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# **PROCEEDINGS**



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## Breeding and Genetics

Yield Comparison of Pure-line Selections Derived from Concurrent Peanut Breeding Programs in Georgia and Zimbabwe. W. D. BRANCH\* and G. L. HILDEBRAND, Dept. of Agron., Univ. of Georgia, Coastal Plain Expt. Station, Tifton, GA 31793-0748 and Commercial Oilseeds Producers' Assoc., Agric. House, P. O. Box 592, Harare, ZIMBABWE.

In 1977, crosses were made between two U. S. cultivars (Florunner and Florigiant) and two African genotypes (Makulu Red and 486 GKP). These four parental lines, two from each country, represent high-yielding germplasm, but do not reciprocally perform well. Hybrid seed populations were equally divided between the Coastal Plain Experiment Station and the Harare Research Station. Subsequently, pedigree methods were simultaneously practiced in the early segregating generations at both locations using similar selection intensity. Preliminary yield trials were conducted in the  $F_2$  and  $F_3$  to identify the eight highest yielding pure-line selections from each breeding program. Selections were then interchanged, and combined yield evaluations were determined among the 16 breeding lines and parents over a three-year period at both locations.

### Use of Pedigreed Natural Crossing in Breeding Peanuts in

Virginia. T. A. COFFELT. USDA-ARS, Suffolk, VA 23437. Pedigreed natural crossing has been suggested as a technique for increasing the number of hybrids in peanut (*Arachis hypogaea* L.) breeding programs, when used in conjunction with the conventional crossing procedure. Since the success of this technique is largely dependent upon the natural outcrossing frequencies, a study was conducted from 1984 to 1986 to determine the natural outcrossing frequency in breeding plots in Virginia. The cultivar Florigiant was used as the female parent and the breeding line Krinkle was used as the male parent in a pedigreed natural crossing field plot. Krinkle has a dominant leaf characteristic easily identified in the hybrid progeny. Seed harvested from the Florigiant parent were planted the following year and the percentage of Krinkle plants determined for calculating the frequency of outcrossing. The frequency varied with environment from 2.8% in 1984 to 0.0% in 1986. These results indicate that while pedigreed natural crossing is a viable technique in Virginia, low crossing frequencies indicate that the minimum plot size for success is probably greater than  $11 \text{ m}^2$ . The occurrence of natural crossing rates as high as 2.8% indicate that isolation distances between seed fields may need to be greater than in current regulations, and multi-line cultivars need to be closely rogued for off-type plants during seed increase.

Use of Inbred Backcross Line Method in Peanut. J. C. WYNNE\*, M. K. BEUTE, C. T. YOUNG, W. V. CAMPBELL, D. M. PORTER and T. A. COFFELT, Depts. of Crop Science, Plant Pathology, Food Science and Entomology, N. C. State University, Raleigh, NC 27695 and USDA-ARS, Tidewater Research Center, Suffolk, VA 23437.

The Inbred Backcross Line Method (IBLM), originally proposed for use with the common bean (*Phaseolus vulgaris* L.), was evaluated for use with the peanut (*Arachis hypogaea* L.). The IBLM develops a population of near-homozygous lines through backcross to an adapted parent after an initial cross to an appropriate donor parent. After the last backcross, selfing by single seed descent produces the population of families among which selection is practiced. The resulting lines are similar to the recurrent parent for most traits but differ for traits of the donor parent. Five populations of lines were developed using a single recurrent parent and donor parents for earliness and sclerotinia blight resistance (Chico), yield and shelf-life (NC 7), early leafspot resistance (PI 109839), CBR resistance (NC 18229), and insect resistance (GP-NC 343). Breeding lines similar in phenotype to the recurrent parent but differing in traits from the donor have been developed from each cross. These lines have the potential to be released as new cultivars or can be used as components of multi-line cultivars. Our results suggest that the IBLM should be a useful procedure for peanut breeders.

Utilization of Chinese Peanut Germplasm in Variety Development.

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Twenty-two peanut (*Arachis hypogaea* L.) germplasm lines obtained from China in 1982 were evaluated under replicated field conditions for resistance to Sclerotinia blight (SB), caused by *Sclerotinia minor*, and leafspot (LS) caused primarily by *Cercospora arachidicola*. Two varieties, Florigiant (no resistance to SB or LS) and VA 81B (moderate resistance to SB but highly susceptible to LS) were used as reference checks. Most Chinese germplasm lines were susceptible to LS. Two germplasm lines, however, were significantly less susceptible to LS than Florigiant. At harvest, 16 Chinese germplasm lines exhibited significantly fewer symptoms of SB than VA 81B. These 16 germplasm lines averaged 3.0 to 7.5 "hits" per 40 ft. row while Florigiant and VA 81B averaged 24.5 and 17.0, respectively. The Chinese germplasm most susceptible to SB was the most resistant to LS. Pod yields of the 22 Chinese germplasm lines averaged 33% less than Florigiant and VA 81B. The Chinese germplasm lines with the highest value per acre was 6% less than the value of VA 81B. Protein content of the Chinese germplasm lines averaged 5% greater than Florigiant. Oil content was similar for all lines tested. Eight Chinese germplasm lines had better blanching characteristics (whole blanched percentage) than Florigiant or VA 81B. Oil quality (shelf-life) of most of the Chinese germplasm lines was not equal to that of VA 81B.

Breeding for Pod Rot Resistance: Progress and Problems. O.D. SMITH\*, S.M.

AGUIRRE, W.J. GRICHAR, and C.E. SIMPSON. Dept. of Soil & Crop Sci., Texas A&M Univ., College Station (77843); and Texas Agri. Exp. Sta., Yoakum (77995) and Stephenville (76401), Tx.

Germplasm evaluation, hybridization, field evaluation, and selection for agronomically acceptable, pod rot resistant breeding lines for release as cultivars have been effected in Texas for 15 years. Partial, but useful, resistance to *Pythium myriotylum* Drech. and *Rhizoctonia solani* Kuehn have been incorporated into productive, advanced generation, spanish and runner type breeding lines through modified bulk and single pod descent breeding. Dual selection for minimal pod disease in pathogen infested soil, high kernel percentage, and high yield have been required. Mis-classifications resulting from non-uniform inoculum, and macro- and micro-environmental variation in field nurseries have been persistent deterrents to progress. Multiple, replicated evaluations of advanced generation families have been required. Identification of segregates with grades equal to popular commercial cultivars and high levels of pod disease resistance has presented problems. Concurrent improvements among segregates in resistance to *Sclerotium rolfsii* Sacc., *Sclerotinia minor* Jagger, *Pratylenchus brachyurus* (Godfrey) Filip Sch. Stek, and possibly leafspot have been welcome by-products of the effort.

Resistance of an International Collection of Peanut Genotypes to Insects in

North Carolina, Philippines and Thailand. W. V. CAMPBELL\* (Dept. of Entomology, N.C. State Univ.), J. C. WYNNE (Dept. of Crop Science, N.C. State Univ.), MANOCHAI KEERATI-KASIKORN (Dept. of Entomology, Khon Kaen Univ., Thailand) SATHORN SIRISINGH (Dept. of Agriculture, Bangkok, Thailand), C. ADALLA (Dept. of Entomology, Univ. of Philippines) and E. P. CADAPAN (Dept. of Entomology, Univ. of Philippines).

An international collection of peanut germplasm was evaluated in North Carolina and Southeast Asia for resistance to a complex of insects. Ten experiments were conducted, four in Thailand, four in Philippines and two in North Carolina. Each test consisted of 250 genotypes with four replications. Each test was identical except for location and randomization. GP-NC343, a multiple insect resistant line, exhibited resistance to the complex of insects in North Carolina, Philippines and Thailand. Several crosses containing GP-NC343; viz., GP-NC343 x NC7 and GP-NC343 x NC17367, exhibited resistance to thrips, leafhopper and defoliators at all locations. Other genotypes were resistant to sucking insects or defoliators or pod borers at all or most locations. Fortunately, many of the same genera of insects are present on peanuts in North Carolina and Southeast Asia. Local cultivars, except NC6, were generally susceptible to the insect complex.

Genetic Control of Maturity in Peanut. C. C. HOLBROOK\*, C. S. KVIEN, and W. D. BRANCH, USDA-ARS, and Dept. of Agronomy, University of Georgia, Coastal Plain Exp. Stn., Tifton, GA 31793.

A cultivar's time requirement for full maturity is an important consideration in all peanut breeding efforts. The objective of this study was to examine the genetic control of maturity.  $F_1$  and  $F_2$  plants from reciprocal crosses involving Chico, an early maturing peanut, and PI 383421, an extremely late maturing peanut, were examined under field conditions at Tifton, Georgia. The hull-scrape procedure was used to determine optimal harvest dates for individual plants. No reciprocal differences in maturity were observed indicating predominant control by nuclear genes. The  $F_1$  hybrids all matured similar to PI 383421 which suggests dominance for lateness. However, based on considerations of the distribution and variances of  $F_2$  families, maturity appears to be under the control of four to six genes with a tendency towards earliness. Broad sense heritability indicated that greater than 90 percent of the variance exhibited in the  $F_2$  was of genetic origin.

Inheritance of a Lethal Seedling Trait in *Arachis hypogaea* L. D. J. BANKS, USDA-ARS, Plant Science Research Laboratory, Stillwater, OK 74076.

A peculiar peanut plant with narrow leaflets (different from previous narrow leaf reports) was discovered in a field plot planting of 'Dixie Spanish' peanuts at the Perkins Agronomy Research Station in 1968. In addition to possessing narrow leaflets, the plant was glabrous and expressed an abnormal bluish-green color. Because the plant appeared to be somewhat seed sterile, it was propagated in the greenhouse by rooted cuttings. When planted, seeds from the cuttings segregated into normal, lethal, and intermediate seedling classes. The lethals died within a few weeks of germination, whereas the intermediates, although smaller than normals, survived and produced some seeds. Later, hybrids were produced by utilizing the intermediate genotypes as pollen donors onto 'Spanhoma' and 'NC4X' females. Still later, by employing an innovative grafting technique, it was possible to utilize pollen from a lethal genotype to achieve hybrids with the cultivar 'Comet'. Subsequent studies showed that the lethal seedling trait is conditioned by a single gene with genetic ratios of  $\frac{1}{4}$  normal,  $\frac{1}{2}$  intermediate, and  $\frac{1}{4}$  lethal. This lethal trait, not previously reported for *A. hypogaea*, is somewhat analogous to a similar trait appearing in some interspecific hybrids in the genus. Preliminary studies suggest that the trait may interfere with nitrogen assimilation. The symbol "le" is proposed for the lethal allele.



Inheritance of Symbiotic Nitrogen Fixation in Two Peanut Crosses. T. D.

PHILLIPS\*, J. C. WYNNE, T. J. SCHNEEWEIS and G. H. ELKAN, Depts. of Crop Science and Microbiology, N. C. State University, Raleigh, NC 27695.

Improvement in the symbiotic nitrogen fixing ability of peanut (Arachis hypogaea L.) requires a knowledge of the inheritance of the traits involved in the process. A generation means analysis for two crosses using parents, the F<sub>1</sub> and F<sub>2</sub> generations, and the two backcrosses was conducted in the greenhouse to estimate mean, additive, and dominance effects. The parents Robut 33-1, Argentine, and NC 4 were selected to represent diversity in origin and diversity in response to the Bradyrhizobium strain, NC92. Except for nitrogenase activity in the cross of Robut 33-1 x Argentine, the additive-dominance model did not fit the data. The data still did not fit the additive-dominance model when changes of scale using the log and square-root transformations were used. Our results suggest that dominance and epistatic variances are important in the inheritance of nitrogen-fixing traits (nodulation, plant weight, nitrogenase activity).

Inheritance of Morphological Traits in Peanut (Arachis hypogaea L.). N. B.

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Morphological traits are useful tools to peanut taxonomists and geneticists. With the exception of growth habit, few morphological traits have been studied with reciprocal crosses in peanut. The objective of this project was to study the inheritance of growth habit, stem color, nodulation and leaflet size with reciprocal crosses. A diallel design with Argentine, T2442 and Arachis monticola Krap. et Rig. was used. Analysis of F<sub>2</sub> progenies suggest: 1) that growth habit and nodulation may be determined by four and three genes in peanut, 2) that purple pigmentation and green pigmentation are two distinct traits determined respectively by at least one gene, and two duplicate genes, 3) that leaflet size may be quasi-quantitatively determined in peanut, 4) that relationships between extra-nuclear factors and nuclear genes may be epistatic and/or additive for growth habit, stem color and leaflet size, and 5) that extra-nuclear factors may influence relationships among traits.

Diallel Cross Analysis of six Peanut Cultivars in the F1 and F2 Generation.

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Six peanut cultivars (Florigiant, Florunner, Virginia Bunch 67, Spanish Starr, 15607 and Valencia A.) and their 15 F1 diallel hybrids were evaluated in Maracay (Venezuela) in 1984. The variation for general combining ability (GCA) was significant for all nine traits, including fruit and seed yield and meat content, but specific combining ability (SCA) was not significant for any characteristic. Virginia Bunch 67 showed the highest GCA effect for all traits but meat content. The F2 generation of the diallel and the parents were planted in two locations in the eastern plains of Venezuela (1985). A high proportion of empty fruits, due possibly to calcium deficiency was observed in location 2. GCA variation was significant for all traits in both environments, while SCA was significant only for fruit length and seed weight in location 1 and for fruit weight in location 2. Florigiant in location 1 and Florunner in location 2 had the highest GCA effects. Fruit length was the only trait not associated with fruit and seed yield and meat content in both tests. There were significant correlations between parents and crosses for fruit yield in both locations.

# Entomology

Effect of Monocrotophos on Thrips Population, Yellow Spot Virus and Peanut Yield. Sathorn Sirisingsh\* and Srisamorn Pitak, Entomology and Zoology Division, Department of Agriculture, Bangkok, Thailand.

Several species of thrips including Frankliniella Schultzei (Trybom), Caliothrips indicus Bagnall and Scirtothrips dorsalis hood infest peanut but only on rare occasions cause economic loss. They are more important as vectors of several virus diseases. Only S. dorsalis, however, has been reported transmitting peanut yellow spot virus (PYSV). Monocrotophos applied five times at 0.2, 0.1, 0.05, and 0.025 kg/ha at two week intervals when plants were 40 days old resulted in a significant reduction in thrips population and virus disease. Specifically, thrips were reduced from 120 individuals to 20 individuals per 20-hill sample, the incidence of PYSV was reduced and peanut yield was increased 20 percent when monocrotophos was applied for thrips control.

Entomopathogens for Suppression of Lesser Cornstalk Borer. M. E. GILREATH\* and J. E. FUNDERBURK, Dept. of Entomology & Nematology, N. Fla. Res. & Educ. Ctr., Quincy, FL 32351.

The fungal pathogen Beauveria bassiana and the bacterium Bacillus thuringiensis have shown in laboratory bioassays to be virulent at relatively low rates to larvae of the lesser cornstalk borer (LCB), Elasmopalpus lignosellus. Exposure of 1st stage larvae to B. bassiana (RS-252 isolate, Abbott Laboratories) on leaf disks resulted in ca. 30% mortality at a concentration of  $1.8 \times 10^4$  CFU/cm<sup>2</sup> of leaf surface, ca. 75% mortality at  $1.8 \times 10^6$  CFU/cm<sup>2</sup>, and ca. 95% mortality at  $1.8 \times 10^8$  CFU/cm<sup>2</sup>. Four of thirteen isolates of B. thuringiensis (HD-1, HD-241, HD-246, and HD-263) resulted in at least 40% mortality at a rate of 0.44<sub>2</sub>ug  $\delta$ -endotoxin/cm<sup>2</sup> of leaf surface, 50% mortality at 0.88 ug  $\delta$ -endotoxin/cm<sup>2</sup>, and 90% mortality at 4.4 ug  $\delta$ -endotoxin/cm<sup>2</sup>. Six B. thuringiensis isolates (HD-84, HD-123, HD-232, HD-248, HD-269, and HD-525) were less virulent and the remaining three (HD-34, HD-184, and HD-501) were only mildly pathogenic to LCB 1st instars. Feeding and development were inhibited in larvae treated with B. thuringiensis but not with B. bassiana.

