Jay, FL to characterize the growth and development of wild poinsettia grown from seed collected at three locations; Plains, GA, Marianna, FL and Baton Rouge, LA. Twenty-four plants from each selection were transplanted from the greenhouse to peanut growing in the field 10 days after emergence. Wild poinsettia plants were spaced 3 m apart to prevent intraspecific competition. An additional 50 plants of each selection were grown alone, without a crop. Observations made throughout the growing season indicated that the Louisiana selection flowered later, grew to a larger size, produced more leaf area and biomass and caused a greater peanut yield reduction than the other selections. The Georgia selection flowered first, produced the smallest plants, leaf area and biomass and was least competitive with peanut. The Florida selection was intermediate for these parameters.

Mechanical Rod Weeding versus Conventional At-Cracking Herbicide Systems in Peanuts.

D. L. COLVIN*. University of Florida, Agronomy Department, Gainesville, FL.

Experiments were conducted during 1993 and 1994 to evaluate mechanical rod weeding systems versus conventional at-cracking herbicide systems in peanuts at Archer, FL. Herbicide systems consisted of a base treatment utilizing Starfire and Starfire plus Basagran, coupled with residual treatments such as Dual or Cadre, and were compared to mechanical rod weeding systems. All treatments, chemical or not, received Prowl preplant incorporated (PPI) for the control of grasses. The mechanical rod weeder used was a machine manufactured by the Lely Corp. designed to stir the soil in the top one to two inches and displace root systems of small weeds. Initial results with these experiments have shown that conventional chemical applications performed somewhat better than the timings chosen for rod weeder weed control application. In initial studies, the rod weeder was applied at 2 days after emergence (DAE) 7, 14, 21, and 28 DAE. A second set of treatments consisted of a set of two-days after emergence treatments coupled with 7, 14,21, and 28 DAE. A third set of treatments were delayed until 7 days after emergence and then followed with another rod weeder treatment at 14, 21, and 28 DAE. A final set of rod weeder treatments started at 14 DAE then followed at 21 DAE and then again at 28 DAE. Rod weeder systems begun at 2 and then continued at 7, 14, 21, and 28 DAE equaled yield of chemical application systems. Initial results show that the highest yielding systems consisted of Prowl PPI plus Starfire + Cadre at-cracking. The more intense the rod weeder system utilized and the earlier it began, the higher the peanut yield. Rod weeder systems equivalent to chemical systems were applied at 7 and 21 DAE as well as at 2, 7, 14, 21, and 28 DAE. Work will continue during 1994 to evaluate mechanical rod weeder systems for peanut weed control. Initial studies in 1993 showed that this particular method of weed control may be quite beneficial in Valencia type peanuts where applications of paraquat and paraquat-containing systems retard the initial growth and canopy formation of this market type. Response to applications for runner and Virginia type peanuts are not known; however, work will continue over the next several seasons investigating the use of rod weeders coupled with various chemical applications in an effort to produce more sustainable systems for peanut weed control utilizing less chemical herbicides.

Sicklepod *(Cassia obtusifolia)* Control in Peanuts with Flair. D.T. GOODEN, Clemson University, Clemson, SC 29634.

Experiments were conducted in 1992 and 1993 at the Pee Dee Research and Education Center at Florence, SC to evaluate the effects of time and rate of Flair application on sicklepod *(Cassia obtusifolia)* control in peanuts. Flair was applied either at crack (AC), 3 weeks after planting (EPOE) or 5 weeks after planting (POE) in 1992 and 3 weeks after planting (EPOE) or 5 weeks after planting (POE) in 1993. Flair rates were 0.5, 0.75 and 1.0 lb ai per acre. All treatments received Prowl preplant incorporated (PPI). Starfire plus Basagran was used as a standard for the studies. Additional treatments were Cadre, Pursuit and 2,4-DB individually tankmixed with Flair. The AC treatments gave poor results. When applied EPOE, Flair was equal to or better than the standard. There was no rate response to Flair when applied EPOE. With POE applications of Flair, there was a rate response with the 0.75 lb rate equal to the standard, while the 1.0 lb rate was better. Tank mixing Flair with other herbicides had little effect beyond the activity of the individual herbicides. Crop injury with Flair was similar to the standard.

POSTERS

Susceptibility of Peanut Varieties and Breeding Lines to Southern Blight Disease. B. A. BESLER*, W. J. GRICHAR, and O. D. SMITH. Texas Agricultural Experiment Station, Yoakum, TX and College Station, TX.

Eight Texas and one Georgia breeding line, four accessions from Burkina Faso (West Africa), and five runner and two spanish-type check cultivars were compared for yield, grade, and *Sclerotium rolfsii* reaction for two years under irrigated field conditions near Yoakum TX. Field *S. rolfsii* infestation was supplemented with inoculum from laboratory cultured field isolates of the fungus. Disease development, as measured by 30-cm infection sites in the four replicate 2-row, 6.1 m plot test, was moderate in both 1992 and 1993, with disease developing late in the 1993 season. Entry differences in yield and infection sites were highly significant during both years, but the relative responses of the entries to the disease were not consistent over years. Two entries (Tamspan 90 and Tx896100) were consistently low in infection sites, ranking 1 and 2 both years, and statistically ($P=0.05$) lower than all cultivars except Georgia Browne. Disease infection was low in Georgia Browne in both tests but was not different from Southern Runner. All four African lines were intermediate to high in infections sites and low in yield. The interaction of yields by years for the entries was less than for infection sites. Tx896100 and Georgia Browne were among the best yielding entries each year, and ranked high in the 1992 and 1993 combined data. GA T-2842 had intermediate disease pressure both test years, but was also among the best yielding. Coefficients of correlation for yield and grade characters with infection sites were low both years.

Evaluation of Disease Resistant Peanut Varieties when Sprayed with Bravo 720 and/or Folicur 3.6F on Extended Spray Schedules. A. J. Jaks* and W. J. Grichar. Texas Agricultural Experiment Station, Yoakum, TX 77995.

A field test was conducted in 1993 with GK-7, Florunner, Southern Runner, Sunrunner and AT-127 varieties using Bravo 720 and Folicur 3.6F plus adjuvant on 14, 21 and 28-day spray schedules. The amount of Folicur applied was restricted. Therefore, Bravo was used with Folicur respectively, to provide leafspot control in the 14 and 21-day schedule treatments. Sprays on the 28 day schedule were with Folicur plus adjuvant alone. All treatments in the 14, 21 and 28-day schedules were initially applied at 32 days after planting (DAP). Bravo was applied at 1.5 pt./A. Folicur and Induce were applied at 8.0 fl. oz./A + 0.19% v:v, respectively. Seven sprays were applied on the 14-day schedule including 1,2 and 7(Bravo) and 3,4,5 and 6 (Folicur). Five sprays were applied on the 21-day schedule with spray 1 (Bravo) and 2,3,4 and 5 (Folicur). Four Folicur sprays were applied on the 28-day schedule. Weather conditions caused moderate disease pressure in plots. Ratings at 91 DAP showed disease levels for unsprayed Southern Runner plots were not different from plots of this variety sprayed on the 21 or 28-day schedule. All other varieties had higher leafspot in unsprayed plots than in any spray schedule plots. At 114 DAP there was no difference in infection between 14 and 28-day treatments for AT-127 and Florunner. GK-7, Southern Runner and Sunrunner had lower leafspot infection in 14-day than 28-day treatments. There was no difference in final infection ratings between any of the varieties at the 21 or 28-day spray schedules. Yields were not different from Florunner, Southern Runner, Sunrunner and AT-127 when sprayed on the 14, 21 or 28-day schedules. GK-7 yield was higher at the 28-day schedule spray than at the 14 or 21-day spray. However, unsprayed plots of Southern Runner and Sunrunner had pod yields which were not different from 14,21 and 28 day treatments in their varieties. GK-7 and Florunner unsprayed plot yields were not different from plots in these varieties sprayed at 14-days. AT-127 unsprayed plots yielded less than sprayed plots of this variety. There was no spray x cultivar interaction for disease development or yield. Plots were dug at 134 DAP because of earlier freezing temperatures at 122 and 129 DAP.

Yield and Leafspot Response of Interspecific Peanut Crosses in Early Generation Tests.

M. OUEDRAOGO*, O.D. SMITH, and C.E. SIMPSON. Dept. of Soil & Crop Sciences, Texas A&M Univ., College Station, TX, and Texas Agricultural Experiment Station, Stephenville, TX.

Seven interspecific lines and Southern Runner were crossed in half-diallel, i.e. without reciprocals. F_1 plants were selfed and F_2 progenies evaluated for early leafspot reaction and yield. The objective of the study was to determine the predictability in F_1 and F_2 generations of crosses most likely to give the greatest expression of early leafspot resistance and yield. Field early leafspot assessment was made using the Florida leafspot rating scale at 110 days after planting, and determinations were made for lesion diameter, amount of sporulation, and latent period in both the field and laboratory. Genetic analysis was performed using the Griffing method 2 model 1. Significant differences existed among crosses and the parents for the visual leafspot rating, latent period, and amount of sporulation in the F_2 generation (P=0.05). Pod yield, based on individual plants, differed significantly among the F_2 crosses, but not in the F_1 (P=0.05). Little heterosis was found among these F_1 crosses. Performance in the F_1 did not reflect the performance of the F_2, as rank correlation between the two populations for plant yield was low (r=0.32) and not significant (P=0.05). Mean performance of both F_1 and F_2 generations will be compared to the mean performance of the F_3. Combining ability effects (both general and specific) were significant for yield and disease parameters in the F_2 generation.

Comparing the Interaction of Two Foliar Fungicides with Biologicals Used to Control Sclerotinia Blight of Peanut. K. E. WOODARD. Texas Agricultural Experiment Station, Stephenville TX 76401.

Sclerotinia blight (SB) of peanut (*Arachis hypogaea* L.), caused by the fungus *Sclerotinia minor* Jagger, has been identified in most of the peanut production areas of Texas since first being reported in Mason Co. in 1981. Chemical control of the disease is limited in quantity as well as quality. Alternative control methods such as biocontrol agents and soil amendments have shown promising, yet erratic, results. It was hypothesized that chlorothalonil used to control peanut foliar diseases was affecting indigenous and applied soilborne biocontrol fungi. A field experiment at Stephenville, TX was conducted in 1993 to test this hypothesis. A biocontrol agent (HS 23-7), cornmeal (thought to enhance natural biocontrol organisms), and iprodione (chemical control standard for SB) were each tested separately with chlorothalonil or cupric hydroxide for leafspot control. Cornmeal\Cupric hydroxide treated peanuts had the lowest disease rating throughout the growing season and was (P=0.05) lower than the untreated check for the last four disease ratings. Cornmeal\Cupric hydroxide treated peanuts had a higher (P=0.05) yield than the other treatments. The yield for Cornmeal\Cupric hydroxide was 2831 kg/ha compared to 1628 kg/ha for the untreated check and 2096 kg/ha for Cornmeal\Chlorothalonil. The yield for Iprodione\Chlorothalonil was 1888 kg/ha and 2141 kg/ha for Iprodione\Cupric hydroxide. Both of the cornmeal treatments and Iprodione\Cupric hydroxide were significantly higher than the untreated check. There were no significant differences among the other treatments for yield. The results of this experiment indicate an interaction between the leafspot control chemicals and Sclerotinia-blight control measures. The results further suggest that biological-based treatments are more effective when chosen to be compatible with other pest control measures.

Water Requirements of Peanuts as Measured in Non-Weighing Lysimeters. J.W. WORTHINGTON* and J.R. SCHMIDT. Texas Agricultural Experiment Station, Stephenville TX

Measuring water use in field grown plants is difficult because the root system is not confined; therefore the soil volume exploited by roots is not defined. Non-weighing lysimeters were fabricated from 1.8 X 0.6 m stock watering tanks. The tanks were painted on the inside with epoxy paint, the bottoms lined with 7 cm of gravel and then filled with soil typical to the peanut growing area of Central Texas. Replicated treatments using runner and/or spanish peanuts were planted in a circle midway between the center and outside of the cans with a space between plants of 10 cm. For any of three, one hour irrigation opportunities daily, metered water was automatically supplied, on demand, as indicated by switching tensiometers. Water was delivered using microirrigation techniques. Water meter readings were recorded daily over the 1991, 1992 and 1993 growing seasons to determine water use. When soil moisture was maintained at or near field capacity, both spanish and runner peanuts used water at a rate of 1 times pan evaporation for the area covered by their canopy. When soil moisture tension was allowed to decline to - 0.05 MPa between irrigations, water consumption was reduced to 0.55 times pan evaporation for the canopy area. On days with high evaporative demand, the crop water stress index (CWSI) increased, and photosynthesis declined as soil moisture tension increased (negatively). CWSI and photosynthesis were highly correlated on days with high evaporative demand. Plants growing under no stress conditions (- 0.01 MPa) show increasing photosynthetic activity through the morning with a depression at 2 to 3 pm but full recovery by 4 pm. When soil moisture tension increased negatively to -0.045 MPa peanuts went into a respiratory cycle by 2 pm and did not recover until water stress was relieved by irrigation and/or reduced evaporative demand. On days with low evaporative demand, CWSI is an imprecise measurement, but photosynthesis indicates little correlation between soil moisture tension and crop stress. When grown under non-stressed conditions, yields of 9,454 kg ha^{-1} and 11,310.3 kg ha^{-1} were obtainted for Tamspan-90 and Florunner respectively. In 1993, modest between-irrigation stress (- 0.05 MPa) reduced yields by 31%.

Regeneration of Peanut Through *in vitro* Culture of Peg Tips. Q. L. FENG* and H. T. STALKER (Dept. of Crop Science) and H. E. PATTEE (USDA-ARS, Dept. of Botany), North Carolina State University.

To recover interspecific hybrids which abort soon after fertilization, techniques must be developed to promote growth and differentiation of embryos and then to regenerate plants. Aerial peg tips (which encompass embryos, ovules and peg meristems) of *A. hypogaea* cv. NC 6, and a diploid wild species, *A. duranensis*, were collected 7, 10, 14 and 21 d after self-pollination. They were cultured in the dark on combined MS and B_5 media with various combinations of NAA, GA_3 and 6-BAP for 12 wks. Ovules or seeds were then isolated from the developing pods and cultured on MS media with NAA and 6-BAP to recover plants. Results indicated that 10-d-old peg tips, which have eight-celled proembryos, were more responsive for achieving *in vitro* embryo development and pod formation than peg tips collected at other ages. The three growth regulators had variable effects on pod formation, embryo growth, ovule development, peg elongation, and callus and root production. High levels of NAA and 6-BAP induced calli and inhibited *in vitro* embryo development whereas GA_3 promoted slight peg elongation and facilitated pod formation. Moderate levels of NAA induced root production and, in combination with very low levels of 6-BAP, induced pod formation and embryo development. Peanut fruits were obtained for both species from immature pegs. Several embryos had differentiated into cotyledons, embryonic axis, plumule and radicle and, after germination on MS medium, plants of *A. hypogaea* were recovered. Relatively low rates of embryo development and pod formation were also observed for *A. duranensis*, but tissues remained dormant. The techniques described for *in vitro* culture of very young embryos have potential for obtaining hybrid plants of crosses which normally abort.

Postemergence Weed Management Systems for Reduced Tillage Peanut Production in Georgia. E. F. EASTIN*, J. W. WILCUT, and J. S. RICHBURG, III. Dep. of Crop and Soil Sciences, Coastal Plain Experiment Station, Univ. of Georgia, Tifton, GA 31793-0748.

Studies conducted in Attapulgus, GA in 1992 and Tifton in 1993 evaluated different weed management systems for reduced tillage peanut production. Rye was planted in the fall of the preceding year and killed with Gramoxone Extra at 0.5 lb ai/ac approximately 3 wks before planting. Florunner peanut was planted with a Brown Harden Ro-Till planter. Weed management systems included a factorial arrangement of early postemergence (EPOST), POST, and late postemergence (LPOST) herbicide applications. EPOST herbicide options included 1) none, 2) Starfire at 0.125 lb ai/ac + Basagran at 0.25 lb ai/ac, or 3) Starfire + Pursuit at 0.064 lb ai/ac. POST options were 1) none or 2) Starfire + Basagran at 0.5 lb/ac + Butyrac at 0.25 ai/ac. LPOST options included 1) none, 2) Select at 0.1 lb ai/ac, or 3) Poast Plus at 0.188 lb ai/ac. All applications were applied with a nonionic surfactant at 0.25% (v/v). A nontreated weedy check was included for comparison. Starfire + Pursuit applied EPOST controlled *Ipomoea* morningglory species, smallflower morningglory, and common cocklebur better than Starfire + Basagran. Starfire + Basagran applied EPOST yielded 3,480 lb/ac and Starfire + Pursuit applied EPOST yielded 3,230 lb/ac. Applying Basagran + Starfire + Butyrac POST following the EPOST Starfire mixtures did not improve yields for these systems but did improve weed control. Select and Poast Plus applied LPOST provided equivalent annual grass control. Postemergence graminicides did not improve peanut yield for any EPOST herbicide application but did improve annual grass control. Two applications of Starfire mixtures controlled Texas panicum, large and southern crabgrass, and crowfootgrass 60 to 80%. Annual grass control was near complete with two applications of Starfire mixtures and a LPOST application of a graminicide. Florida pusley must be controlled at planting and prior to peanut emergence.

Particle Size Distribution in a Peanut-based Beverage. M.J. HINDS*, L.R. BEUCHAT and M.S. CHINNAN. Center for Food Safety and Quality Enhancement, University of Georgia, Griffin, GA 30223.

Chalkiness in a beverage (the sensation of coating on a consumer's mouth and throat) is a defect related to the size distribution of its particles. Chalkiness may be reduced by homogenization at high pressures and temperatures. Previous researchers have reported that beverages made from oilseeds, particularly peanuts, have a high degree of chalkiness. This study investigated the effect of three homogenization temperatures on particle size distribution in a low-fat peanut-based beverage. This beverage has a mild, typical roasted peanut flavor and contains no milk. To prepare the beverage, roasted (163°C) and partially (50%) defatted florunner peanuts were finely ground and blended with water (1:8, w:v). The slurry was filtered through a 38-μm mesh screen. The filtrate was formulated with 3% sugar, 0.05% salt and one of the following emulsifiers: 0.02% CM16B (carrageenan) or 0.2% Emuldan HV52 (hydrogenated vegetable oil). The resulting mixture was pasteurized for 2 min, homogenized at 3000 psi, bottled, cooled and stored at 1°C. Homogenization temperatures were 72, 77 or 82°C. Each formulation was pasteurized at the same temperature at which it was homogenized. Total solids, suspension stability (top/bottom solids) and particle size distribution (by fractional filtration) were evaluated after 7 days storage. Values for total solids and suspension stabilities were 12.8-13.9% and 0.40-0.48, respectively, and were not significantly affected by the various heat treatments used. Particle sizes were smaller at higher homogenization temperatures and in formulations containing Emuldan. Weights percent of total solids in the beverage that were retained on screens with mesh openings of 104, 74, 53 and 38μm were 0.01, 0.01, 0.01 and 0.06%, respectively, for formulations containing Emuldan homogenized at 77 or 82°C; and 0.01, 0.02, 0.03 and 0.10%, respectively, for formulations containing CM16B homogenized at 72°C. Corresponding retention values observed for commercial brands of cow's milk (3.25% milkfat) and a chocolate flavored milk drink were 0.01, 0.01, 0.01, 0.01% and 0.07, 0.11, 0.14, 0.14%, respectively. These commercial products contained 11.8 and 14.1% total solids, respectively. The results suggest that peanut beverage formulations emulsified with 0.2% Emuldan HV52 and homogenized at 77-82°C would impart little or no chalky mouthfeel.

Isolation and Purification of the Methionine-rich Protein from Peanut. S. M. BASHA. Plant Biotechnology Laboratory, Division of Agricultural Sciences, Florida A&M University, Tallahassee, FL

Protein quality and availability is a function of the amino acids present, and the amino acid composition to a large extent determines the nutritive value of plant protein products. Peanut seed proteins are low in sulfur-containing amino acids such as cystine and methionine. To improve the utilization of peanut as a food protein source, it is important to increase the level of methionine. Because of limited genetic variability in methionine content, this goal could not be achieved by traditional breeding and, hence, requires the application of genetic engineering to incorporate methionine-rich protein (MRP) gene from other crops or by over-expressing the MRP-gene(s) in the peanut itself. In this connection a methionine-rich protein has been isolated and purified from peanut by gel filtration on Sephacryl S-200 column followed by ion-exchange chromatography on DEAE-cellulose. The purified protein was found to be an acidic protein and has an apparent molecular weight of 118 KDa. The protein is composed of two polypeptides with molecular weights of 20,500 and 18,000 Daltons. The MRP was found to contain 3.4% methionine and 3.3% cystine. The amino acid sequence of the purified protein will be employed to screen peanut cDNA library for isolating the MRP gene.