Evaluation of Chlorpyrifos-Methyl As a Protectant of Farmers' Stock Peanuts.

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Farmers' stock peanuts were treated with 10, 15, 20 and 30 ppm chlorpyrifos-methyl (CM) and a 52 ppm malathion standard, infested with several common stored-peanut insect pests and held for 12 months. Samples were taken at 2, 4, 6, 9, and 12 months to determine insecticide efficacy. Few damaged kernels or live insects were found in the CM treatments after 12 months of storage. In contrast, neither damaged kernels nor live insects in the malathion-treated peanuts differed from untreated controls after 6 months. CM residues on in-shell peanuts were ca. 30-35% of the control rates after 6 months.

# Harvesting, Storage, Handling and Marketing

## Screening Runner-Type Farmers Stock Peanuts before Storage. J. W. DICKENS\* and

J. I. DAVIDSON, JR., USDA-ARS, North Carolina State University, Raleigh, NC 27695 and National Peanut Research Laboratory, Dawson, GA 31742.

A 1246-kg sample considered to be representative of runner-type peanuts marketed in Alabama and Georgia during the fall of 1979, was separated into 7 size categories by passing it over counter-rotating, parallel rollers spaced 12.70, 11.11, 9.52, 7.94, 6.35 and 4.76 mm apart. The material in each size category was then separated into pods, shelled kernels (LSK) and 6 different types of foreign material (FM). The data indicate that the 9.52-mm (3/8-inch) roller spacing effectively separated the mature pods from most of the LSK and troublesome FM such as small stones, dirt clods, pieces of glass, corn kernels, soybeans and immature pods. The LSK which passed through the 9.52 mm roller spacing were sized over grading screens each of which contained openings with one of the following dimensions: (A) 6.75-mm (17/64-inch) round, (B) 5.56 x 19.05-mm (14/64 x 3/4-inch) slot, (C) 6.35 x 19.05-mm (16/64 x 3/4-inch) slot, (D) 7.14 x 19.05-mm (18/64 x 3/4-inch) slot, (E) 8.33 x 19.05-mm (21/64 x 3/4-inch) slot. The total percentages of damage plus minor defects in the split kernels that were retained by screen A and the whole kernels that were retained by screens B through E were 25%, 11%, 10%, 6% and 4%, respectively. The high percentages of damage plus minor defects in the LSK indicate that the edible quality of shelled peanuts would be improved by diverting LSK to non-food use. In addition, previous studies have indicated that LSK usually contain more aflatoxin than the other kernels in farmers stock peanuts. Removal of FM from farmers stock peanuts prior to storage would help reduce the amount of FM in shelled peanuts.

## Modeling Quality in Bulk Peanut Drying. J.M. TROEGER, USDA-ARS, Coastal Plain Exp. Sta., Tifton, GA 31793.

A bulk peanut drying model, which simulates changes in moisture content in response to the temperature and humidity of the drying air, was modified to indicate conditions which affect peanut quality. Mold growth and mycotoxin production were simulated by indicating when conditions in each layer exceeded 85% relative humidity. Milling quality was simulated by marking relative humidities below 45%. Cumulative time for each of these conditions was determined with various levels of ambient temperature, initial moisture, air flow rate and temperature rise. The results show that dryer operating conditions must be carefully chosen to maintain a satisfactory level of each quality factor. The program is being used to identify drying regimes that give optimum quality, energy use and drying time for given ambient and peanut moisture conditions.

Storability of Farmers Stock Peanuts at Two Moisture Levels in Mechanically and Naturally Ventilated Miniature Warehouses. J. S. SMITH, JR.\* and T. H. SANDERS, USDA-ARS, National Peanut Research Laboratory, Dawson, GA 31742.

Farmers stock peanuts from the same field dried to 8 and 10 percent kernel moisture contents were stored for 6 months in mechanically and naturally ventilated miniature metal warehouses. The warehouses were 1/10 the physical size of conventional warehouses. Temperatures and relative humidities within the peanut masses were monitored at 2-hour intervals throughout the storage period. The ingoing temperatures for the 8 percent initial moisture content peanuts were about 2 to 3 C higher than those for the 10 percent initial moisture content peanuts. This differential was maintained until early February. Relative humidities within the warehouses were about 10 points higher in the 10 percent initial moisture peanuts until early January when they tended to equalize. Final moisture contents in the mechanically ventilated warehouses were about 7 percent compared to about 7.5 percent in the naturally ventilated warehouses. Peanuts were analyzed before and after storage to determine the changes in carbonyl contents, free fatty acids, and aflatoxin in the various seed size categories. Only small changes in total carbonyls and free fatty acids occurred during storage in the warehouses. No aflatoxin was detected in any seed size category before or after storage. First year's results indicated that quality can be maintained during storage of farmers stock peanuts entering storage at 10 percent or less moisture content in a properly constructed and operated mechanically or naturally ventilated warehouse.

Peanut Quality Evaluation Using the Alcohol Meter. H. E. PATTEE\*, J. W. DICKENS, J. A. SINGLETON, and A. B. SLATE, USDA, ARS, North Carolina State University, Box 7625, Raleigh, NC 27695-7625.

The relationship between the concentration of alcohols and aldehydes in the headspace volatiles of ground, raw peanuts and sensory quality is well established. Practical utilization of this knowledge became possible with the development of a chemical test and then an electronic meter, commonly known as the "alcohol meter". The alcohol meter has a sensitive and rapid response, is simple and economical to operate, and has excellent adaptability to the Federal-State Inspection Service peanut grading system. Using peanut grading check samples the relationship between roasted peanut sensory quality and alcohol meter readings from ground, raw peanuts has been investigated. Our findings from a two-year survey suggest that approximately 20 percent of the annual U.S. peanut crop may be at least marginally affected by inferior sensory quality. Use of the alcohol meter at the first point of sale of peanut lots, i.e. the peanut buying stations, to evaluate these lots and divert those peanut lots with inferior sensory quality could improve the overall sensory quality of the U.S. peanut crop.

Peanut Demand Estimates and Consumers' Costs of the Peanut Program

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Knowledge of peanut demand relationships is important to government and industry. Government economists use price and income elasticity estimates to forecast domestic food use which in turn contributes to determining the peanut program quota level. Peanut processors can use the same information to make marketing and pricing decisions. This study estimated demand relationships for peanuts and for primary peanut products using data from 1962-1985. Hypothesized negative price elasticities and positive income elasticities were found. Price elasticities differed by product, ranging from -.06 for peanut butter to -.60 for roasting stock peanuts. Estimated consumer costs of the U.S. peanut program vary directly with the absolute value of the price elasticity.

An Analysis of the Need for and Acceptance of Different Methods for Marketing

Peanuts. D. H. CARLEY\* and S. M. FLETCHER, Dept. of Agricultural  
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Even with the price support program for farmers' stock peanuts, prices received by farmers for their peanuts as well as prices for shelled peanuts vary substantially within a crop marketing year. An analysis of price variability occurring in dry weather markets as in 1980 and 1986, tight supply-demand conditions for domestic edible peanuts, a world market that tends to buy up to 400,000 tons of U.S. peanuts at relatively good prices, and increasing concentration of both buyers of farmers' stock peanuts and processors of shelled peanuts indicates problems with competitive pricing and price equity. Peanuts are sold on a cash basis or with one-on-one forward contracting. There is no mechanism to provide sellers and buyers the opportunity to hedge their position nor is there an adequate communication process that provides opportunities for market participants to obtain adequate price information and to "shop" around. An analysis of the acceptance of a futures market, open forward contracting, computers as marketing facilitators and farmer peanut marketing cooperatives implies there are viable alternatives. The analysis further shows the differences in opinions concerning who should own and operate such marketing systems, and concerns about the grading system and information sources. Statistical techniques show significant differences among the market participants, thus pointing to some of the problems and opportunities for introducing changes in marketing methods that could improve pricing efficiency.

## Pathology and Mycotoxins

Activity of Diniconazole on Foliar and Soilborne Peanut Pathogens In Vivo and In Vitro. T. B. BRENNEMAN\*, A. S. CSINOS, and R. H. LITTRELL. Dept. of Plant Pathology, Coastal Plain Exp. Stn., Tifton, GA 31793.

Diniconazole (XE-779) was found to be very efficacious against *Cercosporidium personatum* (Berk. & Curt.) Deighton, *Sclerotium rolfsii* Sacc., and *Rhizoctonia solani* Kuhn in the field and laboratory. In vitro studies with *C. personatum*, which causes late leafspot of peanut, showed that 100 µg/ml did not inhibit conidial germination but that 0.01 µg/ml significantly reduced subsequent growth and sporulation. Diniconazole concentrations of 0.003 and 0.21 µg/ml inhibited mycelial growth by 50% (EC<sub>50</sub>) for *S. rolfsii* and *R. solani*, respectively. PCNB EC<sub>50</sub> values for *S. rolfsii* and *R. solani* were 1.11 and 9.53 µg/ml, respectively. In the field, diniconazole controlled peanut leafspot as well as the industry standard, chlorothalonil. Disease symptoms of both *S. rolfsii* and *R. solani* were reduced and yields increased significantly by applying cumulative rates of 0.25 to 0.49 kg a.i./ha of diniconazole.

Disease Assessment and Growth Analysis to Estimate Quantitatively the Effect of Cercospora Leafspot on the Growth of Florunner Peanut. G. BOURGEOIS\* and K. J. BOOTE, Dept. of Agronomy, University of Florida, Gainesville, FL 32611.

The objective of this study was to collect data on *Cercospora* leafspot disease progression in order to develop a mathematical disease progress simulator that will be coupled to a peanut growth simulator, PNUTGRO. Disease progress was assessed weekly with two techniques: 1) non-destructive sampling to estimate disease progression on individual tagged leaves (i.e. from leaf appearance to leaf abscission for twelve leaf age classes), and 2) destructive sampling to estimate defoliation and necrotic area proportion on plants selected for growth analyses. Necrotic area proportion was obtained by counting the number of lesions on the leaflets and by comparing these to a standard leafspot diagram. Disease was first observed 70 days after planting (DAP) for Florunner planted June 2. Growth analysis parameters were obtained from two treatments (good disease control and no disease control). We observed differences in leaf area index (LAI), and crop dry matter accumulation after 85 DAP, and in specific leaf area, pod yield, and seed yield after 113 DAP. At this time, the LAI of the no disease control treatment was lower than 2 compared to 8 in the good disease control treatment.



Influence of Chlorothalonil Applied in Irrigation Water on Yield and Foliage Residue. R. H. LITTRELL. Dept. of Plant Pathology, Coastal Plain Exp. Stn., Tifton, GA 31793.

A quadrant in 0.4 ha center-pivot system was used to establish four-row plots of Florunner peanuts (4.3 x 9.1 m). Chlorothalonil was applied with (1) a conventional ground sprayer, (2) irrigation water (no traffic), and (3) irrigation water (with traffic). Fungicide was applied seven times in 96 l of spray per ha with the ground sprayer and in 4 mm of water with the center-pivot system. Pod yields were increased and leafspot diseases were reduced in all fungicide treated plots. There was a 675 kg/ha increase in pod yield in two (no traffic) versus three (traffic) resulting in approximately \$480 increase in return per ha. Chlorothalonil residue was significantly greater in peanut foliage from ground spray application. These results tend to explain the increase in peanut yield when fungicides are applied in the irrigation water.

Incidence, Severity and Defoliation Relationships Between Central and Branch Stems of Florunner Peanut Infected With Late Leafspot. F. W. Nutter, Jr.\* and S. C. Alderman. Dept. of Plant Pathology, University of Georgia, Athens, 30602.

Late leafspot assessment systems in the southeast generally utilize central stems as the population to be sampled and assessed. As sampling units, central stems are easily identifiable but they are not as determinant in their growth habit as lateral branch stems. Lateral branch stems contribute the bulk of the photosynthate which is converted to pod yield and assessment of these stems should provide a better indication of pod yield (or loss). Since disease assessment systems should be fast, accurate, reliable, and highly correlated with yield, we hypothesized that main lateral branch stems would be a better population to sample than central stems. To test this hypothesis, we compared incidence (number of infected leaflets/total number of leaflets per stem), severity (lesion area/total leaf area), and defoliation number of leaflets missing/total number of leaflets) on paired branch and central stems collected from the same plant. Samples were collected from seven different levels of leafspot intensity which were created by using a range of chlorothalonil active ingredient concentrations in a randomized complete block design with 4 replications. Central stems averaged 20 nodes and took 30% longer to assess than branch stems (average of 13 nodes). Incidence, severity and defoliation of branch stems (X) were each regressed against central stems (Y) resulting in the following equations:

Y(Incidence)	= -11.1 + 0.99 X (incidence)	R <sup>2</sup> =92.4%
Y(Severity)	= -6.3 + 0.65 X (severity)	R <sup>2</sup> =91.3%
Y(Defoliation)	= -7.1 + 0.63 X (defoliation)	R <sup>2</sup> =89.5%

The regression coefficient relating incidence on branch stems to incidence on central stems (0.99) indicates that incidence of branch stems is equivalent to the incidence on corresponding central stems. Regression coefficients for severity (0.65) and defoliation (0.63) indicate that sampling and evaluating central stems underestimates the impact of late leafspot on branch stems which may be important when evaluating disease control tactics.

Sporulation of *Cercospora arachidicola* - A Major Component of Early Leafspot Disease Forecasting. S. C. Alderman\* and F. W. Nutter, Jr., Department of Plant Pathology, University of Georgia, Athens, GA 30602.

Aeromycology of *Cercospora arachidicola* Hori was studied in North Carolina (1985) and in Georgia (1986). Burkard 7-day recording volumetric spore traps were used to monitor spore densities of *C. arachidicola*. Temperature and relative humidity (RH) values were obtained using hygrothermographs. A sporulation prediction model, based on three-day running averages of hours of humidity greater than 90%, average hourly temperature during each high RH period, and rainfall, was derived from 1985 data. The model provided accurate, quantitative estimates of spore release in North Carolina on Florigiant and we found it also accurately predicted spore release under Georgia conditions on Florunner. A sporulation index was derived from the model. Cumulative sporulation index values were plotted along with cumulative index values derived from the Jensen and Boyle early leafspot model and compared with disease progress data. Both prediction models paralleled disease progress, suggesting that sporulation in *C. arachidicola* is an important component of the Jensen and Boyle model. The sporulation model may be useful in developing a simulation model for *C. arachidicola* or in developing a disease forecasting model based upon a mechanistic approach.

Components of Resistance to Late Leafspot in Peanut (*Arachis hypogaea* L.).

Z. A. CHITEKA\*, D. W. GORBET, D. A. KNAUPT, F. M. SHOKES, T. A. KUCHAREK and A. J. NORDEN, University of Florida, Gainesville, FL 32611. Late leafspot, caused by *Cercosporidium personatum* (Berk. and Curt. Deighton), reduces yields in peanuts annually in the U. S. Breeding for resistance to leafspots is the most economical and environmentally safe long-term answer to leafspot control in peanut. One hundred and sixteen genotypes, including breeding lines, plant introductions, and cultivars, were screened for components of resistance to late leafspot in greenhouse and field studies during the summer of 1986. The components of resistance that were evaluated included lesion number, lesion size, percent leaf necrotic area, incubation period, latent period and sporulation. Significant differences among genotypes were found for all components in at least one test. The more resistant lines had both longer latent periods and reduced sporulation. UF 81206-1, UF 81206-2 and PI 203396 were among the most resistant genotypes.