Agronomic Performance of Peanut Varieties under Well-Watered Conditions in Mazatepec, Morelos, Mexico. S. SANCHEZ-DOMINGUEZ. Depto. de Fitotecnia, Universidad Autonoma Chapingo, Mexico.

In Mexican Republic, most part of peanut crop is grown during summer under rainy season (June-October). Consequently, due to high peanut supply, a poor price per kg of peanut shell is gotten, by Mexican farmers. In some regions, like State of Morelos (southern Mexico), peanut is cultivated under well-watered conditions, using an agricultural system called "Punta de Riego". However, only on peanut variety is planted: Georgia 119-20. Therefore, the purpose of this research was to test a group of ten erect (bunch) growing habit peanut varieties: Bachimba 22, Dixie Runner, Florida Gigante, Havana, NC-5, RF-111, RF-214, RF-218 and Georgia 119-20 (Control) Planting date was May 15, 1988, using a black-brown clay-sandy soil. Because of its high fertility that was not fertilized. A randomized block design with four replications was used. Analysis of variance using Statistical Analysis System was made. Main results indicate that, Multiple Rank Test (Tukey, 0.05) did not show statistical differences, in pod yield. Among varieties, RF-111, NC-5 and Florida Gigante were the best genotypes, with 5.07, 5.04 and 3.09 ton/ha of pod yield respectively. These varieties were also the best in other variables like fresh pod weight (FPW) and dry pod weight (DPW), both recorded from a ten plants sample. Pod yield was positively and significantly correlated with dry matter weight ($r=0.74$), FPW ($r=0.77$) and DPW ($r=0.80$). Also dry matter weight was positively and significantly correlated with FPW ($r=0.92$). Havana, RF-218 and Dixie Runner with 3.9, 3.8 and 3.4 ton/ha respectively had the lowest pod yield. Main conclusion are: RF-111, NC-5 and Florida Gigante are three peanut varieties that could be planted by Mexican farmers. Even though peanut was not fertilized, pod yield in all varieties was very high. Pod harvest made during August gives advantage, due to the high demand of peanut shell during this season.

Minutes of the APRES Board of Directors Meeting

Tulsa Marriott Southern Hills
Tulsa, Oklahoma
July 12, 1994

President Dallas Hartzog called the meeting to order at 7:00 p.m. Those in attendance were: Tim Brenneman, Gale Buchanan, Terry Coffelt, Danny Colvin, Dan Gorbet, Dallas Hartzog, David Knauft, Craig Kvien, Hassan Melouk, Walton Mozingo, Bill Odle, Wilbur Parker, Harold Pattee, Ron Sholar, Clifton Stacy, Tom Stalker, Charles Swann, Doyle Welch, and Scott Wright.

Approval of the 1993 Minutes of the APRES Board of Directors

The minutes of the 1993 Board of Directors meeting were approved as published in the 1993 PROCEEDINGS.

Executive Officer Report - Ron Sholar

The Executive Officer reported that most of the APRES work is done by committees and that has proven very effective. Dr. Sholar also reported that membership in the Society is stable with approximately 600 members. This number is about 100 lower than the peak membership year 8-10 years ago, but we're not losing members which is a good sign. Financially, the Society ended the 1993-94 fiscal year in the black. Because of last year's adjustment in the value of the PEANUT SCIENCE AND TECHNOLOGY book, the assets of the Society were reduced. The assets were lowered to reflect the actual value of the book. A detailed financial report will be given by the Finance Committee Chair.

American Society of Agronomy Liaison Report - Tom Stalker

The joint annual meetings of the American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America were held in Cincinnati, Ohio, on November 7-12, 1993. Approximately 2700 papers were presented. Of these, 19 were devoted to peanut research and 16 members of APRES authored or co-authored presentations.

The next annual meeting will be held in Seattle, Washington, on November 13-18, 1994.

Southern Association of Agricultural Experiment Station Directors Report - Gale Buchanan

The Southern Association of Agricultural Experiment Station Directors met April 10-13, 1994, in Williamsburg, Virginia. Major focuses at this meeting included the Southern Strategic Research Plan, sustainable agriculture, developing a task force on good laboratory practices, and the GIS-based Southern Management Information System.

There will be a meeting with extension directors at the end of August in San Antonio, Texas.

A complete report will be published in the 1994 PROCEEDINGS.

CAST Report - Dan Gorbet

The CAST Board of Directors met in Chicago on August 27-29, 1993, and in Washington, DC, on February 26-28, 1994. Two professional societies joined CAST during 1993-94--the American Agricultural Economics Association and the American Association for Agricultural Education. CAST has over 3500 individual members.

Recent and forthcoming CAST publications will be listed in the CAST Report in the 1994 PROCEEDINGS.

New Book Ad-Hoc Committee Report - Tom Stalker and Harold Pattee

The current status of the ADVANCES IN PEANUT SCIENCE book is that all chapters but the summary chapter are in hand. We have fallen behind in our publication schedule; however, a new schedule has been outlined and if we're able to keep it, the book can be presented at next year's meeting in Charlotte. A report has been made to the Publication and Editorial Committee and they will present some suggestions in regard to pricing and marketing of the book.

Nominating Committee - Walt Mozingo

After having consulted with numerous members and having discussed a willingness to serve the Society with the nominees, the Nominating Committee submitted the following slate of representatives to the Board for 1994-95:

President Elect	Harold Pattee
State Employee Rep from SW	Chip Lee
State Employee Rep from SE	Danny Colvin
Industry Rep (production)	Robert E. Scott

This slate will be presented to the membership during the 1994 business meeting for their approval.

Finance Committee Report - Scott Wright

As of June 30, 1994, the fiscal year's receipts were $71,898.82 and expenditures were $61,439.47, giving an excess of receipts over expenses of $10,459.35.

There was a motion and second that the 1994-95 proposed budget of $66,150 be accepted as presented. Motion carried.

The Finance Committee recommended that a memo of understanding be drawn up between the North Carolina Crop Science Department and APRES for secretarial assistance to the editor of PEANUT SCIENCE. The Committee also recommended that the Finance Chairman be informed of matters related to the finances of the Society during the year.

Bailey Award Committee Report - Hassan Melouk

The winners of the Bailey Award from the 1993 presentations were T. B. Brenneman and A. K. Culbreath for the paper "Utilizing a Sterol Demethylation Inhibiting Fungicide in a Predictive Spray Schedule to Manage Foliar and Soilborne Diseases of Southern Runner Peanut". Seven nominations from the 1993 eligible papers were judged by the six committee members. The awards will be presented at the business meeting on Friday morning.

DowElanco Award Committee Report - David Knauft

After receiving five nominations collectively for the Research and Extension Awards, the Committee evaluated them by mail and reached a consensus on both awards. The recipients will be announced at the business meeting on Friday morning.

Public Relations Committee Report - Dan Gorbet

Dr. Gorbet indicated that the new APRES brochure prepared by the Executive Officer is acceptable. The Committee suggested that APRES develop an additional publication that provides history, purpose, goals, peanut industry information, etc., that could be useful over a long period of time.

The Committee recommended that the APRES President appoint a membership committee composed of a representative in each peanut growing state, an industry representative and a grower representative, and that these individuals have active responsibility on APRES membership maintenance and growth in their state or area.

Dr. Gorbet reported the death of Dr. Al Norden this past year. A resolution on Dr. Norden will be read at the business meeting and will be included in the 1994 PROCEEDINGS.

Fellows Committee Report - Olin Smith

Dr. Olin Smith reported that five nominations were received for Fellowship in APRES. Evaluations were made and submitted to the Board of Directors for selection of three recipients who will be announced at the 1994 business meeting.

Coyt T. Wilson Award Committee Report - Craig Kvien

Dr. Kvien reported that although the call for award nominations was published in PEANUT RESEARCH well ahead of the deadline, no nominations were received. Therefore, no award will be given in 1994.

Peanut Quality Committee Report - Terry Coffelt

The Peanut Quality Committee made three recommendations to the Publication and Editorial Committee:

1) that efforts continue to publish more new methods, especially in the areas of peanut nutrition, biotechnology, and *A. flavus* detection;

2) that advertisements for ADVANCES IN PEANUT SCIENCE also include ads for the QUALITY METHODS book;

3) that papers presented in the Quality Symposium at the APRES meeting on July 13 be published together in the PROCEEDINGS.

The Crop Advisory Committee met and discussed the development of something to recognize Al Norden's contributions to the peanut industry. Hopefully a recommendation can be made at next year's meeting.

Site Selection Committee Report - Danny Colvin

The 1995 meeting will be held at the Adams Mark Hotel July 11-14 in Charlotte, North Carolina. The 1996 annual meeting will be held July 9-12 at the Omni/Rosen Hotel in Orlando. The Omni/Rosen is currently under construction and completion is scheduled for early 1995. A contract has been signed. The 1997 annual meeting will be held in Texas; city and dates have not yet been determined.

There was discussion about the rotation of the annual meeting in the peanut producing states. Several members indicated they would like to see the meeting be held in other southern cities such as Nashville, and some locations in South Carolina. A motion was made that the APRES President appoint an ad-hoc committee to study the rotation of the annual meeting sites and make a recommendation at next year's meeting. The motion was seconded and passed.

> * Editor's Note: Subsequent to the Board of Directors meeting, Texas representatives to the Site Selection Committee recommended, and the Board approved, San Antonio for the 1997 meeting.

Publication & Editorial Committee Report - Tim Brenneman

Dr. Brenneman announced that three qualified candidates applied for the position of PEANUT SCIENCE editor. The unanimous selection was Dr. Tom Stalker of North Carolina. A motion was made to approve Dr. Stalker as the new editor of PEANUT SCIENCE. Motion was seconded and carried. A motion was made to hire a half-time secretary for PEANUT SCIENCE at a salary of $12,000 to be administered from APRES funds to North Carolina State University. Motion was seconded and carried.

It was recommended by this Committee, and a motion made, that the price of the new book, ADVANCES IN PEANUT SCIENCE, be set at $45 + handling, with an early purchase option of $40 + handling if purchased by the 1995 annual meeting. Motion was seconded and carried.

A motion was made that Kim Cutchins, President of the National Peanut Council, coordinate the marketing effort for the sale of ADVANCES IN PEANUT SCIENCE, in consultation with the editors. Motion was seconded and carried.

Retiring from the PEANUT SCIENCE editorial board are: Tim Mack, John Sherwood, Tom Stalker, Glen Wehtje, and James How. It was moved that the following replacements be approved for the PEANUT SCIENCE editorial board: Ames Herbert, John Damicone, Peggy-Ozias-Akins, Carroll Johnson, and Alan York. Motion was seconded and carried.

Upon the suggestion of the Peanut Quality Committee, the Publication and Editorial Committee recommended and made a motion that new methods be added to the QUALITY METHODS book and the QUALITY METHODS book needs to be advertised along with ADVANCES IN PEANUT SCIENCE. Motion seconded and passed.

After some discussion about including the Quality Symposium papers in the PROCEEDINGS, along with the question & answer period from the session, there was a motion made that the abstracts of the Quality Symposium be published collectively in a section, with additional comments added based on the discretion of the Quality Committee after they review the materials. Motion was seconded and approved.

Program Committee Report - Bill Odle

Papers scheduled for this meeting total 125. No conflicts will occur with the Quality Symposium, which is set up immediately after the General Session. A symposium is scheduled for Thursday on Peanut Trade Policies. Ron Sholar and Hassan Melouk served as co-chairs of the Local Arrangements Committee and John Damicone served as chair of the Technical Program. The Spouse Program was co-chaired by Afaf Melouk and Linda Sholar.

There was a recommendation that the President appoint an ad-hoc committee to study the possibility of making the Sugg Award a standing committee. Motion passed.

There being no further action for discussion, the meeting adjourned.

Respectfully submitted,

James R. Sholar, Executive Officer

Opening Remarks by the President
at the 1994 Business Meeting
of APRES
July 15, 1994

Dallas Hartzog

Welcome to the Awards Presentation and Annual Business Meeting of the American Peanut Research and Education Society (APRES).

As we begin the next quarter century I certainly want to commend all the committees for making this meeting in Tulsa such a success. On behalf of your Society I want to thank Bill Odle, Program Chairman, and all those from the host state of Oklahoma who have worked so hard to make this meeting a success. Bill, would you please stand and be recognized?--you did an outstanding job. I would like for the co-chairs of the local arrangements committee--Hassan Melouk and Ron Sholar--to stand and be recognized. Would the other members of this committee please stand? The chairman of the Technical Program was John Damicone. John, please stand and be recognized. Would the other members of this committee stand also? The Spouse Program was co-chaired by Afaf Melouk and Linda Sholar. Would these two ladies please stand and be recognized? Would the other ladies on the Spouse Program committee please stand and be recognized?

We as a professional society depend heavily on the manufacturers of our agricultural chemicals to assist with special events such as those we have enjoyed this week. To Rhone-Poulenc for the ice cream social on Tuesday night, to ISK Biotech for the Gilcrease Museum Tour and Dinner on Wednesday night, to American Cyanamid for the Appreciation Dinner last night, and to Valent USA and DowElanco for this morning's breakfast, we say thank you. Would all the representatives of these companies please stand while we recognize you for your contributions?

I would like to divide the next few minutes into two components. The first I would like to discuss is the broad picture of how we as scientists, educators, and industry leaders can use our abilities for the betterment of mankind.

"How Much Land Can Ten Billion People Spare for Nature?" This report was written by Dr. Paul Waggoner who suggests we can have a better fed population and a greener planet. If we continue our current rate of technical progress in farming, we would spare 30% of the land now used globally for agriculture, an area larger than Alaska, and still produce enough food for the world's growing population. Rather than paying for increasing subsidies to keep farmland from reverting to woodland, we should think of even further "decoupling land from food", said Dr. Jesse Ausubel who is director of the Program for the Human Environment at The Rockefeller University.

"The spatial contraction of agriculture - which remains the greatest transformer of our environment - is a probable and powerful antidote to loss of biodiversity and other environmental diseases," he said.

With this premise, and using the latest data from around the world, Dr. Waggoner proceeds to show how "smart farmers" can harvest more per plot and thus spare some of today's cropland for nature. We must help them with changed diets, never ending research, and encouraging incentives.

Among the points the report makes are:

- Calories and protein equally distributed from present cropland could give a vegetarian diet to 10 billion people.

- The global totals of sun on land, carbon dioxide in the air, fertilizer, and even water could produce far more food than 10 billion people need.

- By eating different species of crop and more or less vegetarian diets, we can change the number who can be fed from a plot.

- Recent data show that millions of people do change their diets in response to health, price, and other pressures, and they are capable of changing their diet even further.

- Given adequate incentives, farmers can use new technologies to increase food productivity and thus keep prices level despite a rising population. Even better use of existing technology can raise current yields.

- Despite recurring problems with water supply and distribution, there are opportunities to raise more crops with the same volume of water.

- In Europe and the United States, rising income, improving technology, and leveling populations forecast diminishing use of cropland.

I've spent most of my adult life working as an Extension Specialist and as a researcher working in the area of soil fertility research. Some of you are now pursuing careers with a lot of similarity to mine and others may consider it. I want to spend a minute telling you what I think makes a good Extension Specialist.

When I was growing up on a small peanut farm in South Alabama during the era before pesticides, the labor to produce the crop was either human or animal. I distinctly remember thinking as a teenager how much easier life would be if there was some technology available that could prevent or reduce some of the grass and weed population. Plowing and hoeing was a continuous effort from planting to harvesting. If some way could be discovered that would prevent the peanut leaves from getting spots so close to maturity and causing premature harvest. If the harvest season could somehow be lengthened so that more peanuts could be harvested while near optimum maturity. And finally, if somehow someone could bring this technology to our farm and explain it to us, how much better our lives would be!

And now I am in a position so that all the technology that has ever been discovered on how to produce peanuts is at my fingertips. I feel a heart warming calling to help my peanut farmers adopt new technology because I know how much improved economic conditions can contribute to the quality of life. The benefits of helping someone are like the theory of the Economic Multiplier in Economics in that the effects are felt for many generations to come.

Some people think they have to spend time, use it up one way or another while others invest it, Fred Smith says in his book, LEARNING TO LEAD.

"My philosophy," says Smith, "is to invest, which means looking for a return on what I do. Some of that return will be in dollars or other visible achievement, but some will be more internal. Investing time wisely does something for you. Over a period of time it brings an appreciation, it generates maturity and fullness."

"When you're investing time instead of spending it, you don't get so concerned about running out of it. That's what a mid-life crisis is--thinking about all the time already gone, the things you haven't done, won't get to do--and you get frantic. By contrast, people who invest their time move through the middle years in a much more mature way.

"Many people don't know how to invest their time because they have never identified their unique purpose in life. They have instead settled for comfort. They've climbed the organizational chart until they found a comfortable income or responsibility--and they've pitched their tent permanently.

"Americans are known for seeking comfort and convenience. What this amounts to is settling for life as a consumer rather than a producer. A philosophical approach to life says, 'I am a producer, not just a consumer, I must leave behind something extra, some worthwhile evidence that I passed this way'."

Success is not a pie, with only so many slices to go around. The success of others has nothing to do with your success.

Nor is your success measured by what others say or what others accomplish. We all have the tendency to compare ourselves with others. But the happy people in this life know it's not against others that we compete.

The late Henry Fonda once said that a thoroughbred horse never looks at the other racehorses. It just concentrates on running the fastest race it can.

On our track to success, we have to fight the tendency to look at others and see how far they've come. The only thing that counts is how we use the potential we possess and that we run our race to the best of our abilities.

We all ought to be more accountable. Some of the assets we should be accountable for:

1) A little over a month ago on June 6 we celebrated the 50th anniversary of the allied forces invasion of France at Normandy. Historians have written that the subsequent battles may well have changed the course of civilization. Freedom is a prize to be guarded, monitored, cherished and protected. It is not free! We should be accountable in our attitudes toward this country, other nations, other people and remember the price paid. Many young men gave the ultimate sacrifice so that democracy could remain a way of life for us.

2) Every dollar we as research and extension personnel spend was earned by the sweat of somebody's brow and has become taxes paid by someone. We need to be accountable to these tax dollars. We need to be careful in how the public perceives our objectives - perception is reality.

3) We need to be more accountable to the land. I have just come back from visiting a wilderness area in Montana where man's encroachment has been limited. It is indeed eye opening to think of the impact man has on the soil. Someone has observe "whatever our accomplishments, our sophistication, our intellectual pretenses, we owe our very existence to a six-inch layer of topsoil - and the fact that it rains".

4) We need to be accountable to our forefathers and ourselves. Most of us were born into less than we have now. We need to remember and be accountable to those ahead of us who laid the groundwork for us to enjoy the easy life more of us have. Let us be careful lest we rust out instead of wear out.

Overview of Oklahoma Agriculture
July 13, 1994

Dr. Charles Browning, Dean and Director
Division of Agricultural Sciences and Natural Resources
Oklahoma State University

On behalf of the Division of Agricultural Sciences and Natural Resources, I would like to welcome the American Peanut Research and Education Society to Oklahoma.

Oklahoma's land area is about 44 million acres (19th among states). Oklahoma is truly a transitional state, sharing characteristics with the southeast, southwest, and the central plains. This transition is true for geography, climate, and agriculture. Average precipitation varies from 50+ inches per year in the southeast to 15 inches in the western panhandle. Elevation varies across the state and climbs to nearly 5,000 feet in the Panhandle.

Forests cover nearly 10 million acres of the state's land, mostly in southeast Oklahoma. This includes "Southern pine plantations" in the million plus acres that Weyerhaeuser has in production. The State has four mountain ranges; the Ouchitas in the southeast, the Arbuckles in the south central, the Ozarks in the northeast, and the Wichitas in the southwest.

More typical for most when they think of Oklahoma is the panhandle and irrigated agriculture. The average growing season ranges from 180 days in the panhandle to 240 days in the extreme southeast.

Also typical is Oklahoma and wheat. Oklahoma farms and ranches account for some 32 million acres of the total 44 million acres in the state. Of that, 14 million acres are in cropland, with about 500,000 acres under irrigation. Of course most typical of Oklahoma are cattle on range or pasture. About 17 million acres of Oklahoma is covered with rangeland, pasture, and forages. So for most people this is Oklahoma. Oil and gas, wheat and cattle.

Oklahoma is also a lake state. Over 200 man-made lakes are located on the large rivers and provide recreation, hydroelectric power and irrigation. Lakes, streams, and ponds cover a total of 2,000 square miles. The state has more shoreline than the state of Minnesota!

Probably most of all, Oklahoma is thought of as a rural state. Oklahoma's economy was founded on Agriculture, and Agriculture remains one of the State's largest industries. Oklahoma's population is just over 3 million and, even though we are considered a rural state, 1/3 of the population can be found in Oklahoma City and Tulsa. In fact, 75% of the State's population is located in a triangular pattern which includes Oklahoma City, Tulsa, and Stillwater. (Stillwater does not contribute a great deal to that total.)

Finally, Oklahoma is the "land of the red man." Oklahoma has the largest number of Native Americans of any of the states in the U.S.

The oil and gas industry along with agriculture are the two big economic drivers in the state. The state is working diligently to broaden the base of our economy and, particularly, in the manufacturing sector. In the past several years one of the most rapidly growing parts of the manufacturing sector is for food and agricultural products. However, oil and gas continues to be important. Oklahoma has numerous and large mineral deposits scattered throughout the state. Oil, natural gas, and coal provided the mineral-derived income in the state. Based on total annual production, Oklahoma ranks 5th in crude oil production and 3rd in natural gas production. Of course, the recession in the oil industry (the state's largest source of wealth) had a drastic impact on the economy and we are still adjusting.

As I indicated, Oklahoma's economy was founded on agriculture, and agriculture remains one of the state's largest industries. Agriculture represents about a $3 billion industry in production or farm sales alone. Livestock and wheat are the two largest commodities in the state. Livestock represent about $1.5 billion of the $3 billion of the agricultural income in the state and is represented not only by cow-calf and stocker operations but also feedlots.

Feedlots are concentrated in the panhandle and contribute significantly to the total beef cattle income in the state. As might be expected, our animal science department is the largest in our college with over 500 undergraduate students from 30-35 different states.

The second largest source of agricultural income is winter wheat. About 1/4 of our total comes from winter wheat from about 7 million acres planted annually. About 5 million of these 7 million acres are harvested and the balance is either grazed out or cut as hay.

The combination of livestock and wheat grazing is "true double cropping" for Oklahoma. It is not unique to Oklahoma, but it certainly a tremendous significance and many years for the wheat farmers is a difference between profit and loss. The Wheat Pasture Research Unit, located in Marshall, Oklahoma, was dedicated in January 1990. This multidiciplinary project involving the Departments of Animal Science, Agronomy, and Agricultural Economics has developed a unique facility in support of wheat pasture grazing. The project is designed to conduct production-scale grazing trials to evaluate systems of increasing the profitability of the wheat grain/stocker enterprise. It has been estimated that the annual Oklahoma income could be increased by $131 million from improving the technical efficiency of growing the present numbers of cattle on wheat pasture.

Not to be left out of the Oklahoma agriculture picture, of course, are peanuts. Oklahoma produces over 100,000 acres of peanuts annually with a value of around $90 million.

In addition to income generated by field crops, a significant amount of revenue is generated by the forestry industry in Oklahoma. Most commercial production is located in the southeastern quarter of the state, and is based mostly on pine, although there is some hardwood timber production. Income from forestry as a "crop" in the State ranks behind only wheat, alfalfa, hay, and peanuts.

Oklahoma ranks third, following only California and Texas, in total numbers of horses. Oklahoma supports the greatest density (six per square mile) of horses in the nation. Our thriving horse industry also contributes signficantly to state income via both pleasure and sporting events. Both thoroughbred and quarterhorse racing with pari-mutual betting is legal in Oklahoma.

Alternative agriculture is still a buzz word in Oklahoma as it is throughout the nation. Many of us feel that our greatest alternative continues to be increasing productivity and efficiency of what we do best. However there are nitch markets and important crops still considered alternatives in Oklahoma.

Diversification via alternative enterprises will not only influence the livelihood of the average farm, but will help decide the future of the state. One example is the potential for a tremendous watermelon industry along with other fruits and vegetables throughout the eastern part of the state and, in fact, into the southwestern part of the state on irrigated cropland.

Another example of alternative agriculture is represented by poinsettias--the largest potted flowering crop in the state. Wholesale value is between $4-5 million. The total floriculture wholesale crop value is $24 to 25 million.

Nursery crops, both greenhouse and container grown, are important to the eastern part of the state and Greenleaf Nursery at Tahlequah is one of the largest in the nation.

Herbs and spices and their derivative by-products have uses in food processing and pharmaceutical industries. Estimated farm gate sales have increased from $400,000 in 1990 to about $750,000 and continue to grow in importance. Oklahoma, along with other states, is attempting to attract processing facilities for spices.

In addition, considerable interest has been demonstrated by producers in the potential of canola, kenaf, ostriches, llamas, emus, and even gators.

Ranking of poultry and eggs is number four in the state and the broiler industry is growing by leaps and bounds and is the fastest growing agricultural enterprise in the state. Tyson along with three or four other major firms are locating in the eastern part of Oklahoma and the total integrated poultry industry has come to Oklahoma.

A bill passed in our legislature two sessions ago which liberalized "corporate farming" concepts for Oklahoma. Major corporate swine production again in an integrated system are moving into Oklahoma. Seaboard is currently developing a swine processing plant in the panhandle of Oklahoma and intends to kill 4 million hogs per year by 1996. They plan to have many of these produced in the vicinity of their processing plant.

The swine industry like poultry and other concentrated livestock industries are certain to bring problems with opportunities. We will start construction in the very near future of a modern swine production facility for research and education.

As Oklahoma, like most states, has diversified agriculture, we are dominated by cattle and wheat but as you have seen, poultry and swine are making rapid advances and will become more important in the future and, even though wheat is dominate, peanuts along with soybeans, cotton, alfalfa, corn, sorghum, horticultural crops give us a diversity that present many problems and opportunities.

Let's take a look at agriculture at Oklahoma State University. Oklahoma State University was founded on December 25, 1890, as Oklahoma A&M College. This came after the land run of 1889 and before statehood in 1907. OSU has a total enrollment of about 27,000 students, about 20,000 are enrolled at the main campus in Stillwater, while the rest are enrolled at technical branches in Okmulgee and Oklahoma City, at the University Center at Tulsa, and at the College of Osteopathic Medicine of OSU, Tulsa.

Agricultural enrollment is close to 1,500 undergraduate with 350 graduate students. Our freshmen enrollment has increased the last years by about 30% and graduate enrollment was up about 10% last fall.

There are separate budget agencies for Extension and the Agricultural Experiment Station. The budget for each of these agencies comes directly from the Board of Regents, earmarked and separate from the general OSU budget.

There are 10 departments in the Division of Agricultural Sciences and Natural Resources. The Experiment Station and Cooperative Extension also support efforts in the Colleges of Veterinary Medicine and Human Environmental Sciences.

Oklahoma has 77 counties and offices--an office in every county but several county units with two counties in each of the units. The state is divided into four districts with about 45 area and district specialists complementing the county professionals and approximately 80-85 state extension specialists.

We have 100 FTE's in the Agricultural Experiment Station, down from 126 in the mid-80s. All but four or five of the scientists are located on the campus, but we do have an extensive branch station system throughout the state that recognizes the importance of geographic, soil, and crop differences. The branch stations are managed by one of the departments rather than by the experiment station office and function as integrated teams of research and extension programs.

The main agronomic station is in Stillwater, which boasts 100 years of continuous wheat. There is also a primary wheat research program located in the north central part of the state. The headquarters at Altus has three stations under one superintendent and is primarily irrigated and dryland cotton.

The newest of our branch stations is a program conducted jointly with ARS and is devoted primarily to horticulture and other alternative crops. Along with ARS, we do have research scientists and faculty located at this station.

At the last general election, a $350 million bond issue was approved by the voters with about 60% scheduled for higher education. Of that, the Division of Agricultural Sciences and Natural Resources will receive $18 million. $4 million will be basically for renovations of facilities but will include a $1.5 million modern swine facility as already mentioned. We will also use approximately $500,000 to be matched by private contributions as well a federal appropriation to construct a beef cattle stress research facility of approximately $2 million. We will also improve pesticide storage facilities, greenhouses, and take care of general maintenance.

The big item, however, of the $18 million will be using approximately $14 million for a food and agricultural products processing center for research and technology. Oklahoma as a state is seriously behind the average in the nation in terms of value-added products and food and agriculture products manufacturing. We are hopeful that this investment along with increasing our level of research and extension activity in the area of value-added will help lead the way to greater diversification of agriculture in Oklahoma. The plans for the facility are done and will be going to bid later this month and hopefully construction will begin in the fall.

Our newest and in some ways most impressive facility is referred to as the Noble Reserch Center for Agriculture and Renewable Natural Resources. This facilities houses faculty, students, staff and the Departments of Plant Pathology, Entomology, and Biochemistry and Molecular Biology. It also provides laboratory and research space for several scientists from Agronomy, Horticulture, Forestry, and Animal Science. The Noble Research Center also serves as the Center for Agricultural Biotechnology research for the campus. It is about a $48 million facility with no federal dollars. We were challenged to raise $15 million from private sources and the balance has come from state funds.

"Sun-Up", an agricultural program produced by our agricultural communications group, is on educational television at 7:00 a.m. for 15 minutes each weekday.

Genetic Significance and Implications of Peanut Artifacts Recovered From a Royal Tomb, Sipán, Peru
July 13, 1994

Donald J. Banks

The discovery of the beautiful necklaces and other artifacts depicting the peanut pods that were associated with the warrior-priest at Sipán (Alva, 1988) warrants explanation. This is especially true in view of the statement of Donnan (1990): "I now realize that art expresses the religious and supernatural aspects of Moche culture and that virtually nothing of everyday life is illustrated for its own sake".

It has been established that peanuts were present in Moche agriculture (Pozorski, 1979) and had been illustrated as offerings in their art (Donnan, 1990). Krapovickas (1968) presented evidence that established, without doubt, the origin of peanuts in South America. Hammons (1982) presented the most recent review of the archaeological record of peanuts. He indicated peanut culture in Peru dates to the beginning of the ceramic period, ca. 1200-1500 B.C. Tom and Shelia Pozorski recovered archeological specimens of peanuts from five sites in the Casma Valley spanning a range of ca. 1800 B.C. to 1500 A.D. (Ugent et al., 1986). More recently, peanut remains were reported by Dillehay et al. (1989) from an upper Zaña Valley site in Northern Peru dating to ca. 6,000 B.C.

Pozorski (1979) reported peanut samples from eight Moche sites with the earliest and most abundant samples occuring in the initial period and early horizon (1800-200 B.C.) at Gramalote. With time, peanuts became a minor food staple when compared to corn and squash. Why then were peanuts, rather than another crop, so elegantly displayed as royalty artifacts for the warrior-priest? How do peanuts fit into a supernatural or religious scheme? Some speculative ideas regarding the potential relevance of peanuts to these phenomena follow.

Supernatural Interpretation

Some background may be necessary to understand why the Sipán peanuts may represent supernatural interpretation. The modern cultivated peanut (*Arachis hypogaea* L.) is an allotetraploid, comprised of 40 chromosomes, undoubtedly acquired from two, wild, diploid progenitor species each with 20 chromosomes. Thus far, no native wild species of peanut have been found in Peru. Its nearest wild relatives (genetically and geographically) are located east of the Andes in Bolivia and northwestern Argentina. Banks (1988) proposed a theory that may account for *A. hypogaea* creation. The event may have occurred in a Peruvian garden where wild peanuts, originally collected elsewhere, hybridized. This theory contrasts with that of Smartt

(1976). He believes peanuts probably originated where the wild peanuts grew natively.

Preliminary studies of peanut pods from the previously mentioned Casma valley excavations reveal exciting information. These remarkably well-preserved samples, several of which are whole, show good correlations of pod size with age. The larger samples are the youngest. The oldest pods resemble and may be wild species. Interestingly, there seems to have been a marked increase in pod size occurring ca. 500 B.C. It seems likely, during this period, that a tetraploid peanut evolved in the Casma Valley.

It should be pointed out that the most prevalent archaeological peanut specimens found in the excavations of coastal Peru prior to 100 AD and even later are representative of the *hirsuta* variety. Present-day *hirsuta* genotypes are large plants with numerous branches. They require long growing seasons and develop their widely scattered pods on the underside of the prostrate vines. Their pods develop deep in the arid, sandy soils. During harvest, many pods are frequently left in the soil when the vines are pulled from the ground because the pods are weakly attached to the plant. The pods are relatively long and usually possess a distinct, parrot-like beak at the apical end .

However, the peanuts depicted in the Sipán artifacts do not appear to be the variety *hirsuta*. Because of their shape and conspicuous ribs they closely resemble the variety *peruviana* (sensu Krapovickas, pers. comm.). This variety belongs to the subspecies *fastigiata* whereas the variety *hirsuta* belongs to the subspecies *hypogaea* (Krapovickas, 1968).

Present-day *peruviana* genotypes are medium-size plants with few, coarse, more or less erect stems. The pods mature rather quickly and they are produced in shallow clusters near the center of the plant base. The pod attachment to the plant is strong and the recovery of pods at harvest by hand methods is quick and relatively easy. These pods are conspicuously marked with prominent, long, parallel, coarse ribs (veins). Because of these characteristics, the *peruviana* variety is considered agronomically superior to variety *hirsuta*. However, pod type alone does not necessarily determine plant form and function. Consequently, we cannot be sure that primitive peanuts are like present-day forms for all traits.

It is impossible to determine the type of peanut commonly grown near Sipán during the reign of the warrior-priest because archaeological botanical samples are absent, probably owing to poor preservation. However, the royal artifacts suggest that a different peanut may have been discovered. Consequently, for whatever reason, peanuts may have been used in rituals. Such useage certainly would have made the peanut worthy of commemoration.

How the *peruviana* peanut was acquired by the Moche may never be known. It may have originated spontaneously as a mutant in a local garden. Such a mysterious origin might have been considered a good omen from a God and a valid reason for commemoration. Genetic mutations resulting in drastic phenotype alterations are plentiful. They are not mysterious to us because we can explain them, logically, based on our knowledge of genetics. A mutation changing pod shape and ribbing is not unlikely. However, multiple mutations would be required to create the variety *peruwiana* from *hirsuta*, which appears very remote. Perhaps, as indicated later, the *peruviana* peanut came from another area.

Finally, consideration needs to be given to a potential but little known consequence of peanut consumption that would have been extremely mysterious to the Moche. Sampson (1990) has stated: "Today, the peanut is one of the leading causes (if not the leading cause) of food-allergic reactions in the United States." Furthermore, he states: "allergic reactions to peanuts are generally very acute and dramatic". In fact, the extreme cases are characterized by severe anaphylactic shock resulting in sudden death. During a 16-month period, Yunginger et al. (1988) reported four cases in which peanut consumption by individuals with known prior histories of peanut allergy resulted in death. Three of the individuals showed allergy-induced responses within minutes of consumption. Two individuals had consumed only one bite of a peanut-containing cake, or a cookie. How many, if any, Moche people selectively succumbed to the fatally attractive peanut because of allergic reactions is unknown. Interestingly, studies of the bones of the warrior-priest indicated he was in his early 30s when he died, mysteriously (Alva, 1988). Could he have been a victim of the peanut?

Ritualistic Interpretation

There may be another explanation for the peanut artifacts found at Sipán. It fully embraces the warrior-priest concept of Donnan. The new peanut may have been acquired as a spoil from prisoners that were captured from more distant places. Therefore, peanuts may have been used in rituals during prisoner torture and execution. Study of their art has established that the Moche ventured great distances to the south and even into tropical forests to the east (Donnan, 1990). Therefore, it is logical to conclude that Moche warriors would have acquired prisoners along with unique valuables, including unusual crops.

Krapovickas (1968), in describing some *hirsuta* peanuts found in the Peru gene center, stated "We have also found similar fruits, frequently coarser and with heavier veins, belonging to the subspecies *fastigiata* var. *fastigiata*". His reference almost exactly describes the peanut artifacts found at Sipán. However, he had not yet coined the variety name, *peruviana*. Furthermore, he indicated that the variety, known then as "Tingo María", did not appear to be the typical pre-Columbian peanut and probably originated in the forested area in Eastern Peru. Additionally, Gregory and Gregory (1976) in describing peanuts found in Peru indicated that in addition to Virginia and *hirsuta* peanuts, a "special fastigiate form" had been found. They were referring specifically to the 1959 collection (U. S. Plant Introduction no. 262129) which corresponds to the *peruviana* variety mentioned previously by Krapovickas. The collection was from Tingo María, east of the Andes in a forested area near the headwaters of the Rio Huallaga. In 1988, two more seed samples of the rare *peruviana* variety were collected in Bolivia by David Williams, an ethnobotantist from the New York Botanical Garden. One was collected at Yaminahua near the Bolivia/Brazil/Peru border, the other at Napashi, near the front range of the Andes, NE of Lake Titicaca (Williams, 1989).

The uniqueness of plant and pod form and the limited distribution of *peruviana* suggests a different origin from *hirsuta*. Although *peruviana* appears in Moche art later than *hirsuta*, it does not necessarily mean that it is younger, biologically. In fact, utilizing molecular phylogentic methodology, Lowenstein, (1986), prepared a cladogram indicating that *peruviana* is the older of the two varieties (pers. comm.).

The *peruviana* peanut even if it was introduced into Sipán agriculture did not replace the *hirsuta* forms occurring along the Peruvian coast where good peanut archaeological records are abundant. The *hirsuta* variety is still grown, but rarely, in Coastal Peru. Five samples of it were collected in 1985 (Banks, 1991). One farmer said he preferred it to more modern types because it could lay dormant for long periods of time while awaiting irrigation water flowing from the mountains. His attitude indicates that personal preference and tradition can prevail even in light of modern plant breeding accomplishments.

Additionally, not to be overlooked is the prospect that a newly discovered peanut might not have been shared by royalty with peasant farmers, especially, if its qualities were based on mystical or ritualistic concepts. Consequently, the variety might never have been introduced into Moche agriculture.

Finally, consideration should be given to a potential peanut use which might have a ritualistic context. Although not widely publicized, peanuts are reported to contain a factor that plays a role in reducing bleeding time, especially in hemophiliacs (Frankton, et al., 1963). Such potential use contrasts with the suspected Moche practices during sacrificial ceremonies (Donnan 1988, 1990) in which the blood from prisoners may have been treated with plant extracts to keep it from clotting before being consumed by royalty. Whether or not the peanut factor relates in any way with the blood ceremonies relative to captives or the healing of the sick is unknown.

We may never know the reasons why peanuts were chosen to be represented in the Moche art at Sipán. However, it seems clear that the representation of the *peruviana* variety of peanut was delibrate and precise. Whether or not it was done for mystical or ritualistic reasons remains a matter for debate.

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BUSINESS MEETING AND AWARDS CEREMONY
AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY

Tulsa Marriott Southern Hills
Tulsa, Oklahoma
July 15, 1994

The meeting was called to order at 8:30 a.m. by President Dallas Hartzog. The following items of business were conducted:

1. President's Report - Dallas Hartzog

2. The following awards were presented and reports made. Detailed reports are presented in the PROCEEDINGS.

    a. Fellows - Olin Smith

    b. Bailey Award - Hassan Melouk

    c. Joe Sugg Graduate Student Competition - Hassan Melouk and Bob Sutter

    d. DowElanco Awards for Research & Extension - David Knauft

    e. Past President's Award - Dallas Hartzog

    f. Peanut Science Associate Editors - Harold Pattee

3. The following reports were made, accepted, and approved by the membership. Detailed reports are presented in the PROCEEDINGS.

    a. Executive Officer Report and Reading of Minutes of Previous Meeting - Ron Sholar

    b. New Book Committee Report (ADVANCES IN PEANUT SCIENCE) - Tom Stalker and Harold Pattee

    c. Nominating Committee - Walton Mozingo

    d. Finance Committee - Scott Wright

    e. Public Relations Committee - John Damicone

    f. Peanut Quality Committee - Terry Coffelt

    g. Site Selection Committee - John Damicone

h. Publications and Editorial Committee - Tim Brenneman

i. Program Committee - Bill Odle

4. Mr. Hartzog turned the meeting over to the new President, Bill Odle of Texas, who then adjourned the meeting.

FINANCE COMMITTEE REPORT

The Finance Committee met at 4:00 p.m. on July 12, 1994, in Tulsa, Oklahoma. Committee members present were: Jerry Martin, Fred Cox, James Weeks, Roger Bunch, Charles Simpson, Ron Sholar (ex-officio), and Scott Wright. Others present included Harold Pattee, Tim Brenneman, and William Odle.

The Committee reviewed and approved the financial report presented by the Executive Officer, Ron Sholar. For the 1993-94 year, the Society received a total of $71,898.82 and expended $61,439.47 for an excess of receipts over expenditures of $10,459.35.

The June 30, 1994, assets totalled $136,077.99 which is a decrease of $1,847.29 over the June 30, 1993, fund balance. Assets included (in round numbers) $91,900 in savings, $35,900 in checking, and $8,000 in book inventory. De-valuation of the PEANUT SCIENCE AND TECHNOLOGY book from $22.96 to $10.00 caused the fund balance decrease.