Effect of Planting Date, Seeding Rate, Growth Regulator and Fungicide on Sclerotinia Blight of Peanut. P. M. PHIPPS. Tidewater Agricultural Experiment Station, VPI&SU, Suffolk, VA 23437.

The effect of crop management strategies on Sclerotinia blight of Florigiant peanut was evaluated at field sites in Southampton Co., Surry Co., and Suffolk, Virginia. Main plots consisted of two planting dates (23-25 Apr, 14-15 May) and two seeding rates (70 lb/A, 140 lb/A). Subplots consisted of treatments with Kylar 85W, Rovral 50W, Kylar 85W and Rovral 50W, and an untreated check. Kylar 85W treatments were applied at 1 lb/A when plants in adjacent rows were 6 inches from touching in row middles, followed by 0.5 lb/A 4 to 6 weeks later where necessary to suppress heavy vine growth. Rovral 50W treatments were applied at 2 lb/A when disease was first detected, and subsequently at 4 week intervals according to label instructions. Disease appeared first in early plantings at all three locations, and incidence was initially greatest where the high seed rate was used. Disease incidence at harvest was equally high in all plots not treated with Rovral, regardless of planting date or seeding rate. A split-plot analysis of disease and yield data indicated that Rovral was the only input that gave significant ( $P=0.01$ ) disease suppression. At each location where Rovral was used, the late planted plots received one less application than early planted plots due to the delay in disease appearance. Kylar treatments resulted in significant suppression of plant canopy height at all locations, but had no effect on disease incidence. Mean disease incidence for all subplots at harvest was 50, 34, 35 and 50 foci per plot (two, 40-ft rows) in the Kylar treated, Rovral treated, Kylar/Rovral treated, and the untreated, respectively. Yields averaged 2049, 2781, 2884 and 1814 lb/A in the Kylar treated, Rovral treated, Kylar/Rovral treated, and the untreated, respectively.

In vitro Suppression of Sclerotinia minor with Metolachlor. K. E. Woodard, C. E. Simpson\*, and T. A. Lee, Jr., Texas A&M University Research and Extension Center, Stephenville 76401.

Sclerotinia blight caused by the fungus Sclerotinia minor was diagnosed during the harvest of 1986 in a peanut breeding nursery at the Texas Agricultural Experiment Station - Stephenville. This is the first report of Sclerotinia blight on peanut in Erath Co. Texas. In an attempt to determine if routine chemical application was altering the soil microflora where the disease was located, in vitro tests were conducted using gypsum, chlorothalonil, and metolachlor. Equivalent rates for gypsum (0.5, 1.0 T/A), chlorothalonil (1.0, 2.0, 4.0 pt/A) and metolachlor (0.5, 1.0, 2.0 pt/A) were incorporated into potato dextrose agar (PDA). Nonamended PDA was used as a check. S. minor and three fungi isolated from S. minor sclerotia (Aspergillus sp., Gliocladium sp., Trichoderma sp.) were used in the tests. Radial growth of fungal colonies was measured every 24 hours for 96 hours.

The results were essentially the same for all fungi tested with gypsum either slightly enhancing growth or being not significantly different ( $P \leq 0.05$ ) from the check. All rates of chlorothalonil were significantly lower than the check and rates of metolachlor were significantly lower than chlorothalonil.

### Spatial and Temporal Aspects of *Cylindrocladium* Black Rot Disease

Progress in Peanut. A. K. CULBREATH\* AND M. K. BEUTE.

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Three new peanut (*Arachis hypogaea* L.) genotypes, NC 18414, NC 18416 and NC 18417; *Cylindrocladium* Black Rot (CBR) susceptible cultivar, Florigiant; moderately-resistant cultivar NC 8C; and highly-resistant genotypes, NC 3033 and NC 18016 were evaluated in a field experiment designed to determine the effects of peanut genotype and *Cylindrocladium crotalariae* (Loos) Bell and Sobers inoculum density on CBR disease progress. Crop rotation and observation of previous CBR incidence were used to divide the field into quadrants with different average *C. crotalariae* inoculum levels. Soil samples from each plot were assayed prior to planting for inoculum density estimation, and each genotype was assigned to plots in a wide range of inoculum densities. Disease progress was monitored in each plot. Disease incidence and area under the CBR disease progress curves were used for comparison of genotypes. NC 18416 and NC 18417 had performance comparable to that of currently used moderately-resistant cultivar, NC 8C. NC 18417 appears to be the best candidate for release. NC 18414 performed only slightly better than Florigiant. Significant correlations between initial inoculum densities of the pathogen and AUDPC's were obtained for all genotypes except NC 3033. NC 18417 appears to respond more drastically to increases in inoculum density than does NC 8C though their overall performances were comparable.

### Inducing Suppression to *Cylindrocladium* Black Rot in Field Soil through Crop

Rotation. J. R. SIDEBOTTOM\* and M. K. BEUTE, Plant Pathology Department,  
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*Cylindrocladium* black rot (CBR) severity in peanuts (*Arachis hypogaea* L.) is affected by the previous cropping history of the field. In microplots it was demonstrated that both inoculum density and CBR severity were lower when peanuts followed corn (*Zea mays* L.), a non-host to the pathogen *Cylindrocladium crotalariae* (Loos) Bell & Sobers, than when peanuts followed peanuts. CBR severity was also reduced following soybeans (*Glycine max* L.) even though the inoculum density was as high as following peanuts. In the present study, eight different three-year rotations involving peanut, corn and soybeans were established to determine the effect of cropping history on CBR incidence in the moderately-resistant peanut cultivar, NC 8C. In 1984 and 1985, CBR incidence exceeded 40% in peanuts and was evident as perithecia on soybeans. In 1986, CBR incidence averaged 21.1%. Inoculum densities were similar in all rotational treatments (average 3 microsclerotia/g soil) but were not correlated with CBR incidence in plots. Incidence was lowest in plots where corn had been planted two years previously (15%) and highest in plots where peanuts had been grown in 1985 and either corn or soybeans in 1984 (29% and 27% respectively). However, if peanuts followed more than one year of peanuts, CBR incidence was reduced (19%). In rotations where peanuts followed soybeans, CBR incidence was also reduced (16%). These data indicate that continuous peanuts and soybeans planted the year previously to peanuts will reduce CBR incidence in NC 8C peanuts.

Infection of Peanut by *Aspergillus niger*. S. S. ABOSHOSHA, H. A. MELOUK\*, D. H. SMITH and P. F. LUMMUS. Dept. of Plant Pathology, College of Agriculture, Alexandria, Egypt; USDA-ARS, Dept. of Plant Pathology, Oklahoma State University, Stillwater 74078-0285; Texas Agricultural Experiment Station, Yoakum, TX 77993, and Texas Agricultural Extension Service, Pearsall, TX 78061.

*Aspergillus niger* was isolated from the crown of peanut cv. Florunner (at near maturity) grown in a field in Atascosa County, Texas. Affected plants exhibited light green to chlorotic foliage, leaf flaccidity, and wilting. The majority of diseased plant crowns exhibited hypertrophy, brown discoloration of the stele, and corky texture of crown and root tissues. No reports have been found in the literature relating these symptoms to infection by *A. niger*. Crowns of infected plants collected from the field were subjected to cyclic moist and dry conditions at  $25 \pm 1$  C under continuous light (800 lux), after which black conidial masses of *A. niger* formed on the crown. The conidial masses were surface sterilized with 0.5% sodium hypochlorite for five seconds, then transferred to Czapek-Dox agar. Hypocotyls of peanut cultivars Tamnut 74, Pronto, Giza 3 and line OK-FH15 were inoculated by injecting 0.1 ml of conidial suspension ( $10^6$  conidia/ml) into an incision (2 mm long) made with a needle. Hypocotyls were then placed on moist filter paper in petri dishes (9 cm), and incubated at  $28 \pm 1$  C in darkness. After 6 days of incubation lesions bearing abundant conidia of *A. niger* had developed on the hypocotyls. All peanut entries tested were susceptible to this isolate of *A. niger*.

A Virus Causing Top Paralysis of Peanut. E. E. WAGIH, H. A. MELOUK\* and J. L. SHERWOOD. Dept. of Plant Pathology, College of Agriculture, Alexandria, Egypt, and USDA/ARS, Dept. of Plant Pathology, Oklahoma State University, Stillwater, OK 74078-0285.

A virus was isolated from a wild peanut growing in the greenhouse at the USDA-ARS, Stillwater, Oklahoma. Symptoms on the wild plant were restricted to a few leaves as green patches in a light green to yellow background. Some leaflets lost most of the basal part of the laminae which resulted in the top portion of leaflets rolling upwards and forming a cone. The virus was transmitted mechanically to cultivated peanut (*Arachis hypogaea* L.) and caused stunting, rosetting, and severe malformation of leaves with reduction of leaflet laminae, resulting in a spindly appearance of the plant. The terminal bud also ceased to grow (top paralysis). This virus differed in symptomology, host range, and/or serological reactivity from other known peanut viruses, particularly those causing leaf malformation and stunting. The virus induced necrotic local lesions on *Phaseolus vulgaris* 'Topcrop', and chlorotic local lesions bordered by intense red color on *Chenopodium amaranticolor*. In both PAS-ELISA and Ouchterlony double immunodiffusion tests, the virus did not react with antisera against brome mosaic virus, bean yellow mosaic virus, peanut stripe virus, potato virus Y, tobacco mosaic virus, watermelon mosaic virus 1 and 2, wheat soilborne mosaic virus, wheat streak mosaic virus, zucchini yellow mosaic virus, pea streak mosaic virus, and cucumber mosaic virus. However, it did cross-react with antiserum of an isolate of peanut mottle virus from Oklahoma.

Evaluation of Peanut Genotypes for Peanut Stripe Virus (PSTV) Infection using ELISA and Dot-blot Immunobinding Assay.

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A dot-blot immunobinding assay and three variants of ELISA, the direct double antibody sandwich (DAS-ELISA), Protein-A ELISA, and an indirect ELISA using F(ab')<sub>2</sub> fragments were compared for detecting PSTV infection in two peanut cultivars, NC7 and Tainan 9. Highly purified PSTV was used for antiserum production. Whole IgG was used for both DAS-ELISA and Protein A ELISA. F(ab')<sub>2</sub> fragments of IgG were utilized for the indirect ELISA and the dot-blot assay. Alkaline phosphatase-protein A conjugate was used as the second antibody for Protein A and indirect ELISA while alkaline phosphatase goat anti-rabbit conjugate was used for the dot-blot assay. Dot-blot assay proved to be more sensitive than the three ELISA methods, however, indirect ELISA using fragments appeared to be more suitable for quantitative assay. A study on virus accumulation on eight peanut genotypes was conducted to determine possible quantitative resistance to the virus. Using the indirect ELISA, virus titer was measured on both inoculated and systemically-infected leaves. Results showed no differences in virus accumulation among the eight genotypes.

Reaction of Peanut Genotypes to the Rosette Virus and Its Vector Aphis

craccivora Koch. S. M. MISARI<sup>1</sup>, O. A. ANSA<sup>1</sup>, J. W. DEMSKI<sup>2</sup>, C.

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Population dynamics of the cowpea aphid, Aphis craccivora Koch., were studied on several peanut (Arachis hypogaea L.) cultivars in randomized complete block experiments in the field in Nigeria. The different life stages of the cowpea aphid were counted weekly on each of the peanut cultivars. Presence of natural enemies (Coccinellidae and Syrphidae) of the aphids and the groundnut rosette disease development in peanut plants were also recorded weekly in each of the peanut cultivars. Nymphal populations of A. craccivora were consistently higher than those of alate and apterous aphids in the first weeks after planting in all varieties. Total aphid population peaks were attained during the fourth and fifth weeks after planting and cultivars did not significantly influence population numbers. After the fifth week, aphid populations declined and resident aphids were not observed after the eleventh week. Natural enemy populations attained their peak one week after the aphid population had reached their maximum limit and disappeared one week after the aphids were gone. This seems to indicate the relationship between natural enemies and aphids is density dependent. Incidence of groundnut rosette varied widely with the cultivar. Two of six cultivars were resistant to rosette even though aphid colonization was similar to susceptible cultivars. The resistance mechanism is likely to be against the virus and not to the vector.

TOMATO SPOTTED WILT VIRUS on Peanuts in Senegal? J. DUBERN, C. HUGUENOT and M. DOLLET\*, LPRC (Laboratoire de Phytovirologie des Régions Chaudes), CIRAD-INRA-ORSTOM, CIRAD, BP 5035, 34032 Montpellier Cedex (France).

Symptoms described in the literature as being typical Tomato Spotted Wilt Virus (TSWV) symptoms found on peanuts in other continents have been observed in Senegal: ring pattern, ringspot, chlorosis, chlorotic spot, line pattern, leaf distortion. To date it has been impossible to transmit these symptoms mechanically from peanut to peanut or other known host plants. Only grafting enables transmission of symptoms. An ELISA test using an antiserum against a TSWV strain originating from Brazil and multiplied several years in Dr Peters' laboratory (Wageningen / The Netherlands), gave a positive reaction only once on 30 tests developed. Nonetheless, the observation of thin sections in electron microscopy could make it possible to detect particles resembling TSWV described in literature. Although it would appear that TSWV occurs in Senegal, standard techniques used to characterize this virus do not always seem to be suitable to this strain.

Tomato Spotted Wilt on Peanuts in Alabama. A. K. HAGAN\*, J. R. WEEKS, R. T. GUDAUSKAS, W. S. GAZAWAY, and R. SHELBY. Auburn University, AL 36849.

Peanut plants displaying typical symptoms of infection by tomato spotted wilt virus (TSWV) were found in 51 of 54 fields surveyed in 1986 in the nine major Alabama peanut producing counties. Identity of TSWV was confirmed by enzyme-linked immunosorbent assay. Average disease incidence within field and county-wide incidences of 3.1% and 1%, respectively, occurred in Covington County. Generally, highest disease incidence and severest symptoms, i.e. stunting, reduced pod set, and seed coat mottling, were seen in peanuts under irrigation. Very few plants showing symptoms of TSWV were seen in fields that had been under severe moisture stress throughout the summer. Chlorotic ringspotting and/or mottling of leaflets, and shortening of terminal internodes were often the only symptoms found in these fields. This is the first confirmed report of TSWV-infection of peanuts in Alabama.

Spotted Wilt and Rust Reactions in South Texas Among Selected Peanut Genotypes.

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Spotted wilt, a new peanut disease in South Texas caused by tomato spotted wilt virus (TSWV), reduced yields in 1984, 1985 and 1986. Thrips insects are vectors for TSWV. Rust, caused by *Puccinia arachidis* Speg., occurs every year and often necessitates extra fungicide applications. Spotted wilt was more damaging than rust in these tests. Resistance in peanut to spotted wilt has been attributed to nonpreference by thrips. A total of 52 genotypes in three replicated tests were observed for disease reactions in one field in Frio County, TX in 1986. An additional 358 lines were observed in unreplicated plots. Seeds were obtained from breeding programs in the U.S.A. (TX, NC, FL, OK) and India (ICRISAT). Florunner, GP-NC 343 and Robut 33-1 were intermediate in reaction to spotted wilt. Southern Runner had less spotted wilt and rust and greater yield than Florunner, Langley, TP 107-11, TP 107-3-3 and TX 771174. GBPRS 15 had similar rust but less spotted wilt and greater yield than Florunner. Nine ICRISAT lines had %SMK+%SS of 70 or greater. Genotypes ranking highest in spotted wilt incidence were TP 107-3-3, TX 771174, BNV 93, ICGS 44, 2-23-B3-30 and Tx-Ag 3. Mean spotted wilt incidences for replications were significantly different in all three replicated tests and decreased as distance from a weedy fence row at the southern edge of the field increased. Mean Florunner yield in three tests increased as distance between each test and the fence row increased. Large plots, numerous replications blocked perpendicular to the disease gradient, high seeding rates and heavy disease pressure are suggested in future genotype tests for spotted wilt reaction. Detection of TSWV in annual and perennial weeds around peanut fields using ELISA, transmission EM and mechanical inoculation of indicator plants suggests that this virus may be a permanent threat to peanut production in South Texas.