The financial statement for PEANUT SCIENCE was presented by Harold Pattee, editor. Income exceeded expenditures of $24,435.54 by $1,528.09.

The Committee discussed a total budget for fiscal year 1994-95 for APRES. The following recommendations were presented and approved by the Board:

1) The Finance Chairman should be informed of matters related to the finances of the Society.

2) An agreement should be prepared between the Crop Science Department, North Carolina State University, Raleigh, North Carolina, and the Society to pay for secretarial assistance for PEANUT SCIENCE for the annual amount of $12,000.

3) A proposed budget for APRES of $66,150 for the fiscal year 1994-95 is accepted. A copy of the budget will be published in the PROCEEDINGS.

The meeting adjourned at 5:30 p.m.

Respectfully submitted,

Scott Wright, Chair

AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY
BUDGET 1994-95

RECEIPTS

Annual Meeting Registration	$15,500
Membership Dues	15,000
Special Contributions	11,000
Differential Postage	2,500
Peanut Science & Technology	1,000
Quality Methods	50
Proceedings and Reprint Sales	100
Peanut Science Page Charges & Reprints	17,000
Interest	4,000
TOTAL RECEIPTS	**$66,150**

EXPENDITURES

Annual Meeting	$ 9,500
CAST Membership	1,000
Office Supplies	2,000
Secretarial Services	12,000
Postage	2,500
Travel - Officers	1,200
Legal Fees	500
Proceedings	3,600
Peanut Science	30,000
Peanut Science and Technology	100
Peanut Research	1,500
Quality Methods	100
Bank charges	150
Miscellaneous	250
On-line Computer Search Capability	1,500
Reserve	200
TOTAL EXPENDITURES	**$66,150**

Excess Receipts over Expenditures	0

AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY
BALANCE SHEET FOR FY 1993-94

ASSETS	June 30, 1994	June 30, 1993
Petty Cash Fund	329.32	$ 429.01
Checking Account	35,897.15	28,536.76
Certificate of Deposit #1	19,937.60	19,245.35
Certificate of Deposit #2	12,755.43	12,327.64
Certificate of Deposit #3	11,952.14	11,531.51
Certificate of Deposit #4	31,340.10	30,197.09
Certificate of Deposit #5	11,888.24	11,426.61
Money Market Account	2,830.33	2,746.06
Savings Account (Wallace Bailey)	1,157.68	1,188.61
Inventory of Books	7,990.00	20,296.64
TOTAL ASSETS	$136,077.99	$137,925.28
LIABILITIES		
No Liabilities	0.00	0.00
TOTAL FUND BALANCE	$136,077.99	$137,925.28

AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY
STATEMENT OF ACTIVITY FOR YEAR ENDING

	June 30, 1994	June 30, 1993
RECEIPTS		
Annual Meeting Registration	$16,680.00	$16,667.00
Award Income	2,000.00	300.00
Contributions	9,100.00	9,750.00
Differential Postage	2,880.00	2,686.50
Dues	16,573.00	17,334.00
Interest	4,110.12	4,428.12
Peanut Research	52.00	40.00
Peanut Science	702.00	958.00
Peanut Science Page Charges	16,437.70	15,696.33
Peanut Science and Technology	1,130.00	2,090.00
Proceedings	127.00	59.00
Quality Methods	30.00	0.00
Spouse Registration	2,045.00	1,310.00
Other Income	32.00	40.00
TOTAL RECEIPTS	**$71,898.82**	**$71,358.95**
EXPENDITURES		
Annual Meeting	$ 9,968.74	$19,127.58
Bank Charges	49.25	130.25
CAST Membership	552.50	520.00
Corporation Registration	115.00	270.00
Federal Withholding	540.00	343.00
FICA	1,242.48	636.84
Legal Fees	300.00	250.00
Medicare	290.64	148.92
Miscellaneous	50.00	110.00
Office Expenses	936.20	2,955.52
Oklahoma Withholding	221.88	128.79
Peanut Research	2,535.28	2,988.86
Peanut Science	25,468.98	24,073.49
Peanut Science and Technology	0.00	0.00
Postage	2,926.58	2,798.80
Proceedings	3,600.42	2,630.30
Quality Methods	0.00	0.00
Sales Tax	40.22	44.70
Secretarial Services	8,491.56	9,685.70
Spouse Program Expenses	2,857.53	1,573.93
Travel - Officers	1,252.21	1,137.15
Other Expenses	0.00	226.00
TOTAL EXPENDITURES	**$61,439.47**	**$69,779.83**
EXCESS RECEIPTS OVER EXPENDITURES	**$10,459.35**	**$ 1,579.12**

PEANUT SCIENCE BUDGET
1994-95

INCOME

Page and reprint charges	$17,000.00
Foreign mailings	1,100.00
APRES member subscriptions (514 x $13.00)	6,682.00
Library subscriptions (79 x $15.00)	1,185.00
TOTAL INCOME	**$25,067.00**

EXPENDITURES

Printing and reprint costs	$16,200.00
Editorial assistance	12,000.00
Office supplies	250.00
Postage, domestic	675.00
Postage, foreign	1,100.00
TOTAL EXPENDITURES	**$30,225.00**

PEANUT SCIENCE AND TECHNOLOGY
SALES REPORT AND INVENTORY ADJUSTMENT
1993-94

	Books Sold	Remaining Inventory
Beginning Inventory		884
1st Quarter	43	841
2nd Quarter	20	821
3rd Quarter	13	808
4th Quarter	9	799
TOTAL	85	

85 books sold x $10.00 = $850.00 decrease in value of book inventory.

799 remaining books x $10.00 (book value) = $7,990.00 total value of remaining book inventory.

Fiscal Year	Books Sold
1985-86	102
1986-87	77
1987-88	204
1988-89	136
1989-90	112
1990-91	70
1991-92	119
1992-93	187
1993-94	85

PUBLIC RELATIONS COMMITTEE REPORT

The APRES Public Relations Committee met on July 12, 1994, at the Tulsa Marriott Southern Hills with seven members present. Initial discussion concerned the APRES brochure, published in 1993. The committee members present indicated that the present brochure is very informative and functional but, in its present form, will need to be updated every 3-4 years. We may want to develop another publication that provides history, purpose, goals, peanut industry information, etc., that is somewhat more useful over a longer period of time and in a more polished, slick-paper finish form.

Dr. John Damicone made a few brief comments on local publicity for the 1994 meetings (press and media contacts). Arrangement have been made for photos during the meeting. OSU media people have helped in these efforts.

An extensive discussion among the committee members followed concerning membership. The thrust of the comments was that we (APRES) should be more proactive. The committee suggests that the APRES President appoint a membership committee composed of a representative in each peanut growing state, an industry representative and a grower representative and these individuals have active responsibility on APRES membership maintenance and growth in their state or area. The current brochure and suggested new brochure should be provided to these committee members for support in their efforts.

Committee members commented on the advantage of annually providing a half or all day session on grower/industry topics (non-scientific presentations). A single page summary of the annual meeting program, including the above session would be helpful in encouraging area county extension agents, growers and industry attendance and participation in the annual APRES meetings.

Also, committee members encouraged more interaction with the National Peanut Council (NPC), including interchange of information at annual meetings, industry needs, and public perception of peanuts and the peanut industry.

The final comments concern the recognition of members and leaders in the peanut industry that passed away in 1993-94. Dr. Al Norden was the only member that passed away and will be recognized with a resolution.

The meeting adjourned.

Respectfully submitted,

D. W. Gorbet, Chair

RESOLUTIONS

Whereas Dr. Allan James Norden, Professor of Agronomy at the University of Florida, was a leader in peanut research and education in the area of plant breeding and genetics for over 30 years, with more than 150 publications, including several book chapters, and serving as major professor to 10 graduate students, and on numerous student advisory committees, and

Whereas Dr. Al Norden made major contributions to the peanut industry in the area of variety development, including primary developer of Florunner, Early Bunch, Altika, and Sunrunner and co-developer of NC Fla. 14, Southern Runner, and Marc I peanut cultivars, with the Florunner variety having a major impact on the entire U.S. peanut industry, occupying over 90% of the Southeastern U.S. peanut acreage for more than 15 years, and contributing over 70% of the U.S. production at one time, and

Whereas Dr. Norden received numerous honors, including Fellow in the American Society of Agronomy, Crop Science Society of America, and APRES, recipient of the Golden Peanut Award and the Georgia Peanut Service Award, inducted in the Florida Agriculture Hall of Fame, honored as Man of the Year in Service to Florida Agriculture (Progressive Farmer), and Senior Faculty Award honoree from Gamma Sigma Delta, and

Whereas Dr. Norden served APRES in many capacities including President, member of Board of Directors, and on numerous committees, contributing two chapters in APRES books, and

Whereas Dr. Al Norden passed away in High Springs, Florida, on March 9, 1994,

Be it resolved that Dr. Al Norden's life and contributions to the peanut industry and APRES are honored by the American Peanut Research and Education Society.

PUBLICATIONS AND EDITORIAL COMMITTEE REPORT

The Publication and Editorial Committee of APRES met July 12, 1994, at Tulsa, Oklahoma. Members present were Marvin Beute, Bill Branch, Dave Hogg, Austin Hagan, Ed Colburn, and Tim Brenneman. Harold Pattee, Corley Holbrook, Tom Whitaker, and Terry Coffelt were also present.

<u>Old Business:</u>

Work by the committee during the previous year to find a replacement for Harold Pattee as Editor of PEANUT SCIENCE was reviewed. The position was advertised in PEANUT RESEARCH and announced at the 1993 APRES meeting. Three applications were received and reviewed by the committee. Tom Stalker of North Carolina State was the first choice and he indicated a willingness to serve. However, he also requested that a part-time secretary be hired to assist in these duties at a cost of approximately $12,000 per year. The committee voted unanimously to recommend Dr. Stalker as the new editor and provide funding for the secretarial position which would be administered through the Crop Science Department at North Carolina State University.

Corley Holbrook reported that things are going quite smoothly with PEANUT RESEARCH with Marie Griffin serving as co-editor.

Tom Whitaker reported that the New Book Committee had completed their task and that the main function needing to be addressed was marketing and sales. The committee recommends that the price be set at $45 + handling with an early purchase option of $40 + handling. This price would be good until the end of the 1995 meeting and hopefully the book will be available at that time. The committee also recommends that Kim Cutchins coordinate the advertising of the book in consultation with the editors.

The committee received Harold Pattee's Editorial Committee report. PEANUT SCIENCE is in good shape financially and there were 47 manuscripts submitted from July 1, 1993 through June 30, 1994. Seventeen articles (67 pages) and a five-page index were printed in the July-December 1993 issue; and 17 articles were printed in the January-July 1994 issue. Nineteen articles are currently in review and seven articles have been accepted for the next issue. The proposed budget indicates a debt of approximately $5,000 due to the increased expenditure for a secretary. The committee recommended that the Finance Committee consider appropriating these funds from members' dues and only increase page charges as a last resort.

Retiring from the PEANUT SCIENCE editorial board after six years of service are Tim Mack, Entomology; John Sherwood, Plant Pathology; Tom Stalker, Breeding and Genetics; Glenn Wehtje, Weed Science; and James How, Food Science. Replacements recommended are Ames Herbert, Entomology; John Damicone, Plant Pathology; Peggy Ozias-Akins, Breeding and Genetics; Carroll Johnson, Weed Science; and Alan York, Weed Science. The addition of a second weed science position to replace the food science associate editor reflects the relative number of papers in those fields.

New Business:

Terry Coffelt presented a proposal from the Quality Committee concerning the Quality Symposium schedules for July 13. They suggested these papers be printed as a block along with transcribed comments from any discussion. The committee agreed that this would be a good idea, but expressed concern related to the potential amount of material involved, extra publication costs, etc. The proposal presented to the board was to publish all abstracts from this session together along with additional comments as deemed appropriate by the Quality Committee following the actual session.

The Quality Committee also indicated that updates and revisions were needed to the Quality Methods handbook which Tim Sanders will coordinate. It was suggested that promotion for this revised edition could be included in any publicity that goes out promoting the new book, ADVANCES IN PEANUT SCIENCE. This was approved by the committee.

Respectfully submitted,

Tim Brenneman, Chair

NOMINATING COMMITTEE REPORT

The Nominating Committee consulted with various members, from the states or industry area from which representatives were to be nominated, for nominees. After discussion with the nominees concerning their willingness to serve the Society, the Nominating Committee submitted the following slate of representatives to the Board for 1994-95:

President-Elect	Harold Pattee
State Employee Representative (SW)	Chip Lee
State Employee Representative (SE)	Danny Colvin
Industry Representative (production)	Robert E. Scott

This slate was presented to the membership during the 1994 business meeting for their approval. The slate of nominees was approved.

Respectfully submitted,

Walton Mozingo, Chair

FELLOWS COMMITTEE REPORT

Five nominations for recognition as Fellow were received and evaluated by the committee. Committee member scores were compared both in respect to average number of points per nominee and ranking of nominees. Both systems favored the same three nominees and scores were transmitted to the President for Board review and action.

Four committee members met at the programmed time and place on July 12. Discussions were held on: 1) the degree of flexibility advisable in following guidelines (e.g. date of receipt of nominations); 2) definition of primary and secondary fields of service to the profession (guidelines under Section II reference 50 points for primary and 20 points for secondary and nominations often don't differentiate so that reviewer must make judgement and score for each); 3) tabulation of score for report to President. A high or low score by one reviewer can override intermediary scores of two or three reviewers.

No recommendations were made for Board consideration.

Respectfully submitted,

Olin D. Smith, Chair

Dr. William (Bill) D. Branch, Professor, Department of Crop and Soil Sciences, University of Georgia, is responsible for the Georgia Peanut Breeding and Genetics Program. The Georgia Program is active in the development of peanut varieties that will improve grower income, enhance industry profits, and fulfill consumer demands through: increased yield and grade; resistance to diseases, insects, virus, nematodes, aflatoxin, and drought; better shelling characteristics and processing qualities; longer shelf-life; and enhanced flavor and nutritional qualities. Dr. Branch has developed and co-released three prominent peanut varieties, four germplasm lines or populations, one parental line, and two genetic stocks.

The Georgia Peanut Genetics Program also actively pursues the basic understanding of inheritance for both qualitative and quantitative characteristics. Dr. Branch and colleagues have been leaders in the study of peanut genetics, and have identified and developed inheritance models for 12 genes in the cultivated peanut.

Dr. Branch conducts an active Peanut Variety Testing program that provides a firm basis for Extension recommendations in Georgia on peanut varieties. He has co-coordinated the National Peanut Performance Tests and a USAID-sponsored International Peanut Evaluation Program.

Dr. Branch has authored or co-authored 170 research publications and is a member of several professional societies. He has been an active member of APRES since 1976 with service on several committees, as Associate Editor of PEANUT SCIENCE, and as liaison representative between the American Society of Agronomy, and APRES. He served as Chairman of the Peanut Crop Advisory Committee (CAC), is the current Chairman of the Southern Regional Germplasm Technical Advisory Committee (TAC), and is a member of the Peanut Registration Committee of the Crop Science Society of America.

Dr. Frederick R. Cox, Professor, Soil Science, has been active in soil fertility and plant nutrition research and North Carolina State University since 1961. He is the author or co-author of more than 114 publications. Dr. Cox is recognized as a leader in research on peanut nutrition and development, soil testing, and plant analysis interpretation. He was the first to ascertain the two forms of peanut kernel damage which occurs as a result of boron and calcium imbalances. He established the quantitative relationship between soil pH and extractable manganese and developed a manganese availability index used in the southeast to predict manganese fertilizer requirements for crops grown on sandy soils. His research with manganese, boron, and calcium fertilization of peanut, cotton, and soybean has been developed into standard recommended production practices in use today. These developments have made significant contributions to the successful production of the large-seeded, virginia-type peanut.

Dr. Cox is an international leader in micronutrient and other fertility research on tropical soils. He has been invited to discuss micronutrient management and phosphorus nutrition at international symposia in India. He has advised on oil crop production in South America and has been involved in research and graduate training in Bolivia, Ecuador, Peru, and Brazil. Dr. Cox has served as chairman of the graduate advisory committees for 12 M.S. and 14 Ph.D. programs.

Dr. Cox has contributed to the American Peanut Research and Education Society, Inc., through his service on the Board of Directors as President Elect, President, and Past President and through his service on numerous committees. He served as an Associate Editor of PEANUT SCIENCE for two terms and has written chapters for two books (PEANUTS--CULTURE AND USES, and PEANUT SCIENCE AND TECHNOLOGY) published by the Society.

Dr. Cox has contributed to the advancement in science and status of peanut research and education through his activities and assignments in the American Society of Agronomy, Soil Science Society of America, and the Soil Science Society of North Carolina. Dr. Cox served two terms as Associate Editor for the SOIL SCIENCE SOCIETY OF AMERICA JOURNAL and served on the editorial committee for the book, MICRONUTRIENTS IN AGRICULTURE, published by the Soil Science Society of America.

Dr. Cox is a highly dedicated leader who has developed a distinguished record of contributions in the agricultural community in North Carolina, the United States, and internationally. His research, education and service programs have had a substantial impact on peanut production as well as on numerous other agronomic crops produced in the southern region of the United States.

Dr. James H. Young, Professor in the Biological and Agricultural Engineering Department at North Carolina State University, is acknowledged by his peers as an expert in heat and mass transfer in biological materials. He has conducted research on peanut curing since 1966, when he began a series of experiments which ultimately led to a mathematical description of moisture removal from in-shell peanuts. Dr. Young experimentally determined the equilibrium moisture content for both the peanut shell and kernel, and developed an analytical description of moisture diffusion from each. He used these equations to develop a computational procedure to describe moisture loss from a thin layer of peanut pods, and a computer program to simulate drying of a deep bed of peanut pods. This program has been used to study a wide range of dryer control variables. The recommended drying zone for peanuts currently recommended in commercial practice was based on Dr. Young's research.

Dr. Young used his knowledge of moisture diffusion in peanuts in extensive study of the changes which occur during windrow drying. He designed, built, and tested a recirculating air drier that employs a flat plate solar collector to preheat make-up air that, under some conditions, can reduce energy consumption 40 to 50% as compared to conventional single pass dryers. He has also coordinated the efforts of a multidisciplinary team in developing a model to simulate the growth of a peanut plant.

Dr. Young has authored or co-authored 48 journal articles, 58 written papers, 20 abstracts, and 11 special reports for a total of 137 publications. Four times he has received the ASAE paper award presented to the top 2% of papers published in Transactions of the ASAE and Applied Engineering in Agriculture. He was the Bailey Award recipient for 1986.

Dr. Young is a successful educator who has directed M.S. and Ph.D. programs of students who are contributing faculty members at prestigious universities in the U.S. and abroad. He has a long record of service to APRES having served in a number of appointed positions and as Associate Editor of PEANUT SCIENCE.

Guidelines for

AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY FELLOW ELECTIONS

Fellows

Fellows are active members of the Society who have been nominated to receive the honor of fellowship by other active members, recommended by the Fellows Committee, and elected by the APRES Board of Directors. Up to three active members may be elected to fellowship each year.

Eligibility of Nominators

Nominations may be made by an active member of the Society except members of the Fellows Committee and the APRES Board of Directors. A member may nominate only one person for election to fellowship in any one year.

Eligibility of Nominees

Nominees must be active members of the Society at the time of their nomination and must have been active members for a total of at least five years.

The nominee should have made outstanding contributions in an area of specialization whether in research, extension or administration and whether in public, commercial or private service activities. Members of the Fellows Committee and APRES Board of Directors are ineligible for nomination.

Nomination Procedures

Preparation. Careful preparation of the nomination for a distinguished colleague based principally on the candidate's record of service will assure a fair evaluation by a responsible panel. The assistance of the nominee in supplying accurate information is permissible. The documentation should be brief and devoid of repetition. The identification of the nominee's contributions is the most important part of the nomination. The relative weight of the categories of achievement and performance are given in the attached "format".

Format. Organize the nomination in the order shown in the Format for Fellow Nominations, and staple each copy once in the upper left corner. Each copy must contain (1) the nomination proper, and (2) one copy of the three supporting letters (minimum of three but not more than five). The copies are to be mailed to the chairman of the Fellows Committee.

Deadline. The deadline date for receipt of the nominations by the chairman shall be March 1 of each year.

Basis of Evaluation

A maximum of 10 points is allotted to the nominee's personal achievements and recognition. A maximum of 50 points is allotted to the nominee's achievements in his or her primary area of activity, i.e., research, extension, service to industry, or administration. A maximum of 10 points is also allotted to the nominee's achievements in secondary areas of activity. A maximum of 30 points is allotted to the nominee's service to the profession.

Processing of Nominations

The Fellows Committee shall evaluate the nominations, assign each nominee a score, and make recommendation regarding approval by April 1. The President of APRES shall mail the committee recommendations to the Board of Directors for election of Fellows, maximum of three (3), for that year. A simple majority of the Board of Directors must vote in favor of a nominee for election to fellowship. Persons elected to fellowship, and their nominators, are to be informed promptly. Unsuccessful nominations shall be returned to the nominators and may be resubmitted the following year.

Recognition

Fellows shall receive an appropriate framed certificate at the annual business meeting of APRES. The President shall announce the elected Fellows and present each a certificate. The members elected to fellowship shall be recognized by publishing a brief biographical sketch of each, including a photograph and summary of accomplishments, in the APRES PROCEEDINGS. The brief biographical sketch is to be prepared by the Fellows Committee.

Distribution of Guidelines

These guidelines and the format are to be published in the APRES PROCEEDINGS and again whenever changes are made. Nominations should be solicited by an announcement published in "Peanut Research".

Format for

AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY FELLOW NOMINATIONS

TITLE: Entitle the document "Nomination of ______________ for Election to Fellowship by the American Peanut Research and Education Society", inserting the name of the nominee in the blank.

NOMINEE: Include the name, date and place of birth, mail address (with zip code) and telephone number (with area code).

NOMINATOR: Include the typewritten name, signature, mail address (with zip code) and telephone number (with area code).

BASIS OF NOMINATION: Primary area: designate primary area as Research, Extension, Service to Industry, or Administration.

Secondary areas: include contributions in areas other than the nominee's primary area of activity in the appropriate sections of this nomination format.

QUALIFICATIONS OF NOMINEE: Complete parts I and III for all candidates and as many of II-A, -B, -C, and -D, as are applicable.

I. PERSONAL ACHIEVEMENTS AND RECOGNITION (10 points)

A. Degrees received: give field, date, and institution for each degree.
B. Membership in professional and honorary academic societies.
C. Honors and awards received since the baccalaureate degree.
D. Employment: give years, organizations and locations.

II. ACHIEVEMENT IN PRIMARY (50 points) AND SECONDARY (10 points) FIELDS OF ACTIVITY

A. Research

Significance and originality of basic and applied research contributions; scientific contribution to the peanut industry; evidence of excellence and creative reasoning and skill; number and quality of publications; quality and magnitude of editorial contributions. Attach a chronological list of publications.

B. Extension

Ability (a) to communicate ideas clearly, (b) to influence client attitudes, (c) to motivate change in client action. Evaluate the quality, number and effectiveness of publications for the audience intended. Attach a chronological list of publications.

C. Service to Industry

Development or improvement of programs, practices, and products. Significance, originality and acceptance by the public.

D. Administration or Business

Evidence of creativeness, relevance and effectiveness of administration of activities or business within or outside the USA.

III. SERVICE TO THE PROFESSION (30 points)

A. Service to APRES

1. Appointed positions (attach list).
2. Elected positions (attach list).
3. Other service to the Society (brief description).

Service to the Society and length of service as well as quality and significance of the type of service are all considered.

B. Service to the profession outside the Society

1. Advancement in the science, practice and status of peanut research, education or extension, resulting from administrative skill and effort (describe).
2. Initiation and execution of public relations activities promoting understanding and use of peanuts, peanut science and technology by various individuals and organized groups within and outside the USA (describe).

The various administrative skills and public relations actions outside the Society reflecting favorably upon the profession are considered here.

EVALUATION: Identify in this section, by brief reference to the appropriate materials in sections II and III, the combination of the contributions on which the nomination is based. The relevance of key items explaining why the nominee is especially well qualified for fellowship should be noted. However, brevity is essential as the body of the nomination, excluding publication lists, should be confined to not more than eight (8) pages.

SUPPORTING LETTERS: A minimum of three (3) but not more than five (5) supporting letters are to be included for the nominee. Two of the three required supporting letters must be from active members of the Society. The letters are solicited by, and are addressed to, the nominator, and should not be dated. Please urge those writing supporting letters not to repeat factual information that will obviously be given by the nominator, but rather to evaluate the significance of the nominee's achievements. Attach one copy of each of the three letters to each of the six copies of the nomination. Members of the Fellows Committee, the APRES Board of Directors, and the nominator are not eligible to write supporting letters.

BAILEY AWARD COMMITTEE REPORT

Seven manuscripts were submitted and evaluated by members of the Bailey Award Committee. A list of these papers is listed below.

The Bailey Award winners for 1994 are T. B. Brenneman and A. K. Culbreath for their paper titled "Utilizing a sterol demethylation inhibiting fungicide in a predictive spray schedule to manage foliar and soilborne pathogens of peanut".

The committee meeting was attended by three members. No new issues or concerns were discussed.

Respectfully submitted,

Hassan Melouk, Chair

<u>Papers Submitted for the 1994 Bailey Award</u>

1) Utilizing a Sterol Demethylation Inhibiting Fungicide in a Predictive Spray Schedule to Manage Foliar and Soilborne Pathogens of Peanut. T.B. Brenneman and A.K. Culbreath.

2) Forage Potential of Cultivated Peanut (*Arachis hypogaea L.*). D.W. Gorbet, R.L. Stanley, Jr., and D.A. Knauft.

3) The Relationship of Hull Mesocarp Color to Peanut Seed Maturity. J.M. Ferguson and G.A. Sullivan.

4) MNUT--A Marketing Management Expert System for Peanuts. M.C. Lamb, J.I. Davidson, Jr., and N.R. Martin, Jr.

5) Effect of Harvest Date on Maturity, Maturity Distribution, and Flavor of Florunner Peanuts. T.H. Sanders and K.L. Bett.

6) Effects of Insecticides on Sweetpotato Whitefly Mortality and Distribution on Peanut Leaves. S.L. Brown.

7) Peanut Response to Fluometuron Applied to a Preceding Cotton Crop. A.C. York.

Guidelines for

AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY BAILEY AWARD

The Bailey Award was established in honor of Wallace K. Bailey, an eminent peanut scientist. The award is based on a two-tier system whereby nominations are selected based on the oral paper presentation in sessions at the annual APRES meeting, and final awards are made after critiquing manuscripts based on the information presented during the respective meeting.

For initial selection, the session chairman shall appoint three persons, including him/herself if desired, to select the best paper in the session. None of the judges can be an author or co-author of papers presented during the respective session. No more than one paper from each session can be nominated for the award but, at the discretion of the session chairman in consultation with the Bailey Award chairman, the three-member committee may forego submission of a nomination. Symposia and poster presentations are not eligible for the Bailey Award. The following should be considered for eligibility:

1. The presenter of a nominated paper, whether the first or a secondary author, must be a member of APRES.

2. Graduate students being judged for the Joe Sugg Award are also eligible for the Bailey Award if they meet all other criteria for eligibility.

Oral presentations will be judged for the Award based on the following criteria:

1. Well organized.

2. Clearly stated.

3. Scientifically sound.

4. Original research.

5. Presented within the time allowed.

Final evaluation for the Award will be made from manuscripts submitted to the Awards Committee, after having been selected previously from presentations at the APRES meetings. These manuscripts should be based on the oral presentation and abstract as published in the PROCEEDINGS.

Authorship of the manuscript should be the same (both in name and order) as the original abstract. Papers with added author(s) will be ruled ineligible. Manuscripts are judged using the following criteria:

1. Appropriateness of the introduction, materials and methods, results and discussion, interpretation and conclusions, illustrations and tables.

2. Originality of concept and methodology.

3. Clarity of text, tables and figures; economy of style; building on known literature.

4. Contribution to peanut scientific knowledge.

The presentation of bookends will be made to the speaker and other authors appropriately recognized.

JOE SUGG GRADUATE STUDENT AWARD REPORT

Eight papers were presented in the session. The competition among the students was keen, and all did an excellent job presenting their material and answering questions. Five judges, two of whom were ad hoc, scored the papers based on clarity of presentation, quality of visual aides, originality and contribution to peanut science, overall quality and clarity of abstracts, and responding to questions.

John Baldwin was moderator of the session, and the other four judges were Tom Stalker, James Grichar, Bobby Walls (ad hoc) and Mike Matheron (ad hoc). John Wilcut and Hassan Melouk (members of the committee) declined to participate in scoring the presentations because of a conflict of interest.

The first place award went to John S. Richburg, University of Georgia, for his presentation titled "The Behavior of Pursuit and Cadre in Purple and Yellow Nutsedge". The paper was co-authored by John Wilcut.

The second place award went to Henry S. McLean, University of Georgia, for his presentation titled "Peanut Variety Growth, Yield and Grade Response to Zorial". The paper was co-authored by John Wilcut, J. S. Richburg, E. F. Eastin, and A. C. Culbreath.

Cash awards given by the North Carolina Peanut Growers Association (NCPGA) were presented to the winners by Mr. Robert Sutter, Chief Executive Officer of the NCPGA. The first place winner received $200 and the second place winner received $100.

Respectfully submitted,

H. A. Melouk, Chair

COYT T. WILSON DISTINGUISHED SERVICE AWARD REPORT

The last four years truly set a standard difficult to match by future winners of this award with the past winners of the award for service to the Society being: Don Smith (1990), Leland Tripp (1991), Harold Pattee (1992), and Ron Sholar (1993).

Although the call for award nominations was published in PEANUT RESEARCH well ahead of the deadline, no nominations were received. Therefore, no award will be given in 1994.

Charles Swann and Craig Kvien will be rotating off this committee this year and another committee member, John Wilcut, will be moving to North Carolina. Therefore, to retain the desired regional balance two new members from the southeast are needed. Also a new chair for the 1995 award committee is needed.

Respectfully submitted,

Craig Kvien, Chair

Guidelines for

AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY COYT T. WILSON DISTINGUISHED SERVICE AWARD

The Coyt T. Wilson Distinguished Service Award will recognize an individual who has contributed two or more years of distinguished service to the American Peanut Research and Education Society. It will be given annually in honor of Dr. Coyt T. Wilson who contributed freely of his time and service to this organization in its formative years. He was a leader and advisor until his retirement in 1976.

Eligibility of Nominators

Nominations may be made by an active member of the Society except members of the Award Committee and the Board of Directors. However, the nomination must be endorsed by a member of the Board of Directors. A nominator may make only one nomination each year and a member of the Board of Directors may endorse only one nomination each year.

Eligibility of Nominees

Nominees must be active members of the Society and must have been active for at least five years. The nominee must have given of their time freely and contributed distinguished service for two or more years to the Society in the area of committee appointments, officer duties, editorial boards, or special assignments. Members of the Award Committee are ineligible for nomination.

Nomination Procedures

Preparation. Careful preparation of the nomination based on the candidate's service to the Soceity is critical. The nominee may assist in order to assure the accuracy of the information needed. The documentation should be brief and devoid of repetition.

Format. TITLE: Entitle the document "Nomination of ________________ for the Coyt T. Wilson Distinguished Service Award presented by the American Peanut Research and Education Society". (Insert the name of the nominee in the blank).

NOMINEE: Include the name, date and place of birth, mail address (with zip code) and telephone number (with area code).

NOMINATOR AND ENDORSER: Include the typewritten names, signatures, mail addresses (with zip codes) and telephone numbers (with area codes).

SERVICE AREA: Designate area as Committee Appointments, Officer Duties, Editorial Boards, or Special Assignments. (List in chronological order by year of appointment.)

Deadline. The deadline date for receipt of the nominations by the chairman shall be March 1 of each year.

Qualifications of Nominee

I. Personal Achievements and Recognition:
   A. Education and degrees received: Give field, date and institution.
   B. Membership in professional organizations
   C. Honors and awards
   D. Employment: Give years, locations and organizations

II. Service to the Society:
   A. Number of years membership in APRES
   B. Number of APRES annual meetings attended
   C. List all appointed or elected positions held
   D. Basis for nomination
   E. Significance of service including changes which took place in the Society as a result of this work and date it occurred.

III. Supporting letters:
   Two supporting letters should be included with the nomination. These letters should be from Society members who worked with the nominee in the service rendered to the Society or is familiar with this service. The letters are solicited by and are addressed to the nominator. Members of the Award Committee and the nominator are not eligible to write supporting letters.

Award and Presentation

The award shall be a bronze and wood plaque purchased by the Society and presented at its annual business meeting.

DOWELANCO AWARDS COMMITTEE REPORT

The APRES DowElanco Awards Committee consisted of Chip Lee, John Beasley, Zackie Harrell, Lance Peterson, Rick Brandenburg, and David Knauft. Lance Peterson was named as the DowElanco replacement for Dennis Hale.

The committee received four nominations for the Research and Extension Awards. Dr. Charles W. Swann was selected as the recipient of the Extension Award and the team of Drs. Albert Culbreath, James Todd, and James Demski was selected as the recipient of the Research Award.

Respectully submitted,

David Knauft, Chair

BIOGRAPHICAL SUMMARY OF DOWELANCO AWARD FOR EXCELLENCE IN EXTENSION

Dr. Charles W. Swann is Extension Agronomist at the Tidewater Agricultural Experiment Station, VPI & SU, Suffolk, Virginia. He received his B.S. and M.S. degrees in Agronomy from the University of Wisconsin and his Ph.D. in Agronomy and Plant Physiology from the University of Minnesota in 1968.

Dr. Swann was recognized from the late 1970s through the 1980s as the most credible source of information relative to weed management in peanuts in the South. He achieved this reputation among producers, county Extension agents, and agribusiness personnel through a solid publication record and by conducting literally hundreds of grower meetings over the years. Prestigious awards from his clientele and peers in the National and Georgia Associations of County Agricultural Agents, the Weed Science Society of America, the Georgia Weed Science Society, and the University of Georgia provide strong evidence of the excellence of Dr. Swann's Extension programs.

As both the Extension Peanut Specialist and Weed Scientist in the Tidewater area, Dr. Swann is the primary source of agronomic research and educational programs for Virginia peanut producers. He shares his knowledge and observations with producers and count Extension personnel in the Virginia Peanut Production Guide, the Virginia/Carolina Peanut News, local meetings, tours, and state and regional meetings. His research has identified particular interactions among specific varieties and twin-row spacing and supplemental calcium.

Dr. Swann is highly respected by all segments of the peanut industry. His diplomatic and tactful approach to problem resolution ensures that his counsel is sought by growers,shellers, and manufacturers. He is well-respected for his candor and his willingness to provide honest, forthright information to all segments of the peanut industry. He works tirelessly on behalf of Virginia peanut growers and the entire peanut industry.

BIOGRAPHICAL SUMMARY OF DOWELANCO AWARD FOR EXCELLENCE IN RESEARCH

The team of **Drs. Albert K. Culbreath, James W. Todd, James W. Demski** is recognized for their contribution to an understanding of tomato spotted wilt virus (TSWV) in peanut production.

Dr. Culbreath received his B.S. and M.S. degrees from Auburn, and his Ph.D. from North Carolina State University in 1989. He is an associate professor in the Department of Plant Pathology at the University of Georgia Coastal Plain Experiment Station in Tifton. Dr. Todd received his B.S. and M.S. degrees from Auburn, and his Ph.D. from Clemson University in 1973. He is a professor in the Department of Entomology at the University of Georgia Coastal Plain Experiment Station in Tifton. Dr. Demski received his B.S. degree from Clarion State College and his Ph.D. from Pennsylvania State University in 1966. He is a professor in the Department of Plant Pathology at the University of Georgia Experiment Station in Griffin.

Just over five years ago this group of scientists had little familiarity with tomato spotted wilt virus. Today they are experts on the virus; its vector, thrips; and disease symptomology on several host plants, especially peanut. This team was not organized by administration, but formed as a natural cooperative working structure that incorporated the knowledge, natural inquisitiveness and talents of these scientists to form one of the best examples of interdisciplinary teams that has occurred at the University of Georgia. These scientists have been able to obtain the support necessary to tackle a problem that has stumped researchers before them in many countries around the world.

Research conducted by this group has generated important facts about the disease that may be instrumental in managing this disease problem. Some areas of the world have had to abandon their production areas and move them elsewhere to escape the disease problem. In the Southeastern US, there are many diverse crops that are susceptible to TSWV. The challenge to solve this disease problem is being addressed by these three researchers.

Research comparing peanut cultivars has yielded data indicating that Southern Runner is infected at half the rate of Florunner. This find gives peanut growers an immediate andeconomical, partial solution to a difficult problem. For several years, growers, researchers, and specialists noted yellowing plants late in the season. The yellowing and "sudden death syndrome" had mystified previous researchers. This team, using serological (ELISA) techniques discovered that peanuts exhibiting those symptoms had little virus titer in leaves, but had a very high titer of TSWV in the roots. They have described this new symptomology and put another piece of the puzzle into place. It is possible this TSWV infection is responsible for yield reductions seen in recent years. The team, cooperatively, using ELISA, has documented evidence for TSWV overwintering in volunteer peanut and tobacco thrips.

The team also found that transmission of the virus may occur even when an efficacious insecticide has been applied. This data suggests that the use of expensive insecticides will not consistently control TSWV. Again, growers are able to incorporate this information into their disease control strategies and have saved growers millions of dollars that would have been spent on ineffective insecticide applications.

Although the team has far from solved the TSWV problem on peanuts, they have systematically uncovered important facts on the insect transmitted virus and provided useful information to peanut growers to help reduce losses from this disease. Seldom does a team of scientists work so well together to contribute economically important solutions to problems. The TSWV problem is an important threat to the peanut industry today. However the integrated team of Drs. Culbreath, Todd, and Demski is working to provide economically feasible management programs for this disease.

Guidelines for

DOWELANCO AWARDS FOR EXCELLENCE IN RESEARCH AND EXTENSION

I. DowElanco Award for Excellence in *Research*

The award will recognize an individual or team for excellence in research. The award may recognize an individual (team) for career performance or for an outstanding current research achievement of significant benefit to the peanut industry. One award will be given each year provided worthy nominees are nominated. The recipient will receive an appropriately engraved plaque and a $1,000 cash award. In the event of team winners, one plaque will be presented to the team leader and other team members will receive framed certificates. The cash award will be divided equally among team members.

Eligibility of Nominees

Nominees must be active members of the American Peanut Research and Education Society and must have been active members for the past five years. The nominee or team must have made outstanding contributions to the peanut industry through research projects. Members of the DowElanco Awards Committee are ineligible for the award while serving on the committee.

II. DowElanco Award for Excellence in *Extension*

The award will recognize an individual or team for excellence in educational programs. The award may recognize an individual (team) for career performance or for an outstanding current educational achievement of significant benefit to the peanut industry. One award will be given each year provided worthy nominees are nominated. The recipient will receive an appropriately engraved plaque and a $1,000 cash award. In the event of team winners, one plaque will be presented to the team leader and other team members will receive framed certificates. The cash award will be divided equally among team members.

Eligibility of Nominees

Nominees must be active members of the American Peanut Research and Education Society and must have been active members for the past five years. The nominee or team must have made outstanding contributions to the peanut industry through education programs. Members of the DowElanco Awards Committee are not eligible for the award while serving on the committee.

NOMINATION FORM FOR DOWELANCO AWARDS

General Instructions: Listed below is the information to be included in the nomination for individuals or teams for the DowElanco Award. Ensure that all information is included. Complete Section VI, Professional Achievements, on the back of this form. Attach additional sheets as required.

****

Indicate the award for which this nomination is being submitted.
Date nomination submitted:

___ DowElanco Award for Excellence in Extension

___ DowElanco Award for Excellence in Research

****

I. Nominee(s): For a team nomination, list the requested information on all team members on a separate sheet.

Nominee ______________________________

Address ______________________________

Title ________________ Tel No. ________________

II. Nominator:

Name ________________ Signature ________________

Address ______________________________

Title ________________ Tel No. ________________

III. Education: (include schools, college, universities, dates attended and degrees granted).

IV. Career: (state the positions held by listing present position first, titles, places of employment and dates of employment).

Eligibility of nominators, nomination procedures, and the DowElanco Awards Committee are identical for the two awards and are described below:

Eligibility of Nominators

Nominators must be active members of the American Peanut Research and Education Society. Members of the DowElanco Awards Committee are not eligible to make nominations while serving on the committee. A nominator may make only one nomination each year.

Nomination Procedures

Nominations will be made on the Nomination Form for DowElanco Awards. Forms are available from the Executive Officer of APRES. A nominator's submittal letter summarizing the significant professional achievements and their impact on the peanut industry may be submitted with the nomination. Three supporting letters must be submitted with the nomination. Supporting letters may be no more than one page in length. Nominations must be postmarked no later than March 1 and mailed to the committee chair.

DowElanco Awards Committee

The APRES President is responsible for appointing the committee. The committee will consist of seven members with one member representing the sponsor. After the initial appointments, the President will appoint two new members each year to serve a term of three years. If a sponsor representative serves on the awards committee, the sponsor representative will not be eligible to serve as chair of the committee.

V. Honors and Awards: (received during professional career).

VI. Professional Achievements: (Describe achievement in which the nominee has made significant contributions to the peanut industry).