Disease Reaction of Peanut CRSP Introduced Germplasm in Burkina Faso:

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Germplasm lines selected on the basis of parentage, source, and reaction to disease in Texas were evaluated in 1985 and 1986 at two or more locations in Southwest Burkina Faso. Texas breeding lines included spanish and runner entries developed for leafspot resistance and/or pod rot resistance. Recent valencia-type introductions from South America and U.S. and African checks were also included. Pod disease development was generally light. The leafspot and rust scores of the Texas breeding lines were not superior to the local check. Leafspot and rust scores were low in the introductions from South America, but poor agronomic acceptability of these entries makes them useful as germplasm only. Tx Ag-3 and the African check, RMP 12 were resistant to leafspot but susceptible to rust. Prevalence of Rosette virus at Niangoloko and Banfora in 1986 indicated the need for resistance to this virus.



Resistance to Sclerotinia Minor in Cultivated Peanut. C. N. AKEM\*, H. A. MELOUK, and O. D. SMITH. USDA/ARS, Dept. of Plant Pathology, Oklahoma State Univ., Stillwater, OK 74078-0285 and Dept. of Soil and Crop Science, Texas A&M Univ., College Station, TX 77843.

Reaction to Sclerotinia minor was evaluated under field conditions at Stillwater, Oklahoma. Thirteen and nineteen peanut genotypes were evaluated in 1985 and 1986, respectively. Entries were planted in a randomized complete block design in field plots with four replications. Plots had sclerotial density of about 4 per 100 g of soil. Rows were 4.55 m long and 0.91 m apart. The blocks were separated by 1.5 m alleys. For both 1985 and 1986, the average maximum disease incidence (percent) for the most resistant genotypes TX 804475, TX 798731, TX 798736, and TX 798683 were 0, 10, 16.3, and 16.6, respectively; while the most susceptible genotypes, Florunner and TX 835841 had disease incidence values of 98 and 100, respectively. In 1986, incidence of S. minor infection was recorded throughout the growing season and data were transformed using multiple infection transformation. Disease progress values ( $r$ ) were 0, 0, 0.003, 0.006, and 0.006, for the resistant genotypes Toalson, TX 804475, TX 798731, TX 798736 and TX 798683, respectively; while Florunner and three lines with Florunner parentage (OK-PH 13, OK-PH 15 and Okrun) had  $r$  values of 0.13, 0.17, 0.16 and 0.16, respectively. Other genotypes had varying degrees of resistance. These results were in agreement with greenhouse tests using a detached shoot technique to evaluate the genotype reaction to S. minor.

Responses of Five Peanut Cultivars to Field-Inoculation with Four Endomycorrhizal Fungi. R. A. TABER\*, R. E. PETTIT, J. S. NECK, S. RAJAPAKSE, O. D. SMITH, D. H. SMITH, and W. L. HARMAN, Dept. of Plant Pathology and Microbiology, Dept. of Soil and Crop Sciences, Texas Agri. Exp. Stn., Texas A&M University, College Station, TX 77843, Texas Agri. Exp. Stn., Yoakum, TX 77995, and Texas Agri. Exp. Stn., Amarillo, TX 79106.

Four species of vesicular-arbuscular endomycorrhizal fungi were field-inoculated onto 5 peanut cultivars at 4 sites in Texas. Inoculants were applied to unfumigated soil by hand the first year and by belt planter the second year. The 5 peanut cultivars, Tamnut, Florunner, Starr, Pronto, and McRan, responded differently to colonization by Glomus deserticola, G. mosseae, G. intraradices, and G. etunicatum. Florunner was the most responsive cultivar. Inoculation with the combination of Bradyrhizobium spp. and G. deserticola was the best overall treatment. The most effective single species among all treatments was G. deserticola; the least effective species was G. mosseae. Introduced species together with indigenous species performed better than indigenous species alone. The most striking responses were increases in shoot and root fresh and dry weights. Our conclusion is that specific endomycorrhizal fungi introduced into the rhizosphere enhance peanut growth. This information suggests the opportunity exists for possible manipulation of these symbiotic fungi to increase peanut yield and quality.

Rates, Timing, and Methods for Delivery of Flutoloni1 for Control of Soil-borne Diseases. P. A. BACKMAN\* and M. A. CRAWFORD, Dept. of Plant Pathology, Ala. Agric. Expt. Sta., Auburn University, AL 36849.

Flutoloni1 50WP (SN-84364, Nor-Am Chemical Co.) was applied as a banded spray at rates of 0.5, 1.0 and 2.0 lbs ai per acre either at planting (7" band), 30 days after planting (7" band), or 60 days after planting (12" band). In a second experiment flutoloni1 was applied in combination with Bravo 720 (1 1/2 pt. per acre). These treatments were compared to Bravo 720 applied alone and to flutoloni1 applied to Bravo treated plots. Flutoloni1 applications were made either at 2 lbs ai in the third leafspot spray, or at 1 lb in each of sprays 3 and 4, or finally at 1 lb ai as a directed spray applied in a 12" band after leafspot sprays 3 and 4. Results indicated that as application timing was delayed to 60 days after planting, control of stem rot, pod rot and limb rot was improved. At the 60-day application timing, disease control was similar for all three rates. Yields were improved by more than 1000 lbs per acre when flutoloni1 was applied 60 days after planting. The second experiment produced similar results. The third leafspot application was made at 62 days after planting, resulting in yield improvements of approximately 900 lbs per acre where flutoloni1 was applied. Neither yields nor disease control responded to multiple applications, increased rates, or methods of application. Flutoloni1 did not interfere with leafspot or rust control when applied in combination with Bravo 720. These data indicate that flutoloni1 should be applied at rates between 1 and 2 lbs ai per acre as a directed spray to the peanut plant crown, or alternatively can be tank-mixed with Bravo and delivered with a standard leafspot sprayer. Either application should be made at about 60 days after planting to optimize disease control and yield response.

Nutritional Factors Involved in the Peanut Pod Rot Complex. A. S. CSINOS, T. P. GAINES, and M. E. WALKER. Department of Plant Pathology and Department of Agronomy, Coastal Plain Experiment Station, Tifton, GA. 31793-0748.

Several pathogens have been implicated in the peanut pod rot complex. The most common fungi reported are *Pythium myriotylum*, *Rhizoctonia solani* and *Fusarium solani*. Researchers from Virginia have indicated in the 1960s that nutrition was intimately involved in the incidence of pod rot on Virginia peanuts. Although calcium in the form of  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$  was demonstrated to reduce the incidence of disease, and Mg and K increased pod rot, the exact relationship was unclear. Research conducted in Georgia over the past 8 years has elucidated some of these relationships. Tests included evaluating the application of other competitive cations applied in the pegging zone. The application of K, Mg or N in the pegging zone tended to aggravate pod rot while the application of Ca in the form of  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$  alone or in combination with K, Mg or N decreased pod rot. Calcium levels in the peanut pods correlated negatively with percent pod rot. Studies attempting to control the disease on Virginia peanuts with sterol inhibiting fungicides and PCNB were less effective than with  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ . Evidence indicated that nutritional imbalance in the pod zone predisposes pods to invasion by common soil-borne pathogens.

Ecology of Rhizoctonia solani Anastomosis Group 2 Types 1 and 2 and AG-4 on Peanut, Soybean, Snap Bean, Blue Lupine, Corn, and Sorghum. D. K. BELL\* and D. R. SUMNER, Plant Pathology Department, Coastal Plain Experiment Station, Tifton, GA 31793.

Rhizoctonia solani anastomosis group (AG) 2 types (T) 1 and 2 did not reduce ( $P = 0.05$ ) the emergence of Florunner peanut, Bragg soybean, Eagle snap bean, Funks G-4507 corn and Funks G-522 sorghum planted in soil infested with the fungi in a greenhouse test. However, AG-2T2 reduced the emergence of Tifblue-78 blue lupine 52%, but AG-2T1 did not reduce the emergence. R. solani AG-4 reduced the emergence of peanut, soybean, snap bean, blue lupine and sorghum 84, 60, 41, 96, and 68% respectively, but not corn, compared with the controls. In the same greenhouse test, R. solani AG-4 increased the root-hypocotyl disease index of peanut (4.5), soybean (3.3), snap bean (3.8), blue lupine (4.9) and the root-mesocotyl disease index of sorghum (3.4) on an increasing disease scale of 1-5. However, AG-4 did not increase the root-mesocotyl disease index of corn, compared with the controls. In a field microplot test, R. solani AG-2T1, AG-2T2, and AG-4 did not reduce the yield of pods in 1982 or 1984. When peanut seed from the microplot test were plated on a selective medium for R. solani and other soilborne basidiomycetes, AG-2T1, AG-2T2, and AG-4 were isolated from 1.5, 0.8, and 0.8% respectively, of seed from pods attached to plants at digging. In a similar assay with pods left-on or in the ground at digging, AG-2T1, AG-2T2, and AG-4 were isolated from 3.0, 2.3 and 11.3% respectively, of the plated seed. All fungi that were used in the greenhouse test were isolated from symptomless peanut seed. In the field microplot test, fungi isolated from seed from pods attached to plants at digging and many fungal cultures from pods left-on or in the ground at digging were from symptomless peanut seed. These results show that peanut seed left-on or in the field after harvest can be inoculum sources of R. solani AG's that are pathogenic to various economically important plants in southern Georgia.

The Relationship of Water Activity and Phytoalexin Production to Preharvest Aflatoxin Contamination of Peanuts Subjected to Late-Season Drought Stress.

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Florunner peanuts were grown in environmental control plots, and at 103 days after planting (DAP) the following treatments were imposed: irrigated, drought with mean 2 in. soil temperature of 29°C (optimum for aflatoxin contamination) and drought with mean 2 in. soil temperature of 25°C (less conducive for aflatoxin contamination). Beginning at 114 DAP (11 treatment days) samples of peanuts were taken at weekly intervals from the three treatments. Peanuts were hand-picked and classified into maturity stages by the Hull-Scrape method. Water activity (Aw), moisture, capacity for phytoalexin production, and aflatoxin contamination were measured in peanuts from five maturity stages (yellow 1, yellow 2, orange, brown, black). The objectives of the study were to determine (1) what role, if any, stilbene phytoalexins have in natural resistance of peanuts to aflatoxin contamination and (2) the role of elevated soil temperature in aflatoxin contamination of peanuts subjected to late-season drought stress. Results showed that kernels from the irrigated treatment maintained high Aw, high capacity for phytoalexin production, and essentially no aflatoxin contamination throughout the study. As the drought period progressed in the other two treatments, kernel Aw decreased, phytoalexin production ceased, and aflatoxin contamination appeared. This rate of change was faster in the 29°C treatment than in the 25°C treatment, indicating that the primary role of elevated soil temperature is in the rate at which peanuts become susceptible to Aspergillus flavus proliferation and aflatoxin contamination. Evidence for phytoalexin involvement in natural resistance of peanuts to aflatoxin contamination was strong. Regardless of maturity, there was no significant aflatoxin contamination of peanuts until the ability to produce phytoalexins was lost as a result of decreased water activity.

Critical Evaluation of an Aflatoxin Immunoassay Quick-Card Test in Farmers Stock  
Peanuts, R. J. COLE<sup>1\*</sup>, J. W. DORNER<sup>1</sup>, J. W. KIRKSEY<sup>1</sup>, and R. J. HENNING<sup>2</sup>,  
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Fertilizer and Milling Company, Colquitt, GA 31737.

An immunoassay quick-card test was evaluated on farmers' stock peanuts relative to the criteria of speed, reproducibility, sensitivity, and economic consideration. The test was conducted at a buying point laboratory by two non-technical personnel. Fifty-two 25-lb samples of farmers' stock peanuts were collected by pneumatic probe from 26, 4-5 ton peanut wagons (2 samples per load) representing 5 fields that experienced some drought stress. Each sample was processed by the Federal State Inspection Service in the same fashion as regular grade samples resulting in 5 grade categories for each sample (sound mature kernels [SMK], sound splits, other kernels, loose-shelled kernels and damaged kernels). The results of the immunoassay were compared to high performance liquid chromatography (HPLC) analyses of the same extracts. The official TLC analysis was only conducted on the SMK category due to limiting amounts of other sample categories. The immunoassay test was set up to detect 0-20 ppb, 20-100 ppb, and >100 ppb. Twelve analyses out of 520 analyses were in wide disagreement between the immunoassay and HPLC. Errors resulting from the immunoassay were possible in 6 of the 12 discrepancies. The test, using two people, one to weigh, extract and filter samples, and the other to actually conduct the test, achieved a rate of 30 analyses/hr. The rate was achieved doing 20 analyses at a time.

Influence of Tannin-related Compounds on the Growth of *Aspergillus Parasiticus*  
and Aflatoxin Production. H. A. AZAIZEH, R. E. PETTIT\*, and R. A. TABER,  
Dept. Plant Pathology and Microbiology, Texas Agri. Exp. Stn., Texas A&M  
University, College Station, TX 77843.

Several tannin-like compounds were tested in a liquid nutrient medium at concentrations of 100, 500, and 1,000 mg/l to determine their influence on growth of *Aspergillus parasiticus* Spear and Aflatoxin production. Fungal growth inhibition was greatest using tannic acid, catechol, and methyl catechol. Aflatoxin production was significantly decreased by methyl catechol, naringenine, umbelliferone, and hydrobenzoic acid. In addition, ferulic acid caused significant growth inhibition at a concentration of 1,000 mg/l. Tannin-like compounds extracted from peanut seed coats also inhibited *Aspergillus* growth and aflatoxin production.

#### Density Segregation of Peanuts Naturally Contaminated with Aflatoxin.

J. W. KIRKSEY<sup>1</sup>, R. J. COLE<sup>1</sup>, J. W. DORNER<sup>1</sup>, and R. J. HENNING<sup>2</sup>, <sup>1</sup>USDA, ARS, National Peanut Research Laboratory, Dawson, GA 31742 and <sup>2</sup>Farmers Fertilizer and Milling Company, Colquitt, GA 31737.

A water flotation method was used to reduce aflatoxin concentrations in naturally contaminated samples of shelled farmers' stock peanuts. Five-hundred-gram samples of contaminated peanuts were added to 2,000 ml of tap water with approximately 5-15% of the kernels rising to the surface as "floaters". These floaters, when analyzed, contained 80-90% of the total sample aflatoxin content resulting in considerable cleanup of the samples. There were some limitations, however. Splits, small whole kernels (<16/64 in.), and balds do not follow the same "float-sink" pattern of aflatoxin reduction. The method seems best suited for aflatoxin reduction in jumbo, medium, and No. 1 sizes.

#### Comparison of Immunochemical and Chemical Methods for Aflatoxin Determination in Raw Peanuts. D.M. WILSON\*, R.W. BEAVER, R.C. LAYTON, A.L. TRANTHAM, and D.L. McMILLAN, University of Georgia, Coastal Plain Experiment Station, Tifton, GA 31793.