VII. Significance: (A "tight" summary and evaluation of the nominee's most significant contributions and their impact on the peanut industry.) This material should be suitable for a news release.

PEANUT QUALITY COMMITTEE REPORT

The Peanut Quality Committee met at 3:00 p.m. on July 12, 1994, at Tulsa, Oklahoma. Four members and five guests were present.

The Committee reviewed the minutes from the 1993 meeting and what had been done to accomplish the goals set last year.

The Committee voted to recommend to the Publications and Editorial Committee that efforts continue to publish more new methods, especially in the areas of peanut nutrition, biotechnology, and *A. flavus* detection. We also recommend to the Publications and Editorial Committee that advertisements for the new book should also include ads for the Peanut Quality Methods book in order to generate new orders and inform new members of its availability.

The Committee recommended to the Publications and Editorial Committee that the papers presented at the Quality Symposium on July 13 be published as a block in the APRES PROCEEDINGS if possible.

Being no further business, the meeting was adjourned.

Respectfully submitted,

Terry Coffelt, Chair

PROGRAM COMMITTEE REPORT

The 26th annual meeting of the American Peanut Research and Education Society was held in the Tulsa Marriott Southern Hills in Tulsa, Oklahoma, on July 12-15, 1994. The working committees were chaired by Hassan Melouk and Ron Sholar (Local Arrangements), John Damicone (Technical Program), and Afaf Melouk and Linda Sholar (Spouse's Program). The complete listing of all committee members is included in the program section of these PROCEEDINGS.

In the Technical Program, there were 10 posters papers, 8 papers in the graduate student competition, 18 presentations in the symposia, and 89 volunteer papers.

Five major contributors (Rhone Poulenc, ISK Biotech, American Cyanamid. Valent, and DowElanco) supported four special events. Additional organizations gave financial assistance and supplied peanut products for the breaks. A complete listing of these organizations is in the program section of these PROCEEDINGS.

Persons in attendance at the 1994 annual meeting totaled 381. This included 262 registered participants (representing 21 states and 7 countries other than the U.S.), and 119 spouses and children.

A special thank you and congratulations to all 1994 APRES meeting committees for a job well done.

Respectfully submitted,

Bill Odle, Chair

1994 PROGRAM

BOARD OF DIRECTORS
1993-94

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PROGRAM COMMITTEE

Local Arrangements	Technical Program	Spouse's Program
Hassan Melouk, Co-Chair	John Damicone, Chair	Afaf Melouk, Co-Chair
Ron Sholar, Co-Chair	Raleigh Jobes	Linda Sholar, Co-Chair
Keith Castner	Darold Ketring	Kim Castner
Doug Glasgow	Jim Kirby	Mireille Damicone
Dewayne Goldmon	Don Murray	Sue Jackson
Ken Jackson	Phil Mulder	Barbara Kirby
Mike Kubicek	Bill Raun	Kianna Kubicek
Lonnie Sellers	John Sherwood	Donna Odle
	Ron Sholar	

PROGRAM HIGHLIGHTS

Tuesday, July 12

7:00- 2:00	Golf Tournament	South Lakes Golf Club
8:00-12:00	Peanut CAC Meeting	Birch
12:00- 8:00	APRES Registration	2nd Floor Lobby
1:00- 5:00	Spouse's Registration	Suite 320
	Spouse's Hospitality	Suite 320
1:00- 2:00	New Book Committee	Suite 306
	Site Selection Committee	Suite 312
	Fellows Committee	Suite 316
	Coyt T. Wilson Award Committee	Birch
2:00- 3:00	Associate Editors, Peanut Science	Suite 306
	Public Relations Committee	Suite 312
	Bailey Award Committee	Suite 316
	DowElanco Awards Committee	Birch
3:00- 4:00	Publications and Editorial Committee	Suite 306
	Nominating Committee	Suite 312
	Joe Sugg Graduate Student Award Committee	Suite 316
	Peanut Quality Committee	Birch
4:00- 6:00	Finance Committee	Suite 306
7:00-11:00	Board of Directors	Birch
8:00-10:00	RHONE-POULENC ICE CREAM SOCIAL	Council Oak A-C

Wednesday, July 13

8:00- 4:00	APRES Registration	2nd Floor Lobby
	Spouse's Registration	Suite 320
	Spouse's Hospitality	Suite 320
	Preview Room	Cedar
8:00- 5:00	Industry Exhibits	2nd Floor Lobby
	Press Room	Cypress
8:00- 9:30	General Session	Council Oak A-C
10:00-12:00	Peanut Quality Symposium	Council Oak A-C
1:00- 5:00	Poster Session I	2nd Floor Lobby
1:00- 3:00	Plant Pathology I	Council Oak A
1:00- 3:00	Breeding & Genetics I	Council Oak B
	Production Technology I	Sycamore
3:30- 5:00	Plant Pathology II	Council Oak A
	Production Technology II	Sycamore

3:30- 5:00	Physiology & Seed Technology	Council Oak B
6:30-10:00	ISK BIOTECH GILCREASE MUSEUM TOUR/DINNER	Gilcrease Museum

Thursday, July 14

8:00-12:00	APRES Registration	2nd Floor Lobby
8:00- 4:00	Spouse's Hospitality	Suite 320
	Preview Room	Cedar
	Industry Exhibits	2nd Floor Lobby
	Press Room	Cypress
8:00- 4:30	Poster Session II	2nd Floor Lobby
8:00-10:00	Graduate Student Competition	Redbud
	Breeding & Genetics II	Council Oak D-E
	Economics	Sycamore
10:30-12:00	Plant Pathology III	Council Oak D-E
	Production Technology III	Sycamore
	Storage, Curing, Processing, & Utilization	Redbud
1:00- 3:00	Symposium	Council Oak D-E
	Weed Science	Redbud
	Plant Pathology IV	Sycamore
3:20- 5:00	Symposium	Council Oak D-E
	Entomology	Redbud
6:30- 9:00	AMERICAN CYANAMID APPRECIATION DINNER	Council Oak A-E

Friday, July 15

7:30- 8:30	VALENT AND DOWELANCO AWARDS BREAKFAST	Council Oak A-B
8:30-10:00	APRES Awards Ceremony and Business Meeting	Council Oak A-B

GENERAL SESSION

Wednesday, July 13

8:00 - 9:30 a.m. **Council Oak A-C**

8:00 Call to Order
Mr. Dallas Hartzog, APRES President

8:10 Welcome to Oklahoma
Dr. Ron Sholar, APRES Executive Officer

8:20 Overview of Oklahoma Agriculture
Dr. Charles Browning, Dean and Director,
Division of Agricultural Sciences and Natural Resources,
Oklahoma State University

8:40 Trends in the Commercialization of Transgenic Plants
Dr. Arnold Foudin, Deputy Director
Biocontrol Permit Unit, USDA, APHIS

9:00 Changes and Challenges in the Global Peanut Market
Dr. Wayne Lord, President
Southco Commodities
and Chairman,
National Peanut Council

9:25 Announcements:
Technical Program
Dr. John Damicone
Local Arrangements
Dr. Hassan Melouk

SPECIAL EVENTS

Tuesday, July 12

8:00-10:00	ICE CREAM SOCIAL Rhone Poulenc	Council Oak A-C

Wednesday, July 13

6:30-10:00	GILCREASE MUSEUM TOUR/DINNER ISK Biotech	Gilcrease Museum

Thursday, July 14

6:30- 9:00	APPRECIATION DINNER American Cyanamid	Council Oak A-E

Friday, July 15

7:30- 8:30	AWARDS BREAKFAST Valent and DowElanco	Council Oak A-B

TECHNICAL SESSIONS

Wednesday, July 13

Peanut Quality Symposium .... **Council Oak A-C**
Moderator: T.A. Coffelt

What is Quality and What are the Problems?

10:00 (1) From a Grower's View. **G.A. Sullivan.** North Carolina State Univ., Raleigh, NC.

10:05 (2) From a Sheller's View. **J. Simpson.** Birdsong Peanuts, Gorman, TX.

10:10 (3) From a Manufacturer's View. **C.T. Young.** North Carolina State Univ., Raleigh, NC.

10:15 (4) From a Consumer's View. **B.H. Owens.** North Carolina Peanut Growers, Rocky Mount, NC.

What has been, is being, or can be done to Improve Quality?

10:20 (5) In Variety Development. **D.A. Knauft.** North Carolina State Univ., Raleigh, NC.

10:30 (6) In Pest Management. **T.A. Lee, Jr.** Texas A&M Univ., Stephenville, TX.

10:40 (7) In Agronomic Practices. **J.P. Beasley, Jr.** Univ. of Georgia, Tifton, GA.

10:50 (8) In Engineering Studies. **P.A. Blankenship.** USDA-ARS, Dawson, GA.

11:00 (9) In Program and Marketing Changes. **W.D. Shurley.** Univ. of Georgia, Tifton, GA.

11:10 (10) The Virginia-North Carolina Peanut Variety and Quality Evaluation Program - A Blueprint for a National Quality Evaluation Program? **R.W. Mozingo.** Virginia Polytechnic Institute and State Univ., Suffolk, VA.

11:20 Discussion

Poster Session I .... **2nd Floor Lobby**

1:00-5:00 (Authors present 2:30-3:30)

(11) Susceptibility of Peanut Varieties and Breeding Lines to Southern Blight Disease. **B.A. Besler*, W.J. Grichar, and O.D. Smith.** Texas A&M Univ., Yoakum, TX and College Station, TX.

(12) Evaluation of Disease Resistant Peanut Varieties When Sprayed with Bravo 720 and/or Folicur 3.6F on Extended Spray Schedules. **A.J. Jaks* and W.J. Grichar.** Texas A&M Univ., Yoakum, TX.

(13) Yield and Leafspot Response of Interspecific Peanut Crosses in Early Generation Tests. **M. Ouedraogo*, O.D. Smith, and C.E. Simpson.** Texas A&M Univ., College Station, TX, and Texas A&M Univ., Stephenville, TX.

(14) Comparing the Interaction of Two Foliar Fungicides With Biologicals Used to Control Sclerotinia Blight of Peanut. **K.E. Woodard*.** Texas A&M Univ., Stephenville, TX.

(15) Water Requirements of Peanuts as Measured in Non-Weighing Lysimeters. **J.W. Worthington* and J.R. Schmidt.** Texas A&M Univ., Stephenville, TX.

Plant Pathology I .... **Council Oak A**

Moderator: H.A. Melouk

1:00 (16) Effect of Temperature on Stability of Components of Resistance to *Cercospora arachidicola* in Peanut. **F. Waliyar, B.B. Shew*, H.T. Stalker, T.G. Isleib, R. Sidahmed, and M.K. Beute.** ICRISAT Sahelian Center, Niamey, Niger; North Carolina State Univ., Raleigh, NC.

1:15 (17) Machine Vision Measurement of Leafspot Incidence on Leaflets of Various Peanut Cultivars. **S.H. Deck*, D.M. Porter, and F.S. Wright.** Virginia Polytechnic Institute and State Univ. and USDA-ARS, Suffolk, VA.

1:30 (18) Effect of Foliar Application of Bravo on the Foliar Diseases of Peanut. **A. K. Sinha*, N. McAndrew, and M. Lindo.** Caribbean Agricultural Research and Development Institute, Belmopan, Belize.

1:45 (19) Comparison of Systemic and Protectant Fungicides Applied on Advisory Schedules for Management of Early Leafspot of Peanut. **J.P. Damicone*, K.E. Jackson, and J.R. Sholar.** Oklahoma State Univ., Stillwater, OK.

2:00 (20) Forecasting Peanut Late Leaf Spot with the EnviroCaster: Commercial Application. **N. Lalancette.** Neogen Corporation, Lansing, MI.

2:15 (21) Variation in Susceptibility to Tomato Spotted Wilt Virus Among Peanut Genotypes. **A.K. Culbreath*, J.W. Todd, W.D. Branch, D.W. Gorbet, C.C. Holbrook, W.F. Anderson, and J.W. Demski.** Univ. of Georgia, Tifton, GA.; Univ. of Florida, Marianna, FL.; and Univ. of Georgia, Griffin, GA.

2:30 (22) Plant Spacing and Tomato Spotted Wilt Virus. **D.W. Gorbet* and F.M. Shokes.** Univ. of Florida, Marianna, FL.

2:45 (23) Effects of Seeding Rate, Irrigation, and Cultivar on Spotted Wilt, Rust, and Southern Blight Diseases of Peanut. **M.C. Black*, H. Tewolde, C.J. Fernandez, and A.M. Schubert.** Texas A&M University, Uvalde, TX; Dept. of Soil and Crop Science, Uvalde and Lubbock, TX.

Breeding & Genetics I .... Council Oak B

Moderator: J.S. Kirby

1:00 (24) Ancestral Contributions to Roast Peanut Flavor. **T.G. Isleib*, H. E. Pattee, and F.G. Giesbrecht.** USDA-ARS and North Carolina State Univ., Raleigh, NC.

1:15 (25) An Application of BLUPs in Peanut Breeding. **C.A. Salas, T.G. Isleib*, and H.E. Pattee.** USDA-ARS and North Carolina State Univ., Raleigh, NC.

1:30 (26) Relation of Fruit Productivity to Branching Pattern in Peanuts. **A. Rehman*, R. Wells, and T. Isleib.** North Carolina State Univ., Raleigh, NC.

1:45 (27) Combining Abilities of Lines Derived from an Interspecific Cross, *Arachis hypogaea/A. cardenasii.* **L. Barrientos, T.G. Isleib, and H.T. Stalker.** North Carolina State Univ., Raleigh, NC.

2:00 (28) Use of Somatic Embryogenesis of Mature Embryo Axes as a Strategy in Gene Transformation of Peanut. **J.A. Burns*, C.M. Baker, H.Y. Wetzstein, R.E. Durham, and W.A. Parrott.** Univ. of Georgia, Athens, GA.

2:15 (29) Current Taxonomy in Arachis. **C.E. Simpson*, A. Krapovickas, W.C. Gregory, and J.F.M. Valls.** Texas A&M Univ., Stephenville, TX; Institute Botanica del Nordeste, Corrientes, Argentina; North Carolina State Univ.; and EMBRAPA/CENARGEN, Brasilia, Brazil.

2:30 (30) Introgression from *A. cardenasii* to *A. hypogaea*. **H.T. Stalker*, G.M. Garcia, B.B. Shew, M.K. Beute, T.G. Isleib, and G. Kochert.** North Carolina State Univ. and Univ. of Georgia.

2:45 (31) Genetic Significance and Implications of Peanut Artifacts Recovered From a Royal Tomb, Sipan, Peru. **D.J. Banks.** Pastures Green, Stillwater, OK.

Production Technology I .... **Sycamore**

Moderator: L.D. Sellers

1:00 (32) Yield Response of Two Spotted Wilt-Resistant Peanut Cultivars to Seeding Rate and Irrigation. **H. Tewolde*, M.C. Black, C.J. Fernandez, and A.M. Schubert.** Texas A&M Univ., Uvalde and Lubbock, TX.

1:15 (33) An Analysis of Pesticide Use and Benefits in U.S. Grown Peanuts. **D.C. Bridges, C.K. Kvien*, J.E. Hook, and C.R. Stark, Jr.** Univ. of Georgia, Tifton, GA.

1:30 (34) Evaluation of Chemical and Non-Chemical Management of Major Peanut Pests in Alabama. **J.R. Weeks*, A.K. Hagan, and L. Wells.** Auburn Univ., Auburn, AL.

1:45 (35) Digging Date and Leafspot Control Influence on Peanut Production. **J.R. Sholar*, K.E. Jackson, J.P. Damicone, J.K. Nickels, and J.S. Kirby.** Oklahoma State Univ., Stillwater, OK.

2:00 (36) Interaction of Paraquat and Chlorothalonil with Respect to Weed and Disease Control in Peanut. **J. Choate* and G. Wehtje.** Auburn Univ., Auburn, AL.

2:15 (37) Influence of Planter Type and Seeding Rate on Yield and Disease Incidence in Peanut. **G. Wehtje*, R. Weeks, M. West, L. Wells, and P. Pace.** Auburn Univ., Auburn, AL.

Plant Pathology II .... **Council Oak A**

Moderator: J.P. Damicone

3:30 (38) A Six-year Benefit Assessment of Fluazinam for Control of Sclerotinia Blight of Peanut in Virginia. **G.W. Harrison* and P.M. Phipps.** ISK Biotech Corp., Clayton, NC, and Virginia Polytechnic Institute and State Univ., Suffolk, VA.

3:45 (39) An Assessment of Environmental Conditions Preceding Outbreaks of Sclerotinia Blight of Peanut in Virginia. **P.M. Phipps*.** Virginia Polytechnic Institute and State Univ., Suffolk, VA.

4:00 (40) Utilization of PCNB Alone or in Combination With Iprodione for Control of Sclerotinia Blight of Peanut. **K.E. Jackson* and J.P. Damicone.** Oklahoma State Univ., Stillwater, OK.

4:15 (41) Effects of Various Phenotypic and Mechanically Altered Peanut Canopies on Sclerotinia Blight and Efficacy of Fungicide Applications. **T.M. Butzler*, J.E. Bailey, and M.K. Beute.** North Carolina State Univ., Raleigh, NC.

4:30 (42) Epidemiological Aspects of Minimum Tillage and Incidence of Disease Caused by Three Soil-Borne Pathogens of Peanut. **L.M. Ferguson*, M.K. Beute, and G. Naderman.** North Carolina State Univ., Raleigh, NC.

4:45 (43) The Evaluation of Chemical or Cultural Practices in Combination with Resistance for Control of Cylindrocladium Black Rot in Georgia. **G.B. Padgett* and T.B. Brenneman.** Univ. of Georgia, Tifton, GA.

Production Technology II .... **Sycamore**

Moderator: W.J. Grichar

3:30 (44) Effects of High Residue Cultivators on Yield of Peanuts Planted by Conventional or Strip Tillage Methods. **J.A. Baldwin* and M.J. Bader.** Univ. of Georgia, Tifton, GA.

3:45 (45) The Influence of Furrow Diking on Peanut Yield in 1993. **M.J. Bader* and J.A. Baldwin.** Univ. of Georgia, Tifton, GA.

4:00	(46)	Utilization of the Sunbelt Agricultural Exposition Farm for Extension Demonstrations, Field Days, Agent Trainings and Applied Research on Peanuts. **J.P. Beasley, Jr.*, J.A. Baldwin, S.L. Brown, S.M. Brown, G.B. Padgett, M.J. Bader, and W.D. Shurley.** Univ. of Georgia, Tifton, GA.
4:15	(47)	A Method for Estimating Yield and Quality Losses in Peanut Fields. **J.I. Davidson, Jr.* and M.C. Lamb.** USDA, ARS, National Peanut Research Lab., Dawson, GA.
4:30	(48)	Development of a Knowledge Base for "DRYNUT", an Expert System for Managing Dryland Peanut Production. **R.B. Moss*.** Plains, GA.

Physiology & Seed Technology .... Council Oak B

Moderator: C.K. Kvien

3:30	(49)	Photothermal Effects on Development of Harvest Index in Peanut. **M.J. Bell*, G.C. Wright, G.R. Harch, and G.L. Hammer.** Queensland Dept. of Primary Industries, Kingaroy, Australia, and Toowoomba, Australia.
3:45	(50)	Chemical Composition of *Arachis hypogaea* var. *hirsuta* Peanuts. **D.T. Grimm*, T.H. Sanders, H.E. Pattee, D.E. Williams, and S. Sanchez-Dominguez.** USDA-ARS, North Carolina State Univ., Raleigh, NC; USDA-ARS, Beltsville, MD; and Univ. Autonoma Chapingo, Chapingo, Mexico.
4:00	(51)	Descriptive and Sensory Evaluation of Six Landrace Accessions of *Arachis hypogaea* var. *hirsuta* Kohler Cultivated in Mexico. **H.E. Pattee*, D.E. Williams, and S. Sanchez-Dominguez.** USDA-ARS, North Carolina State Univ., Raleigh, NC; USDA-ARS, Beltsville, MD; and Dept. de Fitotecnia, Univ. Autonoma Chapingo, Chapingo, Mexico.
4:15	(52)	Effect of Cultivar and Production Location on Tocopherol Concentration, O/L Ratio, and Oil Stability of Six Peanut Cultivars. **T.H. Sanders*, W.D. Branch, C.E. Simpson, and T.A. Coffelt.** USDA-ARS, North Carolina State Univ., Raleigh, NC; Univ.of Georgia, Tifton, GA; Texas A&M Univ., Stephenville, TX; and USDA-ARS, Virginia Polytechnic and State Univ., Suffolk, VA.

4:30 (53) Response of Peanut Germplasm to Different Drought Intensities Imposed by an Irrigation Gradient System. **A.M. Schubert*, O.D. Smith, and G.E. Aiken.** Texas A&M Univ., Lubbock and College Station, TX; and USDA-ARS, Booneville, AR.