Three immunochemical and three chemical methods were compared using fifty naturally contaminated lots of raw shelled peanuts. The Federal States Inspection Service modified a Dickens mill to collect special 10 lb. subsamples from commercial lots. The USDA/AMS analyzed all lots using the water slurry modification of the BF TLC method. Samples from fifty separate lots were collected. The lots were chosen so that aflatoxin concentrations ranged from 0 to 100 ppb. Each 10 lb. sample was divided, and duplicate analytical subsamples for each method were carefully prepared to make each subsample as representative as possible. The Aflatest-P mycotoxin testing system uses a monoclonal based affinity column and was provided by Cambridge Naremc, Springfield, MO. The ELISA methods used were the AgriChek aflatoxin test provided by AgriTech Systems, Inc., Portland, ME, and the Agri-Screen test supplied by Neogen Corporation, Lansing, MI. In addition to the water slurry method, the chemical methods included the CB-TLC method and an HPLC method using normal phase separation and a silica gel packed cell with fluorescence detection following the CB extraction step. The overall mean from all analyses and methods was 19 ppb with a range of 0 to 100 ppb total aflatoxins; the CV was 36%. Analysis of variance showed no significant differences between methods. The methods contributed little to variation, but samples contributed to 56% and subsamples to 35% of the variation; variation within methods explained the other 9%. All methods showed significant relationships ( $P < .01$ ) with regression using the water slurry method as the dependent variable. The R values ranged from 0.66 to 0.83. All of the methods performed well and are comparable. Any one of the immunochemical or chemical methods could be routinely used by trained personnel to perform aflatoxin analyses.

A Low-Cost, Microcomputer System to Monitor and Control An Environmental Control Plot Facility. P. D. BLANKENSHIP<sup>\*1</sup>, B. W. MITCHELL<sup>2</sup>, R. C. LAYTON<sup>3</sup>, R. J. COLE<sup>1</sup>, and T. H. SANDERS<sup>1</sup>. USDA-ARS, National Peanut Research Laboratory, Dawson, GA<sup>1</sup>; USDA-ARS, Athens, GA<sup>2</sup>; USDA-ARS, CPES, Tifton, GA<sup>3</sup>.

Since 1980, six 67.1 m<sup>2</sup> environment control plots with apparatus for soil temperature manipulation and motorized shelters for rainfall exclusion have been used for the study of Aspergillus flavus invasion and aflatoxin contamination of peanuts during drought stress. Manual controls and the absence of an alarm system for the plots has mandated daily monitoring and adjustments of thermostats for soil temperature control and visual inspection for proper shelter operation, especially during severe thunderstorms. A microcomputer-based, temperature control system that controls the operation of the facility and provides telephone alarms for soil temperature discrepancies, improper shelter operation, or electrical power interruptions has been assembled from commercially available components. Total cost of the components for the system was approximately two thousand dollars (USA). At the end of a 50-day evaluation period, the system provided a treatment period average plot soil temperature 27.4 C with an expected average of 26.7 C. The 95 percent confidence interval for the treatment period average during the tests was between 25.9 C and 27.9 C.

## Physiology

Comparative Studies on Peanut Seed Germination. S. C. MOHAPATRA and J. H. YOUNG\*, Department of Biological and Agricultural Engineering, North Carolina State University, Raleigh, NC 27695-7625.

This study was undertaken to a) determine a suitable laboratory germination medium and b) compare the germination physiology of four peanut (*Arachis hypogaea*) cultivars grown in North Carolina. Florigiant (FG) seeds were imbibed for 96 h at  $23 \pm 1$  C in water saturated potting soil, cotton pad, paper towel or filter paper. Soil and cotton gave higher germination (radicle protrusion) percentages than the latter two. Between cotton and soil, germination rate and percentage were higher in the former although final radicle length and diameter were greater in the latter. The initial moisture uptake was also higher in cotton. Therefore cotton was used for varietal comparison with respect to leachate conductivity of unimbibed seeds and seed parts, germination rate and percentage, moisture uptake, and dry and fresh weight changes. While all varieties gave greater than 90% germination, there was considerable variability with respect to both radicle length and diameter within and between cultivars. Leachate conductivity from isolated seed coats and embryos appeared to be a better indicator of vigor (germination rate) than that from whole seeds and isolated cotyledons. This is probably expected since the seed coat plays a major role by regulating moisture supply and the radicle of the embryo is the first part to protrude. On the other hand, the cotyledons probably play a negligible role during radicle protrusion, because the dry weight changed little, if any, during the 96 h observation period. Cultivar NC6 had the slowest seed coat and embryo leaching kinetics, thus implying a high vigor. Accordingly, these seeds germinated at a faster rate than the other three cultivars (NC7, FG, VA81BS). As expected, fresh weight change followed the same general pattern as moisture uptake in all cultivars.

The Influence of a Triazole Regulator on the Germination of Peanuts from Treated Plants. D. J. DAIGLE\*, L. F. ROSS, and E. J. CONKERTON, USDA, ARS, Southern Regional Research Center, New Orleans, La. 70179; and C. S. KVIEN, University of Georgia, Tifton, Ga. 31793.

A systemic fungicide Spotless (XE779) [(e)-1-(2,4-di-chlorophenyl)-4,4-dimethyl-2-(1,2,4-triazol-1-yl)-1-penten-3-ol], has been shown to decrease vine growth and increase yields in Florunner peanuts (*Arachis hypogaea* L.). A decrease in germination and seedling height of seeds from treated plants was noted and correlated with the amount of compound applied. The active isomer of the fungicide was isolated by extraction and identified by HPLC and its identity confirmed by mass spectroscopy. Peanuts from plants treated with Spotless contained the active isomer. The effect of storage at elevated temperatures on the degradation of the fungicide and viability of the seeds from treated plants was investigated. Storage at 40°C for eight weeks caused an 82% reduction in the amount of residual active isomer in these seeds. Under these storage conditions, the germination capability of seeds from untreated and treated plants was reduced.

Peanut Seedling Responses to Root Temperature Controlled by a Thermogradient Sand Box. R. M. AHRING, D. J. BANKS\*, and T. L. SPRINGER, USDA-ARS, Plant Science Research Laboratory, Stillwater, OK 74076.

Germination of seeds and subsequent seedling growth patterns are influenced by soil temperatures, but the minimum and maximum temperature requirements for optimum seedling responses for peanuts are not well established. This experiment was conducted to characterize the differences between root and shoot responses at contrasting root zone temperatures and to ascertain the value of a thermogradient sand box as a potential tool for screening peanut genotypes for seedling growth characteristics. Pregerminated week-old 'Comet' (spanish) variety peanut seedlings were grown for seven days in aerated modified Hoagland nutrient solutions in test tubes embedded in sand. Root zone temperatures, ranging from 19.5 to 37.3 C, were controlled by using a thermogradient sand box. The seedling characteristics analyzed included dry matter weights of roots, shoots, and cotyledons and the lengths of roots and shoots. Optimum root growth occurred at root temperatures between 24.8 ( $\pm 2.1$ ) and 31.0 ( $\pm 2.3$ ) C, whereas optimum shoot growth occurred at root temperatures between 31.0 ( $\pm 2.3$ ) and 37.3 ( $\pm 1.9$ ) C. Significant cotyledon dry weight losses occurred at root temperatures of 24.8 ( $\pm 2.1$ ) C and above. Cotyledon dry weights were negatively correlated with root and shoot growth. These data suggest that the roots of peanut seedlings have narrower ranges of optimum temperatures for growth and that they are much more sensitive to temperature extremes than are shoots. Also, by the end of the second week, cotyledon reserves were partitioned more into shoot than into root structure. The thermogradient sand box used in this study proved to be a useful tool for characterizing early seedling growth responses.

Differences in Competitive Ability of Single and Mixed-Strain Inoculants for Peanut. P. J. A. WIJEWICKRAMA, T. J. SCHNEEWEIS\*, J. C. WYNNE and G. H. ELKAN, Depts. of Microbiology and Crop Science, N. C. State University, Raleigh, NC 27695.

A greenhouse and two field studies were conducted to determine the relative competitive ability of *Bradyrhizobium* sp. strains to nodulate peanut (*Arachis hypogaea* L.) cultivars Robut 33-1 and NC 9. Strain treatments consisted of NC70.1, 3G4b20, NC92, or factorial combinations of two strains. The cell density for each treatment was standardized. Strain occupancy within the nodule was determined by enzyme-linked immunosorbent assay (ELISA) methodology. Greenhouse-derived nodules from single strain treatments were used to titer the antisera. Under field conditions, nodules from the noninoculated control plots were used to ascertain cross-reaction of the antisera with endemic bradyrhizobia. Differences in competitive ability among strains were significant with NC92 being less competitive with native rhizobia than NC70.1 and 3G4b20. Mixed strain treatments were less competitive against native rhizobia than expected based on single strain competitive abilities. These results have important implications in the production of inoculants for peanuts.



Effects of Shading on the Growth and Nitrogen Fixation of Selected Peanut

Cultivars. V. E. MATALOG\* and H. D. GROSS, Crop Science Department, North Carolina State University, Raleigh, NC 27695-7620.

Field studies were conducted to determine the effects of various levels of shading (0, 20, 30, 47%) on some peanut cultivars (UPLPn2, UPLPn4, NC6, Florigiant). Slight shading had a stimulatory effect on vegetative growth. Leaf area, shoot dry weight and main stem height were highest under partial shading. The number and dry weight of fruits decreased linearly with increased levels of shade when treatments were imposed at planting. On the otherhand, only 47% shade affected fruit dry weight when shades were placed at the pegging stage. Partial shading (20-30%) generally increased total nodule activity (TNA) and number and dry weight of nodules. Moreover, partial shading imposed at planting enhanced early nodulation and nodule activity. Delayed senescence of the nodule was observed when shades were applied at pegging stage. Shading did not significantly affect the nitrogen concentration and content of the peanut plant parts. Among the cultivars tested, only UPLPn2 showed tolerance to shade.

Validation of Pnutgro, a Crop Growth Simulation Model for Peanut. K. J. BOOTE\*,

J. W. JONES, and G. BOURGEOIS. Departments of Agronomy and Agricultural Engineering, Univ. of Florida, Gainesville, FL 32611.

PNUTGRO V1.0, a peanut crop growth simulation model, was developed by adapting code from the SOYGRO V5.3 crop growth simulation model, and appropriately changing crop and varietal input parameters. Parameters for the model were developed from published and unpublished data, or were assumed unchanged from soybean if data on peanut were not available. Parameters for the model were also developed by calibration to a 1981 growth analysis on Florunner peanut, when published data was not available. In order to test the validity of Pnutgro, the model as parameterized from the literature and from the 1981 data set, was simulated using 1976 and 1986 weather and compared to independent data sets on Florunner growth in those two years. The fit to dry matter accumulation in pods and in total crop appeared to be acceptable for both years and validates parameters for photosynthesis and partitioning. Pod addition, pod maturation, and change in shelling percentage were simulated well. Timing of pod growth was good in 1976 but was early in 1986. Improvements in simulating peanut crop development may be needed to consider photoperiod and water stress effects on development and podset. Based on comparison to the independent data of 1976 and 1986, we believe that the model is substantially validated. Technical documentation for the Pnutgro model and FORTRAN code for running on IBM-PC compatible microcomputers, is available from the authors.

## Processing and Utilization

Destruction of Aflatoxin by Microwave Oven and Chlorine Gas. E. M. AHMED\* and C.F. WEI, Food Science and Human Nutrition Department, University of Florida, Gainesville, FL 32611.

The effects of oven and microwave roasting on aflatoxin contaminated peanuts as well as the effect of chlorine treatment on aflatoxin B<sub>1</sub> (AFB<sub>1</sub>) detoxification were studied. In artificially contaminated peanuts, oven roasting for 30 min at 150°C or microwave roasting for 8.5 min at 0.7 kW were found to be equally effective in destroying 30 to 45% of AFB<sub>1</sub>. In naturally contaminated peanuts, both oven and microwave roastings were found to be equally effective in destroying 48 to 61% of AFB<sub>1</sub> and 32 to 40% of aflatoxin G<sub>1</sub> (AFG<sub>1</sub>). Chlorine gas treatment was found to be very effective in destroying AFB<sub>1</sub>. Time course study of this treatment (100µg AFB<sub>1</sub> with 15 mg chlorine gas at standard temperature and pressure) showed that about 60 to 75% of AFB<sub>1</sub> was destroyed within 10 min of exposure. During the treatment process, at least three new fluorescent reaction products were produced and two of them were identified as 2,3-dichloro AFB<sub>1</sub> and 2,3-dihydroxy AFB<sub>1</sub> (diol). Use of radio-labeled AFB<sub>1</sub> further confirmed the result. Chlorine-dose related study at 10 min exposure indicated that even the treatment of 100µg of AFB<sub>1</sub> with 7.5 mg Cl<sub>2</sub> caused about 75% destruction. Preliminary mutagenicity study using the Ames *Salmonella* assay indicated that the mutagenic activity of the 10-min treated sample in the presence of rat liver S-9 mix can be reduced to about 10% of that of the untreated control. The results indicated that low energy microwave roasting is not an efficient method to remove AFB<sub>1</sub> from contaminated peanut samples, while chlorine gas could be an effective agent in reducing aflatoxin toxicity.

Comparison of Processing Methods for the Preparation of a Bland Peanut Paste. B. L. SANTOS\* and A. V. A. RESURRECCION, Dept. of Food Science and Technology, Agric. Exp. Stn., Univ. of Georgia, Experiment, GA 30212.

A light colored, bland paste made from peanuts can be flavored with cheese, fruit or chocolate to produce a nutritious, high protein spread. Development of such a product would increase the utilization of peanuts in countries where peanut butter is not widely consumed. The objective of this study was to compare three methods for producing a bland flavored, light colored peanut paste. Whole kernels were subjected to water extraction (WE), steam (ST) and dry heat (DH) and ground into pastes. Instrumental values (L) and sensory scores for color and flavor intensity indicated that the WE method produced pastes with the lightest color and most bland flavor. This method was optimized by varying the particle size of the nuts prior to extraction. Pastes made from whole (W), coarsely chopped (CC), moderately chopped (MC) and finely chopped (FC) peanuts were compared. Results of chemical and sensory analysis indicated that water extraction of peanuts chopped to a particle size of 4.75-3.36 mm was found to be the optimum process for preparation of a bland peanut paste.

Sweetener Effect on the Flavor Profile of Peanut Butter made with Virginia Type Peanuts. MICHELE D. KEZIAH\* and CLYDE T. YOUNG, Department of Food Science, North Carolina State University, Raleigh, NC 27695-7624.

Fourteen sweeteners were evaluated in peanut butter made from virginia type peanuts from different locations. The peanuts were blended together to obtain most of the flavor defects commonly found in peanuts. Sweeteners were added at the 3% and 6% level with the exception of honey and molasses (0.5% and 1.0%) and aspartame (0.88% and 1.76%). Salt at 0.6% was the only other ingredient. The peanut butters were evaluated by a professional flavor profile panel to identify and quantitate differences in flavor character notes. Results show that the type and level of sweetener affected the perception and degree of sweet, roasted peanut, nutty, bitter, musty, stale, painty, fruity, tongue burn, under roast, and over roast notes.

Flavor-Maturity Relationship of Florunner Peanuts. T. H. SANDERS\*<sup>1</sup>, J. R. VERCELLOTTI<sup>2</sup>, and G. V. CIVILLE<sup>3</sup>, <sup>1</sup>USDA, ARS, National Peanut Research Laboratory, Dawson, GA 31742, <sup>2</sup>USDA, ARS, Southern Regional Research Center, New Orleans, LA 70179, and <sup>3</sup>Sensory Spectrum, Inc., East Hanover, NJ 07936.

Florunner peanuts from five, pod-color based, maturity stages were screened to obtain uniform sized kernels for roast and flavor analyses. Peanuts, dry roasted for the same time and temperature, had Hunter L values from 49.3 to 53.2. For flavor analysis, roasts producing consistent L values of  $50 \pm 1$  were utilized. Peanut butters were presented to a 12-member panel trained in peanut flavor descriptive analysis. The flavor descriptors roasted peanutty and sweet aromatic were scored higher in mature peanuts. Bitter, astringent, painty, and fruity fermented were commonly scored high in immature peanuts. The data indicate that flavor and roast color of commercial sized lots are influenced by the relative maturity distribution in the lots.

Peanut Butter Analysis: A Technique for Obtaining Reproducible Volatiles Profiles from Peanut Butter. N. V. LOVEGREN\*, H. P. DUPUY, and J. R. VERCELLIOTTI, USDA-ARS, Southern Regional Research Center, New Orleans, LA 70179; T. H. SANDERS, National Peanut Research Laboratory, USDA-ARS, Dawson, GA 31742.

A simple technique has been developed for depositing thin layers of peanut butter of similar weight on the inside of sample tubes. Eluting volatiles from the sample onto a packed Tenax GC-8%PMPE column followed by temperature programming provides a reproducible volatiles profile. Use of a capillary column gives improved resolution but is less reproducible. Volatiles profiles of several high quality peanut butters made from a well selected lot of medium runner peanuts were used to determine optimum ranges in p.p.m. for eight of the larger peaks. Ranges of concentration for individual volatiles in peanut butters analyzed by trained descriptive sensory panel and compared to a well-characterized sensory reference peanut butter were as follows (in parts per million (p.p.m.) for a 0.5 gram sample weighed to  $\pm 2$  mg.): methylpropanal, 0.8-2.1; methylbutanal, 1.1-2.2; N-methylpyrrole, 0.9-1.6; dimethylpyrazine, 2.1-3.5; methylethylpyrazine, 1.7-2.2; benzeneacetaldehyde, 1.9-3.0; vinylphenol, 1.9-5.4; and a peak with retention time (R.T.) of 60 min., 0.7-1.5. Many peaks increase with degree of roast, and careful control of roasting color was exercised in this work with peanut butters having final Hunter L values of  $50 \pm 1.5$  units. Thus, peak size increased with degree of roast (lower Hunter L values and sensory judgment of overroast) for methylpropanal, methylbutanal, methylpyrazine, dimethylpyrazine, methylethylpyrazine, the four-carbon substituted pyrazines around the benzeneacetaldehyde peak, vinyl phenol (57 min. R.T.), the peak at 60 min. R.T. (above), and a peak at 63 min. R.T. Application of this technique to peanut butters made from medium runner peanuts separated according to maturity class through hull-scrape color matching indicates that levels of these volatiles change significantly from the least mature (yellow-2) to the most mature (black). In particular, the least mature peanuts contribute higher methylpropanal, methylbutanal, hexanal, and elevated pyrazine peaks exceeding optimal levels above while the most mature (brown and black) possess the above balance of volatiles within the limits of acceptability correlated with descriptive sensory analysis. High ethyl alcohol was found in least mature peanuts dried at elevated temperatures.

Grading Peanut Butter Using Video Image Analysis Techniques. T. B. WHITAKER\*, J. W. DICKENS, and A. B. SLATE, USDA, ARS, Box 7625, North Carolina State University, Raleigh, NC 27695-7625.

A video image analysis system was designed to quantitatively measure the amount of specks and the color of peanut butter samples for grade purposes. The video image of a 7.6 x 7.6 cm area of the surface of a peanut butter sample was captured and converted into 384 by 384 picture elements (pixels). The intensity of each of the 147,456 pixels was converted into one of 256 shades of gray from 0 for black to 255 for white. The percent of total pixels that represented specks was defined as the speck index. The average shade of gray of all 147,456 pixels was defined as the color index. The speck and color indices were computed for 52 peanut butter samples that had been graded by experienced AMS inspectors. The speck and color indices were both in good agreement with the AMS speck and color determinations assigned to the samples by the inspectors.

Peanut Skins: A Potential Source of Dietary Fiber for Foods. R. L. ORY<sup>\*1</sup> and G. J. FLICK, JR., Dept. of Food Science and Technology, Virginia Polytechnic Institute & State University, Blacksburg, VA 24061. (\*Adj. Faculty: 7324 Ligustrum Dr., New Orleans, LA 70126).

Current interest in the beneficial effects of increased fiber in diets prompted a chemical comparison of peanut skins to other acceptable forms of dietary fiber for possible use as a fiber supplement in selected food items. Skins represent 2-4% of the weight of shelled peanuts. The 1986 crop yielded 1,713,000 tons of Seg. 1 peanuts. At least 25,000 tons of skins should be available from 1,280,000 tons of blanched nuts, based upon 50% use in peanut butter and 25% in blanched roasted nut snacks and confections. Peanut skins contain 12-15% Crude Fiber (43-45% Neutral Detergent Fiber), comparable to the contents in cereal bran and fruit fibers. Properties of peanut skins and potential uses in granola items, extruded breakfast cereal products and baked goods will be presented.

Fractionation of Peanut Seed Proteins by High Performance Liquid Chromatography. S.M. Basha\*, Division of Agricultural Sciences, Florida A&M University, Tallahassee, FL 32307.

Classical methods for fractionation of peanut (*Arachis hypogaea* L.) proteins include ammonium sulfate precipitation, CaCl<sub>2</sub> precipitation, cryoprecipitation or ion-exchange chromatography. However, these methods are tedious and give inadequate resolution. In order to increase the efficiency and resolution, a liquid chromatographic procedure for the analysis of peanut seed proteins was developed. The seed proteins were extracted with 10 mM sodium phosphate buffer pH 7 containing 0.5 M NaCl and analysed by HPLC. The HPLC system consisted of Waters Model 510 pump, variable wavelength UV/VIS detector, 840 data station and a manual U6K injector. The column employed was Waters, PROTEIN PAK 300SW (7.8 mm x 30 cm). Mobile phase consisted of 20 mM sodium phosphate buffer pH 7, 0.4 M NaCl, and 0.05% NaN<sub>3</sub>. Flow rate was 1.5 ml/min under isocratic conditions. The detector was set at 280 nm and the range was 1 AUFS. Following HPLC the seed proteins resolved into ten peaks with molecular weights between 75,000 and 500,000. Excellent resolution was obtained between the arachin and non-arachin proteins. The protein profiles obtained by HPLC were identical to those obtained using gel filtration on Sephacryl S-300 column. This technique has been employed to monitor genetic variation, effect of boiling on protein quality and changes in protein deposition pattern during seed maturation. The results indicated that using HPLC it is possible to detect qualitative as well as quantitative variations in the protein composition of peanut seeds.

Light and Scanning Electron Microscopy of the Peanut (*Arachis hypogaea* L. cv. Florunner) Cotyledon after Roasting. CLYDE T. YOUNG, WILLIAM E. SCHADEL and R. H. WATKINS\*, Department of Food Science, North Carolina State University, Raleigh, NC 27695-7624.

Changes in the microstructure of peanut (*Arachis hypogaea* L. cv. Florunner) cotyledons after roasting at a temperature of 160°C (10 min) were investigated with light and scanning electron microscopy. Major changes included: (1) pitting and pock-marking of the epidermis of the cotyledons caused by escape of the steam and free oil during roasting; (2) loss of cellular organization of spherosome membranes, protein bodies and starch grains; (3) alteration of the structures of spherosome membranes, protein bodies and starch grains; and (4) heat destruction of some middle lamellae of cell-to-cell junctions.

Major Sulfur Compounds in Peanut Headspace. R.H. WATKINS\* and CLYDE T. YOUNG, Department of Food Science, North Carolina State University, Raleigh, NC 27695-7624.

Some sulfur components contribute a roasted or nutty flavor to roasted peanuts while others may enhance off-flavors. One purpose of this study was to identify by headspace analysis the major volatile sulfur compounds in peanut flavor. Tests with Florigiant peanuts showed that the three major volatile sulfur compounds in order of prevalence are: (1) hydrogen sulfide,  $H_2S$ , (2) methanethiol,  $CH_3SH$ , and (3) carbonyl sulfide,  $COS$ . Another objective was to determine the effects of roasting time and medium on the headspace content of Florigiant peanuts. Significant trends in the amounts of sulfur-containing and carbon-containing compounds were found.

Effect of Temperature and Time of Roast on the Color and Headspace Components of Roasted Peanuts, J.J. HEINTS\*, CLYDE T. YOUNG and K. TRIGANO, Department of Food Science, North Carolina State University, Raleigh, NC 27695-7624.

The relationship of air-roasting temperature (160°, 180° and 200°C) and duration (light, medium and heavy roasts) to color development (Hunter L,a,b) and headspace volatile composition was examined as an indicator of product quality. At higher roasting temperatures of the cultivar Florunner, the dominant wavelength of the nuts shifted toward the red and gained in purity. Lightness (L) values declined most rapidly (3-4 L units/min) for the medium roasting temperature. For the 200°C roast, reddening (increasing a) was most rapid. In addition, the peanuts also became more yellow (0.6-1.2 units/min). At a roasting temperature of 180°C, musty aftertaste (pentane, 2-propanol, acetone, dimethylsulfide; Peak 8) dropped significantly with the longer roasts where the peanuts also became more red (higher a). Peanuts which had darker roasts (lower L) also had higher levels of musty aftertaste. Although the four major headspace peak concentrations were not significantly affected by roasting time at 180°C, the drop in musty aftertaste was significantly affected by roasting time. At 180°C, the fruity peak (2-methylpropanal; Peak 10) was directly correlated with increasing b value (greater yellow). Aging (2- and 3-methyl butanal; Peak 12) and the fruity peak (Peak 10) showed a direct positive correlation.

Preparation of Mish from Peanut Milk, C.B. Chawan\*, D.R. Rao, B. Singh, and R. Muatine, Department Food Science and Animal Industries, Alabama A&M University, Normal, AL 35762

"Mish" concentrated and spiced yogurt consumed in Sudan was prepared from peanut milk (PM), a 1:1 blend of peanut milk and whole milk (PM:WM), and whole milk (WM). The milks were boiled for 3 minutes, cooled to 45°C., inoculated with yogurt cultures and incubated for 16 hours. Whole spices were added at 2.9% (W/W) to the yogurt and held at refrigeration temperature for 24 hours. The whey was then drained and salt was added at 1% level. The sensory characteristics were evaluated by an untrained panel for sourness, mouthfeel, flavor and overall acceptability on a 6 point continuous scale where 0 = least desirable and 6 = highly desirable. The sourness scores for PM, PM:WM and WM were:  $4.36 \pm 1.1$ ,  $3.84 \pm 0.7$  and  $4.02 \pm 1.0$  respectively. These were not significantly ( $P > .05$ ) different. Similarly, the scores for mouthfeel, flavor and overall acceptability were not significantly different for the three products tested. In a second trial mish was prepared from peanut milk flavored with artificial milk flavor. This was compared with mish made with whole milk. There were no significant differences ( $P > .05$ ) in sensory characteristics for flavored peanut milk mish and whole milk mish. The dry matter extractability into milk from peanuts was 82.5%

## Production Technology

Determination of National Peanut Poundage Quota for 1987. R. H. MILLER, USDA, ASCS, Commodity Economics Division, Room 3741-S, Washington, D.C. 20250.

The Food Security Act of 1985 requires that the national poundage quota must equal the quantity of peanuts estimated to be devoted to domestic edible, seed and related uses in each marketing year, but not less than 1.1 million tons. After initially proposing the 1987-crop quota at 1,287,500 tons, USDA set the quota at 1,355,500 tons, the same level as for the 1986 crop. USDA has revised the historical series on domestic food use to reduce double counting of certain exports, but the final quota recognized that some of these exports represent quota peanuts. Increased also were shrinkage factors and transfer of low quality peanuts to quota loans. Other issues considered were: annual growth in consumption, nonrecorded usage, and current crop carryout. Further study is needed to provide accurate data for determining the national poundage quota, as well as the flow of peanuts within the industry. A peanut industry committee has made recommendations to improve the Peanut Stocks and Processing Report. Needed economic analysis of demand relationships were noted.

Efficacy of Tribasic Copper Sulfate and Copper Resinate Against Sclerotinia Blight, Stem Rot and Leafspot Diseases of Peanuts. W. W. OSBORNE,\* IAI, Inc., 1319 N. Main Street, South Boston, VA 24592; J. D. TAYLOR, J & S Plant Consultants, Inc., Skippers, VA 23879; and R. R. BOSEMAN, Crop Protection Specialists, 2020 Boseman Road, Rocky Mount, NC 27804.

The efficacy of tribasic copper sulfate, a broad spectrum fungicide-bactericide, has recently been enhanced by new technology. Peanut (Arachis hypogaea L.) leafspot diseases caused by Cercospora arachidicola Hori and Cercosporidium personatum (Berk. & Curt.) Deighton are effectively controlled by 2 to 3 pounds tribasic copper sulfate product per acre on a standard spray schedule. Because less Sclerotinia spp. disease is observed in tribasic copper sulfate leafspot disease control studies, extrapolation from acquired data prompted laboratory and field research with this product to control Sclerotinia minor Jagger, Sclerotinia sclerotiorum (Lib.) de Bary, and Sclerotium rolfsii Sacc. These studies demonstrated that tribasic copper sulfate is superior to currently recommended fungicides for Sclerotinia blight and stem rot control when utilizing optimum application methods and rates. Research in progress indicates that copper resinate provides effective control of stem rot and Sclerotinia blight disease organisms at economical rates.



#### Field Evaluation of Bacterial Antagonists for Peanut Leafspot Control

H. W. SPURR, JR.\* and W. THAL, USDA-ARS, Oxford, NC 27565 and Department of Plant Pathology, North Carolina State University, Raleigh.

Two bacterial strains, *Bacillus thuringiensis* HD-1 and *Pseudomonas cepacia* PC-742, are antagonists of the fungal pathogen *Cercospora arachidicola* Hori which causes early leafspot of peanut. When these strains were applied to peanut foliage they provided excellent control of leafspot under ideal conditions in the laboratory. In the field, control was variable from year to year and less than provided by the fungicide chlorothalonil. The impact of production, formulation and timing of spray applications on field performance of these strains was investigated at three locations in North Carolina and Virginia on Florigiant peanut in 1986. Both strains were similar in efficacy and significantly decreased leafspot at all locations on a 14-day schedule and were less effective than chlorothalonil. The 14-day schedule was more efficacious than others including a forecast schedule. Combination of the two strains was less effective than separate applications. Formulation of the strains with the sugar raffinose was more effective than formulation with lactose in the laboratory and less effective in the field. In conclusion, production, formulation and application procedures significantly altered field survival of these bacterial strains and their efficacy for leafspot control.

#### Effects of Irrigation Regime and Season on Growth and Development of Peanut

Genotypes. D. L. KETRING\*, USDA-ARS, and Agronomy Dept., Oklahoma State University, Stillwater, OK 74076.

Growth and development responses of peanut (*Arachis hypogaea* L.) to environmental conditions (water, temperature, and light) are needed to increase knowledge of this crop and provide calibration data for peanut crop growth simulation models. Two peanut genotypes, Pronto (spanish) and OK-FH15 (virginia-runner), were grown at the Perkins, OK, Agronomy Farm under line source irrigation in 1985 and 1986. Two and three levels of water (irrigation plus rainfall) were compared in 1985 and 1986, respectively. Amounts of water received by the crop in 1985 were about 61 cm of rainfall plus 24 and 11 cm of irrigation for treatments 1 and 2, respectively. In 1986, amounts of water were about 58 cm rainfall plus 23, 13, and 2 cm for treatments 1, 2, and 3, respectively. In addition, light energy and temperature were compared for the two seasons. Crop growth parameters measured were LAI, leaf, stem, fleshy pod, seeded pod, total pod, seed and shell weights, and number of fleshy and seeded pods. Generally, vegetative growth (LAI, total shoot dry weight) was less in 1985 than in 1986. This was reflected in both leaf and stem dry weights. Pronto produced less vegetative biomass than did OK-FH15, but produced more biomass with less water. Total pod dry weight was less in 1985 than in 1986. OK-FH15 showed higher potential for producing more pods with more water, while Pronto showed greater productivity with less water. This was reflected in the higher number and weight of fleshy pods produced by OK-FH15 than by Pronto under high water regimes. Number and weight of seeded pods were greater for Pronto than for OK-FH15 early in the season, but this was reversed later in the season, showing the differences in maturity of the genotypes. Seed dry weight followed the same pattern as seeded pod dry weight. The data show differences in crop growth between an early maturing (spanish) and a late maturing (virginia-runner) genotype, and the effect of irrigation regime.