Thursday, July 14

Poster Session II .... **2nd Floor Lobby**

8:00-4:30 (Authors present 2:30-3:30)

(54) Regeneration of Peanut Through *in vitro* Culture of Peg Tips. **Q.L. Feng, H.T. Stalker*, and H.E. Pattee.** USDA-ARS, North Carolina State Univ., Raleigh, NC.

(55) Postemergence Weed Management Systems for Reduced Tillage Peanut Production in Georgia. **E.F. Eastin*, J.W. Wilcut, and J.S. Richburg, III.** Univ. of Georgia, Tifton, GA.

(56) Particle Size Distribution in a Peanut-based Beverage. **M.J. Hinds*, L.R. Beuchat, and M.S. Chinnan.** Univ. of Georgia, Griffin, GA.

(57) Isolation and Purification of the Methionine-rich Protein from Peanut. **S.M. Basha*.** Florida A&M Univ., Tallahassee, FL.

(58) Agronomic Performance of Peanut Varieties Under Well-Watered Conditions in Mazatepec, Morelos, Mexico. **S. Sanchez-Dominguez.** Univ. Autonoma Chapingo, Chapingo, Mexico.

Graduate Student Competition .... **Redbud**

Moderator: J.A. Baldwin

8:00 (59) Peanut Variety Growth, Yield and Grade Response to Zorial. **H.S. McLean*, J.W. Wilcut, J.S. Richburg, III, E.F. Eastin, and A.C. Culbreath.** Univ. of Georgia, Tifton, GA, and Sandoz Agro., Inc., Cordele, GA.

8:15 (60) The Behavior of Pursuit and Cadre in Purple and Yellow Nutsedge. **J.S. Richburg, III* and J.W. Wilcut.** Univ. of Georgia, Tifton, GA.

8:30 (61) Utilization of the NOR Mutants in Assessing Aflatoxin Production in Tamspan 90 Lines. **Y. Lopez*, O.D. Smith, N.P. Keller, B. Sarr, and T.D. Phillips.** Texas A&M Univ., College Station, TX.

8:45 (62) Use of Cellophane Surface to Quantify Infection Cushion Formation by *Sclerotinia minor*. **R.K. Soufi*, H.A. Melouk, and S.S. Aboshosha.** USDA-ARS, Oklahoma State Univ., Stillwater, OK, and Alexandria Univ., Egypt.

9:00 (63) Evaluation of Sclerotinia Blight Disease Reaction in a Host Plant Resistance Breeding Program for Runner-type Peanuts. **J.J. Goldman*, O.D. Smith, C.E. Simpson, and H.A. Melouk.** Texas A&M Univ., College Station and Stephenville, TX; and USDA-ARS, Oklahoma State Univ., Stillwater, OK.

9:15 (64) Potential Use of Rapeseed Meal and Rapeseed Greens as Organic Amendments to Reduce Growth and Sclerotial Viability of *Sclerotinia minor* and *Sclerotium rolfsii*. **X. Li*, H.A. Melouk, J.P. Damicone, and K.E. Jackson.** USDA-ARS, Oklahoma State Univ., Stillwater, OK.

9:30 (65) Use of Monoclonal Antibody to the Nonstructural Protein of the S-RNA of Tomato Spotted Wilt Virus to Differentiate Viruliferous and Non-viruliferous Thrips [*Frankliniella occidentalis* (Pergandae)]. **M.D. Bandla*, D.E. Westcot, T.L. German, D.E. Ullman, and J.L. Sherwood.** Oklahoma State Univ., Stillwater, OK; Univ. of Hawaii, Honolulu, HI; and Univ. of Wisconsin, Madison, WI.

9:45 (66) A Genetic Study of the Vegetative Interaction Groups of *Sclerotium rolfsii*. **F.A. Nalim*, N.P. Keller, J.L. Starr, and K. Woodard.** Texas A&M Univ., College Station and Stephenville, TX.

Breeding & Genetics II .... Coucil Oak D-E

Moderator: J.M. Kubicek

8:00 (67) Combination of Early Maturity and Leafspot Resistance within an Advanced Georgia Peanut Breeding Line. **W.D. Branch* and A.K. Culbreath.** Univ. of Georgia, Tifton, GA.

8:15 (68) Optimizing Plot Size for Screening Germplasm for Resistance to White Mold. **W.F. Anderson*, C.C. Holbrook, T.B. Brenneman, and B.G. Mullinix.** Univ. of Georgia and USDA-ARS, Tifton, GA.

8:30 (69) Southwest Runner - A Small-Seeded Runner for the Southwest. **J.S. Kirby*, H.A. Melouk, D.J. Banks, J.R. Sholar, and T.E. Stevens, Jr.** USDA-ARS, Oklahoma State Univ., Stillwater, OK.

8:45 (70) Resistance to Southern Corn Rootworm in Six Virginia-type Peanuts. **T.A. Coffelt* and D.A. Herbert.** USDA-ARS and Virginia Polytechnic Institute and State Univ., Suffolk, VA.

9:00 (71) Response to Selection for High Oleic Acid Peanut Oil. **K.M. Moore* and J.E. Harvey.** AgraTech Seeds Inc., Ashburn, GA.

9:15 (72) Effect of Fatty Acid Composition on Preharvest Aflatoxin Contamination of Peanut. **C.C. Holbrook*, J.E. Hunter, D.A. Knauft, D.M. Wilson, and M.E. Matheron.** USDA-ARS, Univ. of Georgia, Tifton, GA; The Procter & Gamble Co., Cincinnati, OH; North Carolina State Univ., Raleigh, NC; and Univ. of Arizona, Sommerton, AZ.

9:30 (73) A Review of the Potchefstroom Peanut Breeding Programme in South Africa. **P.J.A. Van Der Merwe* and H.L.N. Joubert.** Agricultural Research Council, Oil and Protein Seed Centre, Pothchefstroom, South Africa.

Economics .... **Sycamore**

Moderator: F.D. Mills, Jr.

8:00 (74) Economic Performance Characteristics of Bahiagrass-Peanut Rotations Relative to Continuous Peanuts. **W.A. Miller*.** Auburn Univ., Headland, AL.

8:15 (75) Analysis of a No-Net Cost Provision for Peanut Program Improvement. **D.H. Carley* and S.M. Fletcher.** Univ. of Georgia, Griffin, GA.

8:30 (76) Potential Impact on Peanut Farmers and Food Manufacturers from Changes in Peanut Prices. **S.M. Fletcher*, P. Zhang, and D.H. Carley.** Univ. of Georgia, Griffin, GA.

8:45 (77) The Demand for Peanuts in Peanut Butter. **P. Zhang*, S.M. Fletcher, and D.H. Carley.** Univ. of Georgia, Griffin, GA.

9:00 (78) Economic Benefits of Including SM-9, an Oxyethylene Non-ionic Surfactant in Peanut Pest Management Programs. **P.B. Haney* and G.M. Huddleston.** Agricultural Field Research, Ashburn, GA, and DeLeon TX.

9:15 (79) Impact of Critical Statutory Provisions on the Peanut Program Costs. **R.H. Miller***. USDA-ASCS, Tobacco and Peanuts Analysis Division, Washington, D.C.

9:30 (80) Implications of Changing Cropping Systems on Peanut Production Costs and Farm Returns in the Virginia-Carolina Area. **A.B. Brown and E.W. Taylor***. North Carolina State Univ., Raleigh, NC.

9:45 (81) The Theories of Marginal Cost and Opportunity Cost Applied to Peanut Production: The Case of Additional Peanuts with Implications for Peanut Acreage and Marketing. **W.D. Shurley***. Univ. of Georgia, Tifton, GA.

Plant Pathology III . . . . Council Oak D-E

Moderator: D.L. Nowlin

10:30 (82) Influence of Cropping Pattern on the Severity of Soilborne Diseases of Peanut. **K.L. Bowen, A.K. Hagan*, J.R. Weeks, and D. Hartzog**. Auburn Univ., Auburn, AL.

10:45 (83) Optimal Planting Decisions as Influenced by Control of Southern Stem Rot on Alabama Peanut Farms. **K.L. Bowen*, P.A. Duffy, A.K. Hagan, and C.R. Taylor**. Auburn Univ., Auburn, AL.

11:00 (84) Effective Methods for In-field Evaluation of Resistance to Southern Stem Rot in Peanut. **F.M. Shokes*, D.W. Gorbet, and T.B. Brenneman**. Univ. of Florida, Quincy and Marianna, FL, and Univ. of Georgia, Tifton, GA.

11:15 (85) Effects of Seeding Rate of Florunner Peanut on Severity of Southern Stem Rot in Georgia. **F.D. Smith*, T.B. Brenneman, and B.G. Mullinix**. Univ. of Georgia, Tifton, GA.

11:30 (86) Effects of Rotation With Tifton 9 Bahiagrass on Peanut Diseases, Soil and Shell Mycoflora and Pod Yield. **T.B. Brenneman*, D.R. Sumner, R.E. Baird, G.W. Burton, and N.A. Minton**. USDA-ARS, Univ. of Georgia, Tifton, GA.; Purdue Univ., Vincennes, IN.

Production Technology III . . . . **Sycamore**

Moderator: S.C. Jones

10:30 (87) Influence of Calcium on Agronomic Characteristics of VA-92R Peanut. **R.W. Mozingo* and N.L. Powell.** Virginia Polytechnic Institute and State Univ., Suffolk, VA.

10:45 (88) Reduced Tillage for Peanuts Following Bahiagrass. **J.F. Adams* and D.L. Hartzog.** Auburn Univ., Auburn, AL.

11:00 (89) Poultry Litter Effects on Yield and Grade of Runner Peanut. **D.L. Hartzog* and J.F. Adams.** Auburn Univ., Auburn, AL.

11:15 (90) Evaluation of Planting Pattern of Groundnut Variety RMP-12 at Na mulonge. **Y. Obong*.** Serere Agric. and Anim. Production Research Institute, Uganda.

11:30 (91) Phosphorus Efficiency in Peanuts. **K.R. Krishna*.** Bangalore, India.

Storage, Curing, Processing, & Utilization . . . . **Redbud**

Moderator: K.G. Warnken

10:30 (92) Effect of High Moisture Foreign Material on Aflatoxin in Storage. **F.E. Dowell* and J.S. Smith, Jr.** USDA-ARS, National Peanut Research Lab., Dawson, GA.

10:45 (93) Update on An In-bin Moisture Sensor for Curing Farmers' Stock Peanuts. **C.L. Butts*.** USDA-ARS, National Peanut Research Lab., Dawson, GA.

11:00 (94) Improving Peanut Quality, Maturity and Reducing Aflatoxin Risk by Sorting on Pod Density. **K.S. Rucker*, C.K. Kvien, K. Calhoun, R.J. Henning, S.R. Ghate, and C.C. Holbrook.** Univ. of Georgia, Tifton, GA, and Farmers Fertilizer and Milling, Colquitt, GA.

11:15 (95) Rapid Headspace Analysis of Off-Flavors of Peanuts and Peanut Products. **C.T. Young.** North Carolina State Univ., Raleigh, NC.

11:30 (96) Image Analysis as a Research Tool for Color Evaluation of Roasted Peanuts. **D.M. Deming*, L. Slade, H. Levine, C. Macku, D. Smyth, and E. Holloway.** Nabisco Foods Group, East Hanover, NJ.

11:45 (97) Analysis of Peanut Flavor Volatiles by Static Headspace/On-Column Injection/Gas Chromatography/Mass Spectrometry Technique. **C. Macku*, L. Slade, H. Levine, and D. Deming.** Nabisco Foods Group, East Hanover, NJ.

Domestic and Trade Policies Symposium I . . . . Coucnil Oak D-E

Moderator: F.D. Mills, Jr.

The Future of the U.S. Peanut Industry

1:00 (98) Domestic and Trade Policies - Implications for the U.S. Peanut Industry. **S.M. Fletcher* and D.H. Carley.** Univ. of Georgia, Griffin, GA.

1:35 (99) Domestic and Trade Policies - The Future of the U.S. Peanut Industry from the Viewpoint of a Sheller. **J.W. Dorset*.** Golden Peanut Company, Atlanta, GA.

2:05 (100) Domestic and Trade Policies - The Future of the U.S. Peanut Industry from the Viewpoint of a Manufacturer. A representative of the American Peanut Products Manufacturers, Inc.

2:35 Discussion

Weed Science . . . . Redbud

Moderator: J.R. Sholar

1:00 (101) Applications of Chloroacetamide Herbicides or Chorimuron Do Not Increase Stem Rot of Peanut. **W.C. Johnson, III*, T.B. Brenneman, and B.G. Mullinix, Jr.** USDA-ARS and Univ. of Georgia, Tifton, GA.

1:15 (102) Weed Control in Texas Peanut with Cadre. **W.J. Grichar*, A.E. Colburn, and P.R. Nester.** Texas A&M Univ., Yoakum and College Station, TX; and American Cyanamid Co., The Woodlands, TX.

1:30 (103) Potential Fit of Cadre Herbicide in Peanuts in the Southeast. **S.M. Brown.** Univ. of Georgia, Tifton, GA.

1:45 (104) Weed Control in Peanut CADRE as Influenced by Adjuvants. **P.R. Nester*, K. Muzyk, K. Kalmowitz, F.B. Walls, and G. Wiley.** American Cyanamid Co., The Woodlands, TX, Columbia, SC, Brandon, FL, Goldsboro, NC, and Tifton, GA.

2:00 (105) Weed Management in Reduced Tillage Peanut Production in Georgia. **J.W. Wilcut*, J.S. Richburg, III, and G. Wiley.** Univ. of Georgia, Tifton, GA and American Cyanamid Corp., Tifton, GA.

2:15 (106) Growth and Development of Wild Poinsettia (*Euphorbia heterophylla L.*) Selections in Peanut. **B.J. Brecke*.** Univ. of Florida, Jay, FL.

2:30 (107) Mechanical Rod Weeding Versus Conventional at Cracking Herbicide Systems in Peanuts. **D.L. Colvin*.** Univ. of Florida, Gainesville, FL.

2:45 (108) Sicklepod (*Cassia obtusifolia*) Control in Peanuts with Flair. **D.T. Gooden*.** Clemson Univ., Clemson, SC.

Plant Pathology IV .... Sycamore

Moderator: B.E. Nowlin

1:00 (109) Additive Effects of Root-Knot and Southern Blight on Peanut Yields. **J.L. Starr*, M-Y Shim, C.E. Simpson, and T.A. Lee, Jr.** Texas A&M Univ., College Station, TX; and Texas A&M Univ., Stephenville, TX.

1:15 (110) Evaluation of Sesame for Control of *Meloidogyne arenaria* and *Sclerotium rolfsii* in Peanut. **R. Rodriguez-Kabana*, N. Kokalis-Burelle, D.G. Robertson, and L. Wells.** Auburn Univ., Auburn, AL.

1:30 (111) Evaluation of Rotations with Tifton 9 Bahiagrass for the Control of the Southern Root-knot Nematode. **N.A. Minton*, T.B. Brenneman, D.R. Sumner, and G.W. Burton.** USDA-ARS, Univ. of Georgia, Tifton, GA.

1:45 (112) Coastal Bermudagrass, Cotton, and Bahiagrass as Rotation Crops for the Management of Root-knot and Southern Blight in Peanut. **P.S. King*, R. Rodriguez-Kabana, L.W. Wells, D.G. Robertson, and C.F. Weaver.** Auburn Univ., Auburn, AL.

2:00 (113) Partridge Pea as a Rotation Crop for the Management of *Meloidogyne arenaria* in Peanut. **C.F. Weaver*, R. Rodriguez-Kabana, N. Kokalis-Burelle, D.G. Robertson, and L.W. Wells.** Auburn Univ., Auburn, AL.

2:15 (114) Diplodia Collar Rot of Peanut - a Reoccurrence. **D.M. Porter* and P.M. Phipps.** USDA-ARS and Virginia Polytechnic Institute and State Univ., Suffolk, VA.

2:30 (115) Biologicial Control of Preharvest Aflatoxin Contamination of Peanuts with Combinations of Nontoxigenic Strains of *Aspergillus flavus* and *A. parasiticus*. **J.W. Dorner, R.J. Cole, and P.D. Blankenship.** USDA-ARS, National Peanut Research Lab., Dawson, GA.

Domestic and Trade Policies Symposium I . . . . Council Oak D-E

Moderator: S.M. Fletcher

Implications on Domestic Production

3:20 (116) Evaluating Peanut Production Efficiency in a Changing Market Environment. **D.H. Carley* and S.M. Fletcher.** Univ. of Georgia, Griffin, GA.

3:40 (117) The Virginia/Carolina Perspective on Peanut Production Efficiency in a Changing Market Environment. **G.A. Sullivan*.** North Carolina State Univ., Raleigh, NC.

4:00 (118) The Southwest Perspective on Peanut Production Efficiency in a Changing Market Environment. **T.A. Lee, Jr*.** Texas A&M Univ., Stephenville, TX.

4:20 (119) The Southeast Perspective on Peanut Production Efficiency in a Changing Market Environment. **D. Bridges*.** Univ. of Georgia, Griffin, GA.

4:40 (120) Peanut Production Efficiency in a Changing Market Environment - Summary & Conclusions. **R.J. Henning*.** Farmers Fertilizer and Milling, Co./Seabrook Peanut Co., Inc., Colquitt, GA.

4:50 Discussion

Entomology . . . . Redbud

Moderator: P.G. Mulder

3:30 (121) Contraindications of Insecticide Use Relative to Vector Control and Spotted Wilt Disease Progress in Peanut. **J.W. Todd*, A.K. Culbreath, D. Rogers, and J.W. Demski.** Univ. of Georgia, Tifton and Griffin, GA; and Miles, Inc., Tifton, GA.

3:45 (122) Effects of Soil Texture and Drainage on Peanut Pod Damage by Southern Corn Rootworm. **B.N. Ang, D.A. Herbert, Jr.*, and W.J. Petka.** Virginia Polytechnic Institute and State Univ., Suffolk, VA.

4:00 (123) Peanut Maturity and Yield Responses to Tobacco Thrips and Herbicide Injury. **L.J. Williams*, D.A. Herbert, Jr., and C.W. Swann.** Rhone-Poulenc Ag. Company, Harrisonburg, VA, and Virginia Polytechnic Institute and State Univ., Suffolk, VA.

4:15 (124) Relative Effects of Thrips Damage and Thrips Insecticide Treatments on Florunner, Southern Runner and Georgia Runner Peanut Cultivars. **S.L. Brown.** Univ. of Georgia, Tifton, GA.

4:30 (125) Summary of Field Research with Alternative Control Practices of Tobacco Thrips in Peanut. **D.A. Herbert, Jr.** Virginia Polytechnic Institute and State Univ., Suffolk, VA.

CONTRIBUTORS FOR SPECIAL EVENTS

American Cyanamid Company
DowElanco
ISK Biotech Company
Rhone Poulenc Ag Company
Valent USA Company

SITE SELECTION COMMITTEE REPORT

The committee met with two members and the Executive Officer present on July 12, 1994. The status of future meetings was discussed.

The 1995 meeting site is Charlotte, North Carolina, at the Adams Mark Hotel July 11-14. The contract has been signed for some time and no additional information was presented.

The 1996 meeting will be in Orlando, Florida, July 9-12, at the Omni/Rosen Hotel which is presently under construction. Completion of this facility is scheduled for early 1995. A contract has been signed. Discussion centered on local arrangement activities.

The 1997 meeting will be in San Antonio, Texas. No meeting site or dates are yet available. The need to finalize the Texas meeting was indicated.

With no further business to discuss, the meeting was adjourned.

Respectfully submitted,

John Damicone, Chair

AMERICAN SOCIETY OF AGRONOMY LIAISON REPRESENTATIVE REPORT

The annual meetings of the joint American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America were held in Cincinnati, Ohio, on November 7-12, 1993. Approximately 2700 papers were presented. Of these, 19 were devoted to peanut research and 16 members of APRES authored or co-authored presentations.

Dr. Charles E. Simpson was awarded the "Frank N. Meyer Medal for Plant Genetic Resources" to honor his contributions for collection and preservation of peanut germplasm, acquisition of *Rhizobium* species, and service to the International Board for Plant Genetic Resources.

The next annual meeting will be held in Seattle, Washington, on November 13-18, 1994.

Respectfully submitted,

H. Thomas Stalker

CAST REPORT

CAST (Council for Agricultural Sciences and Technology) is composed of 30 scientific/professional societies in food and agriculture and supports the use of sound science in policy decision-making. CAST provides the latest information in the scientific literature on key national issues in food and agriculture to policy makers, the news media, and the public.

Two professional societies joined CAST in 1993-94, namely the American Agricultural Economics Association and the American Association for Agricultural Education for a total of 30. CAST has over 3500 individual members.