Response of Florunner Peanut to Water Stress Levels Induced Through Irrigation Timing by Canopy Temperature. A. M. SCHUBERT\* and T. H. SANDERS. Texas Agricultural Experiment Station, Yoakum, TX 77995, and USDA-ARS, National Peanut Research Laboratory, Dawson, GA 31742.

It is difficult to systematically subject field plots to variations in water stress without expensive, labor intensive rain shelters which restrict plot size. While line-source irrigation gradient systems offer a solution, they occupy large land areas and wind greatly affects water distribution in some climatic regions. Canopy temperature measurements by infrared thermometers have been successfully used to indicate water stress and to schedule irrigation in some crops. Differential canopy/ambient temperature, as measured by an infrared thermometer, was used in a stress degree day (SDD) index to schedule irrigation in Florunner peanut at Yoakum, Texas in 1984, 1985, and 1986. Canopy temperatures were measured daily at solar noon. When canopy temperature was above ambient, plants were assumed to be water stressed. The number of degrees Celsius by which canopy temperature exceeded ambient were averaged for each treatment to obtain the SDD value. SDD values were totaled each day until the sum exceeded a pre-set value for that treatment. On the day after reaching the critical SDD value, 25 mm of water was applied with a small portable sprinkler system. Treatments included plots watered at 5, 10, 15, 20, and 25 SDD and an unwatered check. Throughout the 3-year experiment, there were significant treatment effects on pod yield, grade, crop value, percent sound splits, and other kernels. Significant linear declines in pod yield were observed during each crop year as SDD level increased. Pod yields declined 42.5 kg/ha for each SDD delay in irrigation in the 5- to 25-SDD range. As drought stress became more severe, kernel sizes declined. In the 3-year test, percent other kernels in the rainfed check was twice that in the wettest treatment.

Peanut Inoculum Evaluations. D.T. GOODEN\* and H.D. SKIPPER, Edisto Research and Education Center, Department of Agronomy, Clemson University, Blackville, SC 29817.

Tests were conducted during 1985 and 1986 to evaluate different sources and types of commercial peanut inoculum. Materials evaluated included granular, seed treatment and liquid inoculum. Results indicated that greatest response of color nodule rating and yield in non-history fields was with the soil applied materials. Seed treatment inoculum was intermediate. In these tests, application of nitrogen did not improve the response significantly. In a non-irrigated history field, yield was not improved with inoculum though color and nodule rating was similar to non-history response. It is interesting that double rates of granular inoculum tended to produce lower yields than the normal rate in all tests.

Irrigation Scheduling for Peanut by Predicting Plant Available Water. N. L. Powell\*, F. S. Wright and B. B. Ross, Department of Agronomy and USDA-ARS, VPI&SU, Tidewater Agricultural Experiment Station, P. O. Box 7099, Suffolk, VA 23437 and Department of Agricultural Engineering, VPI&SU, Blacksburg, VA 24061.

A field study of irrigating peanut in southeast Virginia was conducted on a well-drained Norfolk loamy fine sand soil during crop years 1980-1983. Irrigation water was applied to the crop with a hose tow traveling gun irrigation system. A water-balance model utilizing plant, soil, and climatic data was used to schedule irrigation. Information needed to update the model on a daily basis included leaf area index, maximum and minimum air temperature, precipitation, irrigation, and total incoming solar radiation. The model was used to calculate the percent plant available soil water remaining in the plant root zone on a daily basis. Plant available soil water estimated at weekly intervals by the gravimetric method was compared with the percent plant available soil water calculated by the model. Crop year 1980 was the driest year with only 201 mm of rainfall during the crop growing season. Rainfall for the 1981 through 1983 crop growing seasons was 582, 622, and 472 mm, respectively. Irrigation water applied during the 1980 through 1983 crop growing seasons was 292, 163, 99, and 191 mm, respectively. Peanut yield was increased with irrigation by approximately 200% in 1980 (2200 kg/ha yield increase). However, because of increased disease pressure in the irrigated crop for 1981 through 1983 peanut yields were decreased with irrigation by approximately 8 to 29% (400 to 1600 kg/ha yield decrease).

Irrigation Method and Water Quality Effect on Peanut Yields. F. J. ADAMSEN. USDA-ARS, Suffolk, VA 23437

Peanuts (*Arachis hypogaea* L. cv. VA 81B) were grown in field plots in 1984, 1985 and 1986 using sprinkler and deep buried trickle irrigation and deep well and shallow well water in a factorial design with a non-irrigated control. The deep buried trickle irrigation lateral lines (trickle tubes) were installed 350 to 410 mm below the soil surface. Deep and shallow well water had Na contents of 220 and 4.8 mg/L and sodium absorption ratios (SAR) of 103 and 3.1, respectively. SAR values greater than 15 are generally considered potentially hazardous to soils and plant growth in arid regions. Trickle and sprinkler irrigated plots received an average of 90 and 174 mm of irrigation water respectively. On average trickle irrigated plots used only 52% as much water as sprinkler irrigated plots. The average yield of the non-irrigated control was 4424 kg/ha (3950 lb/a) over 3 years. The best irrigation treatment was shallow well trickle which averaged 4734 kg/ha (4227 lb/a) over the same period. All irrigated treatments had higher yields than the control, except deep well sprinkler plots which yielded 4192 kg/ha (3743 lb/a) for three years. The ELK content of irrigated peanuts was lower than the non-irrigated control. ELK's in sprinkler irrigated peanuts were significantly lower than those in trickle irrigated peanuts. Deep well sprinkler irrigated peanuts produced fewer ELK's than any other treatment. Every grade factor determined was lower in deep well sprinkler irrigated peanuts. The reasons for these differences are not clear at this time. The value of peanuts from the control plots was \$2838/ha (\$1149/a). Peanuts from the shallow well trickle irrigated plots had a value of \$3034/ha (\$1228/a). Value of peanuts from the deep well sprinkler plots was \$2550/ha (\$1032/a). The best irrigation treatment (shallow well trickle) increased the yield of peanuts 7% and value 6% over 3 years in this study. Water quality affected both yield and grade. Water savings, higher yields, better grades and lower operating costs make trickle irrigation an attractive alternative to the sprinkler irrigation.

#### Subirrigation of Peanuts Using an Existing Drainage System.

F. S. WRIGHT\* and F. J. ADAMSEN, USDA-ARS, Tidewater Agri. Expt. Sta., Suffolk, VA 23437.

The irrigated peanut acreage in the Virginia-North Carolina area has increased several fold in the last seven years. Sprinkler irrigation is the most widely used method. Where suitable, subirrigation could provide a more economical and more desirable means of supplying the plant-water needs. The purpose of this paper is to discuss the design and performance of a water control structure installed into an existing on-farm tile drainage system to provide supplemental water for peanuts. The tile drainage system in the selected field (3.2 ha) included one submain and five lateral lines (spaced 34 m apart at a depth of 0.8 to 1.3 m). The field sloped approximately 0.5% and contained three soil types (Myalt, Slagle, Yemassee). The control structure, containing a float switch and adjustable overflow standpipe was installed in the submain outlet flow line. The water table level averaged 18, 34, and 56 cm below the target water level for 1984, 1985 and 1986, respectively. The success to maintain the water table at a desired level was affected by the water table level at the start of the subirrigation mode and the cumulative rainfall during the growing season. Some seepage was detected at the low end of the field. However, the water table level was maintained between 50 and 100 cm below the soil surface. Peanut yields averaged 3424, 4812 and 4387 kg/ha for the three years, respectively. Supplemental water supplied by irrigation appeared adequate and plant response was good. Plant stress was not observed during dry periods as it was in surrounding fields. The technology of subirrigation using an existing tile drainage system was successfully transferred to an on-farm location.

#### Interaction and Minimum Sufficiency Levels of K and Mg for Peanuts Grown on Two

Sandy Soils. M. E. WALKER\*, T. P. GAINES, and M. B. PARKER, Univ. of Georgia, Coastal Plain Stn., Tifton, GA 31793-0748.

Research data are limited on K and Mg requirements of peanuts grown on sandy soils. Field experiments were conducted for three years on Lakeland and Fuquay sands (i) to determine K and Mg effects on yield of Florunner peanuts; (ii) to evaluate relationships between leaf and soil K and Mg; and (iii) to determine sufficient amounts of K and Mg in peanut leaves and soils. Initial soil test values (Mehlich No. 1 extractant) for Fuquay and Lakeland soils were 53 and 23 kg K ha<sup>-1</sup> (low) and 16 and 9 kg Mg ha<sup>-1</sup> (low), respectively. Rates were 0, 56, 112, and 224 kg K ha<sup>-1</sup> and 0, 67, and 134 kg Mg ha<sup>-1</sup> in all combinations. Treatments did not affect yield of peanuts grown on the Fuquay soil because soil levels were sufficient without added K or Mg. On the Lakeland soil, yields were increased by K up to 56 kg ha<sup>-1</sup> each year and by Mg up to 67 kg ha<sup>-1</sup> in two of three years. Yields (3-yr average) were increased 31% by Mg without K, 51% by K without Mg, and 69% by Mg and K combined. Concentrations of K and Mg in leaves and soils were increased by increased amounts of each element. Minimum sufficiency levels for maximum yield were 10 and 2.0 g kg<sup>-1</sup> for leaf K and Mg, respectively, and 20 and 12 mg kg<sup>-1</sup> for soil K and Mg, respectively.

Predicting the Calcium Requirement for Peanuts. H. SMAL\*, M. E. SUMNER, and A. S. CSINOS, Dept. of Agronomy, Univ. of Georgia, Athens 30602 and Dept. of Plant Pathology, Univ. of Georgia Coastal Plain Experiment Station, Tifton 31793. Because Ca supply to developing peanut (*Arachis hypogaea* L.) pods is mainly through the soil solution and because problems have been experienced with the prognostic value of the Mehlich I method in assaying the need for gypsum application to supply Ca, field experiments were carried out at 20 locations in Georgia to investigate the efficacy of a water extract for this purpose. Gypsum applications were made at flowering and soil samples taken after first irrigation or rainfall for analysis. Peanuts were harvested and evaluated for disorders associated with calcium deficiency. In the new method developed for the determination of calcium requirement of peanuts, water was used as the extractant, and after filtration, Ca was measured by specific ion electrode. The results showed that the proposed method was sensitive, easy to conduct, and a preliminary calibration for prediction of calcium requirement of peanuts was established. The optimal conditions for yielding and pod rot suppression were following: 75-130 ppm Ca; 10.0 Ca:K ratio; 20.0 Ca:Mg ratio.

Peanut Production Technology in the Eastern Caribbean. B. R. COOPER\* and M. GORDON Caribbean Agricultural Research and Development Institute, P.O. Box 766, St. John's, Antigua, West Indies.

Peanut production in the Eastern Caribbean is restricted to small farm units of one hectare or less. Levels of technology are low with high labour inputs and minimum use of agrochemicals. Average farm yields are approximately 1000 kg/ha. The two most important varieties are Tennessee Red and NC2 which are reasonably stable yielders under these low inputs. Both are susceptible to rust and leaf spot and are not very responsive to higher levels of inputs. Under the peanut Cooperative Research Support Program (CRSP), in association with the University of Georgia, over 100 accessions have been screened and 20 of these have been selected for further evaluation. Another constraint to increased production is the high labour requirement. The paper reports on the introduction and testing of appropriate labour saving technology for shelling, planting and drying. Harvesting and threshing remain major problem areas. The prospects for development of this crop depend on the successful selection of improved varieties, a reduction in the labour requirement and the development of improved marketing and utilization.

Tillage Methods: Their Effect on Mineral Content of Peanut Tissues.

R. K. HOWELL\*, F. S. WRIGHT, and D. M. PORTER, USDA, ARS, Beltsville, MD 20705, and USDA, ARS, Tidewater Research Center, Suffolk, VA 23437

Non-plow tillage methods are estimated to comprise as much as 90% of the U.S. soil tillage in the near future. Is there an effect of tillage methods on plant mineral content? Tillage systems 1) conventional plow, 2) in-row till, and 3) 10" band till and peanut cultivars 1) Florigiant, 2) NC-6, and 3) Va 81B were selected as experimental treatments. Tillage systems were whole plots and cultivars were subplots. The basic plot was replicated 4X and consisted of four rows 90 cm apart and 15.2 m long. On each of five harvest dates, five randomly selected plants were taken from a border row of an appropriate treatment for analysis. Plants were cleaned and divided into tops, roots, and nodules. All sub-samples were analyzed for N, P, K, Ca, Mg, Fe, Mn, Cu, and Zn. Results were reported as ppm on a dry weight basis. Nodule dry weights/plant were significantly smaller on plants from conventional plowing than on roots from minimal till treatments. Both top and root weights were significantly larger on plants from conventional plowing than on plants from the other treatments. Tillage treatments significantly influenced nodule contents of P, K, Ca, Mg, Fe, B, Cu, and Zn. Top mineral contents of N, P, K, Mg, Fe, and Cu were significantly influenced by tillage methods. Tillage methods also significantly influenced root concentrations of P, K, Ca, Mg, and Cu. The data suggest that mineral contents of plant components vary significantly for tillage methods and that peanut nutrient requirements may be dictated by the tillage system used.

Influence of Reduced Cost Production Practices on Income from Producing Non-Quota

Peanuts. D. L. HARTZOG\*, Dept. of Agronomy and Soils; N. R. MARTIN, JR. and J. A. ATWOOD, Dept of Agri. Econ. and Rur. Soc., and D. R. PARRISH, Ala. Coop. Ext. Ser., Auburn University, AL 36849.

Research was conducted in 1982-1985 at Headland, Alabama to evaluate the economic influence of row spacing, seeding rates, herbicides, and fungicide rates on income from producing non-quota peanuts (*Arachis hypogaea* L.). Enterprise budgeting procedures were used to calculate farm level costs and returns for replicated treatment observations (4x18) over the four test years. Net returns and yield data were analyzed by analysis of variance techniques. Twin row spacing increased yields and net returns when compared to conventional row spacing. These results were statistically significant in three of the four test years. Although statistical significance occurred less frequently in other test comparisons, four year averages of yields for reduced inputs of seed, fungicide, and herbicide were reduced by 260, 129, and 56 kg/ha per acre, respectively. Four year average net returns were lower for reduced seed and fungicide treatments, but slightly higher for the reduced herbicide treatment at prices investigated for non-quota peanuts.

Intra-row Seed Spacing Effects on Five Peanut Cultivars. R. W. MOZINGO\* and J. L. STEELE. VPI & SU and USDA-ARS, Tidewater Agricultural Experiment Station, Suffolk, VA 23437.