The CAST Board of Directors met in Chicago on August 27-29, 1993, and in Washington, D.C., on February 26-268, 1994. The Board heard from leaders of several organizations at the Chicago meeting and approved the hiring of a part-time representative in Washington, D.C. This representative will apprise CAST on issues before legislative and regulatory agencies; represent CAST at meetings and hearings; and interface with science fellows, congressional staff, and agency personnel.

The Washington, D.C. meeting devoted most of its efforts toward the presentation, discussion, and approval of a strategic plan for CAST. This plan and its implementation will put CAST in a position to respond in an efficient and timely manner to meet the needs of its clientele.

After 20 years, CAST moved into its own office building in August 1993, in Ames, Iowa. The new building has a conference room and large offices. An open house and dedication was held on December 10, 1993.

Dr. F. J. Francis received the Charles A. Black Award at the Washington, D.C. meeting. Dr. Francis is from the University of Massachusetts and a member of CAST's Executive Committee.

The following are recent and forthcoming publications from CAST. Numerous topics are in various stages of development.

<u>Recent Publications:</u>

1. Admissible Scientific Evidences in Court
2. U.S. Agriculture and the N. American Free Trade Agreement
3. Pesticides in the Diets of Infants and Children: Scientific Review
4. Wetland Policy Issues
5. Pesticides in Surface and Ground Water

Forthcoming Publications:

1. Animal Well-Being
2. Biological Pest Control in Agriculture: Opportunities and Challenges
3. Contribution of Animal Products to Healthful Diets
4. Development of Host Plant Resistance to Pests
5. Food Biotechnology Regulations
6. Foodborne Pathogens: Risk and Consequences
7. Future of Irrigated Agriculture
8. Future of the Land Grant University System and Agricultural Research

Respectfully submitted,

D. W. Gorbet

REPORT OF LIAISON REPRESENTATIVE FROM THE SOUTHERN ASSOCIATION OF AGRICULTURAL EXPERIMENT STATION DIRECTORS

The spring meeting of the Southern Association of Agricultural Experiment Station Directors was held in Williamsburg, Virginia, during the period April 10-13, 1994. A major focus at this meeting was on completing discussions for the revision of the Southern Strategic Research Plan to be published in the early fall of 1994. This strategic plan is the derivative of the new ESCOP Strategic Plan with identification of a number of specific opportunities for research in the southern region.

Another major focus was placed on sustainable agriculture with briefings by the new management entity for the Southern SARE/ACE. In addition to this focus activity, the association, with its Extension counterpart, is developing an agenda for the broader in support of sustainable agriculture. In addition, a planning workshop will be held in conjunction with the summer meeting of experiment station and Extension directors to further discuss sustainable agriculture research and Extension efforts in the southern region. An inventory of all research as related to sustainability will be completed in the near future. The association also agreed to establish a task force on good laboratory practices to develop approaches for dealing with the matter of good laboratory practice research. With the growing advent of GLP's requirement for research with several agencies, it is our intention that this effort will enable our experiment stations in the southern region to prepare to meet these requirements for GLP in a timely manner.

The GIS-based Southern Management Information System was demonstrated and reviewed by the association at the spring meeting. A user's workshop will be held in the summer of 1994 to provide each state's representative with hands-on experience with the system.

The Southern Association of Experiment Station Directors continues to have a special interest in the American Peanut Research and Education Society and the role it plays in research and education in peanuts that leads to enhancing our peanut industry.

Respectfully submitted,

Gale A. Buchanan

BY-LAWS
of the
AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY, INC.

ARTICLE I. NAME

Section 1. The name of this organization shall be "AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY, INC."

ARTICLE II. PURPOSE

Section 1. The purpose of this Society shall be to instruct and educate the public on the properties, production, and use of the peanut through the organization and promotion of public discussion groups, forums, lectures, and other programs or presentation to the interested public and to promote scientific research on the properties, production, and use of the peanut by providing forums, treatises, magazines, and other forms of educational material for the publication of scientific information and research papers on the peanut and the dissemination of such information to the interested public.

ARTICLE III. MEMBERSHIP

Section 1. The several classes of membership which shall be recognized are as follows:

a. Individual memberships: Individuals who pay dues at the full rate as fixed by the Board of Directors.

b. Institutional memberships: Libraries of industrial and educational groups or institutions and others that pay dues as fixed by the Board of Directors to receive the publications of the Society. Institutional members are not granted individual member rights.

c. Organizational memberships: Industrial or educational groups that pay dues as fixed by the Board of Directors. Organizational members may designate one representative who shall have individual member rights.

d. Sustaining memberships: Industrial organizations and others that pay dues as fixed by the Board of Directors. Sustaining members are those who wish to support this Society financially to an extent beyond minimum requirements as set forth in Section 1c, Article III. Sustaining members may designate one representative who shall have individual member rights. Also, any organization may hold sustaining memberships for any or all of its divisions or sections with individual member rights accorded each sustaining membership.

e. Student memberships: Full-time students who pay dues at a special rate as fixed by the Board of Directors. Persons presently enrolled as full-time students at any recognized college, university, or technical school are eligible for student membership. Post-doctoral students, employed persons taking referesher courses or special employee training programs are not eligible for student memberships.

Section 2. Any member, participant, or representative duly serving on the Board of Directors or a committee of this Society and who is unable to attend any meeting of the Board or such committee may be temporarily replaced by an alternate selected by such member, participant, or representative upon appropriate written notice filed with the president or committee chairperson evidencing such designation or selection.

Section 3. All classes of membership may attend all meetings and participate in discussions. Only individual members or those with individual membership rights may vote and hold office. Members of all classes shall receive notification and purposes of meetings, and shall receive minutes of all Proceedings of the American Peanut Research and Education Society, Inc.

ARTICLE IV. DUES AND FEES

Section 1. The annual dues shall be determined by the Board of Directors with the advice of the Finance Committee subject to approval by the members at the annual business meeting. Minimum annual dues for the five classes of membership shall be:

a.	Individual memberships	: $ 25.00
b.	Institutional memberships	: 25.00
c.	Organizational memberships	: 35.00
d.	Sustaining memberships	: 125.00
e.	Student memberships	: 5.00

(Dues were set at 1992 Annual Meeting)

Section 2. Dues are receivable on or before July 1 of the year for which the membership is held. Members in arrears on July 31 for the current year's dues shall be dropped from the rolls of this Society provided prior notification of such delinquency was given. Membership shall be reinstated for the current year upon payment of dues.

Section 3. A registration fee approved by the Board of Directors will be assessed at all regular meetings of the Society.

ARTICLE V. MEETINGS

Section 1. Annual meetings of the Society shall be held for the presentation of papers and/or discussion, and for the transaction of business. At least one general business session will be held during regular annual meetings at which reports from the executive officer and all standing committees will be given, and at which attention will be given to such other matters as the Board of Directors may designate. Opportunity shall be provided for discussion of these and other matters that members wish to have brought before the Board of Directors and/or general membership.

Section 2. Additional meetings may be called by the Board of Directors by two-thirds vote, or upon request of one-fourth of the members. The time and place shall be fixed by the Board of Directors.

Section 3. Any member may submit only one paper as senior author for consideration by the program chairperson of each annual meeting of the Society. Except for certain papers specifically invited by the Society president or program chairperson with the approval of the president, at least one author of any paper presented shall be a member of this Society.

Section 4. Special meetings in conjunction with the annual meeting by Society members, either alone or jointly with other groups, must be approved by the Board of Directors. Any request for the Society to underwrite obligations in connection with a proposed special meeting or project shall be submitted to the Board of Directors, who may obligate the Society as they deem advisable.

Section 5. The executive officer shall give all members written notice of all meetings not less than 60 days in advance of annual meetings and 30 days in advance of all other special meetings.

ARTICLE VI. QUORUM

Section 1. Forty voting members shall constitute a quorum for the transaction of business at the business meeting held during the annual meeting.

Section 2. For meetings of the Board of Directors and all committees, a majority of the members duly assigned to such board or committee shall constitute a quorum for the transaction of business.

ARTICLE VII. OFFICERS

Section 1. The officers of this Society shall consist of the president, the president-elect, the most recent available past-president and the executive officer of the Society, who may be appointed secretary and treasurer and given such other title as may be determined by the Board of Directors.

Section 2. The president and president-elect shall serve from the close of the annual meeting of this Society to the close of the next annual meeting. The president-elect shall automatically succeed to the presidency at the close of the annual meeting. If the president-elect should succeed to the presidency to complete an unexpired term, he/she shall then also serve as president for the following full term. In the event the president or president-elect, or both, should resign or become unable or unavailable to serve during their terms of office, the Board of Directors shall appoint a president, or both president-elect and president, to complete the unexpired terms until the next annual meeting when one or both offices, if necessary, will be filled by normal elective procedure. The most recent available past president shall serve as president until the Board of Directors can make such appointment.

Section 3. The officers and directors, with the exception of the executive officer, shall be elected by the members in attendance at the annual business meeting from nominees selected by the Nominating Committee or members nominated from the floor. The president, president-elect, and most recent available past-president shall serve without monetary compensation. The executive officer shall be appointed by a two-thirds majority vote of the Board of Directors.

Section 4. The executive officer may serve consecutive annual terms subject to appointment by the Board of Directors. The tenure of the executive officer may be discontinued by a two-thirds vote of the Board of Directors who then shall appoint a temporary executive officer to fill the unexpired term.

Section 5. The president shall arrange and preside at all meetings of the Board of Directors and with the advice, counsel, and assistance of the president-elect, and executive officer, and subject to consultation with the Board of Directors, shall carry on, transact, and supervise the interim affairs of the Society and provide leadership in the promotion of the objectives of this Society.

Section 6. The president-elect shall be program chairperson, responsible for development and coordination of the overall program of the education phase of the annual meeting.

Section 7. (a) The executive officer shall countersign all deeds, leases, and conveyances executed by the Society and affix the seal of the Society thereto and to such other papers as shall be required or directed to be sealed. (b) The executive officer shall keep a record of the deliberations of the Board of Directors, and keep safely and systematically all books, papers, records, and documents belonging to the Society, or in any wise pertaining to the business thereof. (c) The executive officer shall keep account of all monies, credits, debts, and property of any and every nature accrued and/or disbursed by this Society, and shall render such accounts, statements, and inventories of monies, debts, and property, as shall be required by the Board of Directors. (d) The executive officer shall prepare and distribute all notices and reports as directed in these By-Laws, and other information deemed necessary by the Board of Directors, to keep the membership well informed of the Society activities.

ARTICLE VIII. BOARD OF DIRECTORS

Section 1. The Board of Directors shall consist of the following:

a. The president
b. The most recent available past-president
c. The president-elect
d. Three State employees' representatives - these directors are those whose employment is state sponsored and whose relation to peanuts principally concerns research, and/or education, and/or regulatory pursuits. One director will be elected from each of the three main U.S. peanut producing areas.
e. United State Department of Agriculture representative - this director is one whose employment is directly sponsored by the USDA or one of its agencies, and whose relation to peanuts principally concerns research, and/or education, and/or regulatory pursuits.
f. Three Private Peanut Industry representatives - these directors are those whose employment is privately sponsored and whose principal activity with peanuts concerns: (1) the production of farmers' stock peanuts; (2) the shelling, marketing, and storage of raw peanuts; (3) the production or preparation of consumer food-stuffs or manufactured products containing whole or parts of peanuts.
g. The President of the National Peanut Council
h. The Executive Officer - non-voting member of the Board of Directors who may be compensated for his services on a part-time or full-time salary stipulated by the Board of Directors in consultation with the Finance Committee.

Section 2. Terms of office for the directors' positions set forth in Section 1, paragraphs d, e, and f, shall be three years with elections to alternate from reference years as follows: d(VC area), e and f(2), 1992; d(SE area) and f(3), 1993; and d(SW area) and f(1), 1994.

Section 3. The Board of Directors shall determine the time and place of regular and special board meetings and may authorize or direct the president by majority vote to call special meetings whenever the functions, programs, and operations of the Society shall require special attention. All members of the Board of Directors shall be given at least 10 days advance notice of all meetings; except that in emergency cases, three days advance notice shall be sufficient.

Section 4. The Board of Directors will act as the legal representative of the Society when necessary and, as such, shall administer Society property and affairs. The Board of Directors shall be the final authority on these affairs in conformity with the By-Laws.

Section 5. The Board of Directors shall make and submit to this Society such recommendations, suggestions, functions, operation, and programs as may appear necessary, advisable, or worthwhile.

Section 6. Contingencies not provided for elsewhere in these By-Laws shall be handled by the Board of Directors in a manner they deem advisable.

Section 7. An Executive Committee comprised of the president, president-elect, most recent available past-president, and executive officer shall act for the Board of Directors between meetings of the Board, and on matters delegated to it by the Board. Its action shall be subject to ratification by the Board.

ARTICLE IX. COMMITTEES

Section 1. Members of the committees of the Society shall be appointed by the president and shall serve three-year terms unless otherwise stipulated. The president shall appoint a chairperson of each committee from among the incumbent committee members. The Board of Directors may, by a two-thirds vote, reject committee appointees. Appointments made to fill unexpected vacancies by incapacity of any committee member shall be only for the unexpired term of the incapacitated committee member. Unless otherwise specified in these By-Laws, any committee member may be re-appointed to succeed him/herself, and may serve on two or more committees concurrently but shall not chair more than one committee. Initially, one-third of the members of each committee will serve one-year terms, as designated by the president. The president shall announce the committees immediately upon assuming the office at the annual business meeting. The new appointments take effect immediately upon announcement.

Section 2. Any or all members of any committee may be removed for cause by a two-thirds approval by the Board of Directors.

a. Finance Committee: This committee shall consist of six members, three representing State employees, one representing USDA, and two representing Private Business segments of the peanut industry. Appointments in all categories shall rotate among the three U.S. peanut production areas. This committee shall be responsible for preparation of the financial budget of the Society and for promoting sound fiscal policies within the Society. They shall direct the audit of all financial records of the Society annually, and make such recommendations as they deem necessary or as requested or directed by the Board of Directors. The term of the chairperson shall close with preparation of the budget for the following year, or with the close of the annual meeting at which a report is given on the work of the Finance Committee under his/her leadership, whichever is later.

b. Nominating Committee: This committee shall consist of four members appointed to one-year terms, one each representing State, USDA, and Private Business segments of the peanut industry with the most recent available past-president serving as chair. This committee shall nominate individual members to fill the positions as described and in the manner set forth in Articles VII and VIII of these By-Laws and shall convey their nominations to the president of this Society on or before the date of the annual meeting. The committee shall, insofar as possible, make nominations for the president-elect that will provide a balance among the various segments of the industry and a rotation among federal, state, and industry members. The willingness of any nominee to accept the responsibility of the position shall be ascertained by the committee (or members making nominations at the annual business meeting) prior to the election. No person may succeed him/herself as a member of this committee.

c. Publications and Editorial Committee: This committee shall consist of six members appointed to three-year terms, three representing State, one USDA, and two Private Business segments of the peanut industry with membership representing the three U.S. production areas. The members may be appointed to two consecutive three-year terms. This committee shall be responsible for the publication of Society-sponsored publications as authorized by the Board of Directors in consultation with the Finance Committee. This committee shall formulate and enforce the editorial policies for all publications of the Society subject to the directives from the Board of Directors.

d. Peanut Quality Committee: This committee shall consist of seven members, one each actively involved in research in peanuts--(1) varietal development, (2) production and marketing practices related to quality, and (3) physical and chemical properties related to quality--and one each representing the Grower, Sheller, Manufacturer, and Services (pesticides and harvesting machinery in particular) segments of the peanut industry. This committee shall actively seek improvement in the quality of raw and processed peanuts and peanut products through promotion of mechanisms for the elucidation and solution of major problems and deficiencies.

e. Public Relations Committee: This committee shall consist of seven members, one each representing the State, USDA, Grower, Sheller, Manufacturer, and Services segments of the peanut industry, and a member from the host state who will serve a one-year term to coincide with the term of the president-elect. The primary purpose of this person will be to publicize the meeting and make photographic records of important events at the meeting. This committee shall provide leadership and direction for the Society in the following areas:

(1) Membership: Development and implementation of mechanisms to create interest in the Society and increase its membership. These shall include, but not be limited to, preparing news releases for the home-town media of persons recognized at the meeting for significant achievements.

(2) Cooperation: Advise the Board of Directors relative to the extent and type of cooperation and/or affiliation this Society should pursue and/or support with other organizations.

(3) Necrology: Proper recognition of deceased members.

(4) Resolutions: Proper recognition of special services provided by members and friends of the Society.

f. Bailey Award Commitee: This committee shall consist of six members, with two new appointments each year, serving three-year terms. This committee shall be responsible for judging papers which are selected from each subject matter area. Initial screening for the award will be made by judges, selected in advance and having expertise in that particular area, who will listen to all papers in that subject matter area. This initial selection will be made on the basis of quality of presentation and content. Manuscripts of selected papers will be submitted to the committee by the author(s) and final selection will be made by the committee, based on the technical quality of the paper. The president, president-elect and executive officer shall be notified of the Award recipient at least sixty days prior to the annual meeting following the one at which the paper was presented. The president shall make the award at the annual meeting.

g. Fellows Committee: This committee shall consist of six members, two representing each of the three major geographic areas of U.S. peanut production with balance among State, USDA, and Private Business. Terms of office shall be for three years. Nominations shall be in accordance with procedures adopted by the Society and published in the previous year's PROCEEDINGS of APRES. From nominations received, the committee shall select qualified nominees for approval by majority vote of the Board of Directors.

h. Site Selection Committee: This committee shall consist of eight members, each serving four-year terms. New appointments shall come from the state which will host the meeting four years following the meeting at which they are appointed. The chairperson of the committee shall be from the state which will host the meeting the next year and the vice-chairperson shall be from the state which will host the meeting the second year. The vice-chairperson will automatically move up to chairperson.

i. Coyt T. Wilson Distinguished Service Award Committee: This committee shall consist of six members, with two new appointments each year, serving three-year terms. Two committee members will be selected from each of the three main U.S. peanut producing areas.

Nominations shall be in accordance with procedures adopted by the Society and published in the previous year's PROCEEDINGS of APRES. This committee shall review and rank nominations and submit these rankings to the committee chairperson. The nominee with the highest ranking shall be the recipient of the award. In the event of a tie, the committee will vote again, considering only the two tied individuals. Guidelines for nomination procedures and nominee qualifications shall be published in the Proceedings of the annual meeting. The president, president-elect, and executive officer shall be notified of the award recipient at least sixty days prior to the annual meeting. The president shall make the award at the annual meeting.

ARTICLE X. DIVISIONS

Section 1. A Division within the Society may be created upon recommendation of the Board of Directors, or members may petition the Board of Directors for such status, by two-thirds vote of the general membership. Likewise, in a similar manner, a Division may be dissolved.

Section 2. Divisions may establish or dissolve Subdivision upon the approval of the Board of Directors.

Section 3. Division may make By-Laws for their own government, provided they are consistent with the rules and regulations of the Society, but no dues may be assessed. Divisions and Subdivisions may elect officers (chairperson, vice-chairperson, and a secretary) and appoint committees, provided the efforts thereof do not overlap or conflict with those of the officers and committees of the main body of the Society.

ARTICLE XI. AMENDMENTS

Section 1. These By-Laws may be amended consistent with the provision of the Articles of Incorporation by a two-thirds vote of all the eligible voting members present at any regular business meeting, provided such amendments shall be submitted in writing to each member of the Board of Directors at least thirty days before the meeting at which the action is to be taken.

Section 2. A By-Law or amendment to a By-Law shall take effect immediately upon its adoption, except that the Board of Directors may establish a transition schedule when it considers that the change may best be effected over a period of time. The amendment and transition schedule, if any, shall be published in the "Proceedings of APRES".

Amended at the Annual Meeting of the
American Peanut Research and Education Society
July 16, 1993, Huntsville, Alabama

APRES MEMBERSHIP
(1975-1984)

MEMBERS	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Individual	419	363	386	383	406	386	478	470	419	421
Sustaining	21	30	29	32	32	33	39	36	30	31
Organizational	40	45	48	50	53	58	66	65	53	52
Student	–	–	14	21	27	27	31	24	30	33
Institutional	–	45	45	54	72	63	73	81	66	58
TOTAL	480	483	522	540	590	567	687	676	598	595

(1985-1994)

MEMBERS	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Individual	513	455	475	455	415	416	398	399	400	377
Sustaining	29	27	26	27	24	21	20	17	18	14
Organizational	65	66	62	59	54	47	50	40	38	43
Student	40	27	34	35	28	29	26	28	31	25
Institutional	95	102	110	93	92	85	67	71	74	76
TOTAL	742	677	707	669	613	598	561	555	561	535

1994-95
MEMBERSHIP ROSTER

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