Peanut (*Arachis hypogaea* L.) cultivars Florigiant, NC 6, NC 7, VA 81B, and NC 9 were seeded at intra-row spacings of 5.1, 7.6, 10.2, and 15.2 cm in a 3-year field study at the Tidewater Agricultural Experiment Station, Suffolk, Virginia from 1984 through 1986. Plots consisted of two rows 3 m long with inter-row spacing of 91.4 cm for all treatments. Main stems were taller and lateral branches longer with closer intra-row seed spacings. Height of the main stems averaged 42.7, 38.9, 36.7, and 32.9 cm and length of the lateral branches averaged 51.9, 50.0, 49.1 and 47.5 cm with intra-row seed spacings of 5.1, 7.6, 10.2 and 15.2 cm, respectively. Differences were not obtained for grade characteristics except the average percentages of sound mature kernels and total meat which were higher for the 15.2 cm seed spacing than for the 5.1 cm spacing. The number of pods per plant significantly decreased and pods per meter of row increased with closer intra-row seed spacing. Yields averaged 4359, 4221, 4023, and 3827 kg/ha; however, values minus seed costs were 2552, 2572, 2492 and 2430 \$/ha for seed spacings of 5.1, 7.6, 10.2, and 15.2 cm, respectively. Yield increased with closer intra-row seed spacings for all cultivars except NC 9 which was highest at the 7.6 cm spacing. Value minus seed cost (\$/ha) was not significantly different between intra-row spacing for four of the five cultivars studied. VA 81B had a significantly higher value minus seed cost for the 5.1 and 7.6 cm spacings. This study showed that yield increased with closer intra-row seed spacing; however, value minus seed cost may not increase.

Use of Geocarposphere Temperature As A Tool in Managing Peanut Production.

J. I. DAVIDSON, JR.\*<sup>1</sup>, P. D. BLANKENSHIP<sup>1</sup>, T. H. SANDERS<sup>1</sup>, R. J. COLE<sup>1</sup>, R. J. HENNING<sup>2</sup>; USDA-ARS, National Peanut Research Laboratory, Dawson, GA<sup>1</sup>, Farmers Fertilizer & Milling Co., Inc., Colquitt, GA<sup>2</sup>.

Field research data were presented to show that water and pest control needs were highly correlated to geocarposphere temperatures and maximum yields and quality of florunner peanuts were obtained when soil temperature in the geocarposphere were maintained within the prescribed limits. These limits depend upon canopy coverage and fruiting stage of the plant. For example, during the primary fruit addition stage under full canopy (>90%) the maximum daily temperature should be kept between 26.7° (80°F) and 27.8° (82°F). Likewise, the minimum daily temperature should be kept between 21.2° (70°F) and 23.4° (74°F). Slightly higher temperatures (1°-3°) are permitted under less than full canopy or after the 40-day primary fruit addition period. This information and that obtained by other investigations on the effects of soil temperature on emergence, root growth, maturation, and aflatoxin shows that practical instruments such as maximum-minimum dial thermometers should be useful tools for irrigating and controlling pests in peanuts.

PEANUTPC: A User Friendly Peanut Growth Simulation Model. L. J. RAINNEY\*,  
J. H. YOUNG, and K. J. BOOTE. Biol. & Agr. Engr. Dept., North  
Carolina State University, Raleigh, NC and Agronomy Dept., University  
of Florida, Gainesville, FL 32611.

Before peanut growth simulation models may be recommended for general use, they must be carefully calibrated and verified. PEANUTPC is a micro computer program designed to allow the user to select one of two existing models which may be used to simulate North Carolina peanut growth: (1) PEANUT, developed at North Carolina State University or (2) PNUTGRO, developed at the University of Florida. The user is offered a selection of crop and weather parameters from a data base. Also, the user has the option to simulate the effects of irrigation and defoliation on peanut yield. Both graphical and tabular results are quickly and easily compared thereby expediting calibration and verification of both models.



## Weed Science

Acetanilide Herbicide Effects on Peanut Growth and Development. J. CARDINA\* and C. W. SWANN, USDA-ARS, and University of Georgia, Tifton, GA 31793.

The acetanilide herbicides alachlor and metolachlor are widely used for grass and broadleaf weed control in peanuts. Preplant incorporated applications of these herbicides have been reported to retard peanut growth and reduce stands. Experiments were conducted to determine the influence of sequential herbicide applications, herbicide rates, and irrigation on acetanilide injury to peanuts. The delay in peanut emergence showed a linear effect of herbicide rate up to 6.72 kg/ha. Peanut maturity profiles indicated a corresponding delay in pod development. Irrigation following herbicide incorporation and sequential application of acetanilide herbicides in combination with naptalam plus dinoseb resulted in reduced peanut top growth in 1985 and 1986, but yield trends were inconsistent.

Control of Florida Beggarweed in Peanuts with Chlorimuron. B. J. BRECKE\*, Univ. of Florida, AREC, Rt. 3, Box 575, Jay, FL 32565-9524.

The efficacy of chlorimuron for control of Florida beggarweed in peanuts was evaluated over a 2-yr period at Jay, Florida. Chlorimuron was applied at three rates (9, 18, and 36 g/ha) to Florida beggarweed at two growth stages in 1985 and three growth stages in 1986. In 1985, herbicide treatments applied to 40 cm tall beggarweed provided better control than those applied to 20 cm tall weeds. Chlorimuron applied at 18 g/ha to the larger size beggarweed provided control comparable to that achieved with season-long hand weeding. In 1986, chlorimuron applied at 9 and 18 g/ha to 8 cm tall Florida beggarweed provided 80% and 100% control, respectively. When applied to weeds 20 cm tall, application rates of 18 and 36 g/ha were required to provide 80 and 100% control, respectively. None of the treatments applied to 36 cm tall Florida beggarweed provided an adequate level of control. The difference between years in control of the larger size weeds may be due to the dry conditions that prevailed during 1986.

Weed Control in Southeastern Peanuts Before, During and After Dinoseb. D. L. COLVIN\*, Dept. of Agronomy, University of Florida, Gainesville, FL 32611.

Although many breakthroughs have played a significant part in superior peanut production, environmental, human health and political concerns have begun to limit some of the significant advances made by the peanut industry. Recently daminozide has all but been prohibited from use on peanuts, not necessarily based on science but more so on public perception. An even more serious development is the recent loss of dinoseb for weed control in peanuts due to regulatory action by the U.S. Environmental Protection Agency. The removal of dinoseb has placed many peanut growers in the southeast under a hardship in relation to broadleaf weed control. Prior to the 1950's peanut growers used mechanical means for peanut weed control. During the early 1950's and 60's several chemicals were developed that all but removed the need for intense hand labor to produce weed free peanuts. Growers have utilized these materials for the past 20 to 30 years but now with the removal of an important broadleaf control chemical like dinoseb where will the peanut industry turn for safe economical broadleaf weed control in the years to come? The potential for use of existing chemicals to replace dinoseb does exist. However, most alternatives are more expensive than dinoseb or are considered somewhat undesirable by the general public. Possible alternatives include: 1) Gramoxone Super (paraquat) applied at 0.125 lb/ai/ac and, if needed, followed by a second application of the same, 2) Cobra (lactofen) has good tolerance on peanuts and could be used at a rate of 0.2 lbs/ai/ac in a split application, 3) Blazer (aciflourfen) has been labeled in peanuts postemergence for several years but has recently undergone label modifications which allow its application as an at-cracking treatment. Blazer could be used at-cracking at a rate of 0.375 - 0.50 lbs/ai/ac. Several other alternatives do exist, but most are not as effective on hard to control broadleaf weeds and, with the exception of paraquat, all other alternative treatments are more expensive than dinoseb.

Postemergence Weed Control in Peanuts with Gramoxone® Super. J. N. LUNS福德\*, ICI Americas Inc., Dothan, AL 36303

Gramoxone Super was evaluated as a postemergence spray in peanuts for the control of smallflower morningglory, sicklepod, Florida beggarweed, and bristly starbur. Gramoxone Super was applied alone at 0.125 lb ai/A plus 1.8% non-ionic surfactant and tank-mixed with Amiben at 2.00 lb ai/A, Lasso at 3.00 lb ai/A, and 2,4-DB at 0.25 lb ai/A. Applications were made 23 days after planting when peanuts were 4 to 6 inches wide and weeds had 1-6 true leaves. Three days after treatment (DAT) peanut injury was rated from 13.3% to 31.7%. Peanuts rapidly recovered with injury 20 DAT ranging from 0% to 3.67%. All applications with Gramoxone Super provided 100% control of sicklepod and Florida beggarweed. Bristly starbur control ranged from 87.6% to 95%. Smallflower morningglory was not controlled by Gramoxone Super treatments except where 2,4-DB was included in the tank-mix. These results show excellent potential for Gramoxone Super to be used as a post-emergence spray in peanuts.

Season Long Annual Grass Control in Peanuts with Fusilade® 2000. J. N. LUNSFORD\*, BEN ROGERS, VANCE GREESON and HENRY YONCE. ICI Americas Inc., Dothan AL; Statesboro, GA; Pikeville, NC; DeLand, FL

Fusilade 2000 postemergence treatments of 0.125, 0.156, and 0.188 lb ai/A plus 1% crop oil concentrate were applied at various intervals (3, 5 or 7 weeks) after the ground cracking spray of Lasso + Dyanap (3.00 + 4.5 lb ai/A) or Dyanap at 4.5 lb ai/A, or a postemergence treatment of Gramoxone Super at 0.125 lb ai/A. Annual grasses present were southern crabgrass, southern sandbur, and crowfootgrass. For the respective grasses, Lasso + Dyanap alone provided 60%, 75%, and 82.5% control. Prowl at 0.75 lb ai/A preplant incorporated followed by Lasso + Dyanap provided 85%, 72.5%, and 95% control, respectively. Fusilade 2000 applied at all timings and rates provided 100% control of all annual grass species. Fusilade 2000 is capable of providing season-long annual grass control in peanuts.

Effect of Preemergence Treatments of Oxadiazon on Peanuts. G. G. BARR\* and J. A. BARRON, Rhone-Poulenc Ag Company, P. O. Box 350, El Campo, TX 77437 and P. O. Box 12014, 2 T.W. Alexander Drive, Research Triangle Park, NC 27709, respectively. Oxadiazon is a preemergence herbicide currently registered for use in commercial turf and nursery ornamental production in the United States and in rice, vegetable and orchard crops in Asia and Europe, respectively. Numerous trials have been conducted by Rhone-Poulenc Ag Company as well as university and extension weed specialists to determine the effectiveness of Ronstar as a preemergent herbicide on peanuts. Peanuts exhibit good crop tolerance at rates of 1.12 kg/ha to 2.24 kg/ha. Excellent control of pigweeds (*Amaranthus* spp.), Florida beggarweed (*Desmodium tortuosum*), Texas panicum (*Panicum texanum*), sandbur (*Cenchrus* spp.) and numerous other weed species has been achieved at such rates. The preemergent broad spectrum weed control and crop safety provides growers additional utility in their peanut weed management system.

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Efficacy and Behavior of Imazethapyr in Peanuts and Associated Weeds.

T. A. COLE\*, J.W. WILCUT, T.V. HICKS, and G.R. WEHTJE. Auburn University, AL 36849

Field studies were conducted in 1986 to determine weed control efficacy and peanut tolerance to imazethapyr. Preplant-incorporated and preemergence applications were more effective than cracking and early postemergence treatments. Imazethapyr provided greater control of Florida beggarweed than imazaquin. None of the treatments reduced peanut yield or grade. Studies with C14-imazethapyr appear to indicate that tolerance is related to metabolism. At 72 h after application, peanuts metabolized 72% of foliar-applied imazethapyr while sicklepod and Florida beggarweed metabolized about 48% and 60%, respectively. At 72 h after application, approximately 95% of the radiolabel remained in the treated leaf. Absorption ranged from 76% in Florida beggarweed to 96% for sicklepod and peanut at 72 h after application.

Absorption, Translocation and Metabolism of Chlorimuron as Influenced by Peanut Maturity. J. W. WILCUT, G. R. WEHTJE, T. A. COLE and T. V. HICKS. Dept. of Agronomy and Soils, Auburn University, AL 36849.

Research was conducted to determine why peanuts become more tolerant to foliar applications of chlorimuron with increasing maturity. Chlorimuron has been demonstrated to be very active on Florida beggarweed; however peanut tolerance has been variable. Radiolabeled chlorimuron was used to study absorption, translocation and metabolism of chlorimuron in peanuts. Peanut tolerance to chlorimuron appears to be the result of decreased foliar absorption, decreased translocation and increased metabolism. Foliar absorption decreased from 87% in three-week old plants to 42% in ten-week old plants. Greater than 97% of the labeled chlorimuron remained in the treated leaves of ten-week old plants compared to approximately 86% in three-week old plants. Three-week old, seven-week old and ten-week old peanut plants metabolized 67%, 75% and 95% of foliar-applied chlorimuron, respectively.

The Effect of TOUGH on Florida Beggarweed Control and Crop Injury and Yield of Peanuts. J. S. HICKEY\* and C. A. CLARK, Hickey's Agri-Services Laboratory, Camilla, GA 31730 and Helena Chemical Co., Memphis TN 38137.

TOUGH [6-chloro-3-phenylpyridazine-4-yl S-octyl thiocarbonate (IUPAC)] herbicide was evaluated alone and in combination in peanuts (*Arachis hypogaea* L.) for Florida beggarweed and peanut crop injury and yield in 1985 and 1986. TOUGH alone gave a two year average of 65 and 78 percent control of 2-4 leaf beggarweed at one and two quarts per acre respectively. When applied in combination with LASSO + DYANAP and/or DINITRO, control increased to 83 and 93 percent respectively as compared to 57 percent control for LASSO + DYANAP and/or DINITRO treatment. No crop injury was observed in the TOUGH alone or TOUGH + LASSO combinations other than typical at-cracking burn from the DINITRO treatments. Crop yields were comparable to the standard treatments.

TOUGH<sup>®</sup> 3.75EC - A New Highly Selective Postemergence Herbicide in Peanuts.

H. R. Bodingbauer<sup>1</sup>, Gilmore, Inc., 5501 Murray Rd., Memphis, TN 38119.

A. Zohner, Chemie Linz, Research and Development, Plant Protection Division, St. Peter Strasse 25, A-4020, Linz, Austria.

M. Susani, Molecularbiologisches Institut, Akademie der Wissenschaften, Billrothstrasse, Salzburg, Austria

TOUGH<sup>®</sup> 3.75EC is a highly selective contact herbicide containing Pyridate a new compound out of the class of the phenyl-pyridazines. Pyridate was developed in the research laboratories of Chemie Linz and is marketed in the U.S.A. under the registered tradename TOUGH<sup>®</sup>. Due to the lipophilic properties of the ester component, treated leaves absorb Pyridate readily. After penetration into the plant, Pyridate hydrolyzes very quickly to 6-chloro-3-phenyl-pyridazine-4-ol, coded CL-9673, which has been established as the active principle. The mode of herbicidal action of CL-9673 is based on the inhibition of the photosynthetic electron transport activity in the chloroplasts. It had been found that peanut plants tolerate up to four times the recommended rates of TOUGH<sup>®</sup> without visible symptoms of phytotoxicity. Studies on the performance of Pyridate in peanuts showed nearly no effect on photosynthesis. Using <sup>14</sup>C-Pyridate it became evident that the compound easily penetrates into peanut leaf tissues. Pyridate then hydrolyzes into its main metabolite, CL-9673, which is transferred rapidly into non-phytotoxic conjugates largely of an N-glucosidic type. Strong inhibition of the Hill reaction by CL-9673 using isolated broken chloroplasts was found in both cases.

Control of Broadleaf Weeds in Peanuts with Pyridate Alone and in Combination with 2,4-DB. T. V. HICKS\*, J. W. WILCUT, T. A. COLE, and G. R. WEHTJE. Auburn University, AL 36849.

Field trials conducted at Headland, Alabama indicated that pyridate applied early postemergence over-the-top and again seven days later at 1.05 kg/ha (each), which followed at standard application of alachlor + Dyanap (2.25 + 5.04 kg/ha), provided better weed control than this standard treatment alone. Sicklepod control with this standard, as determined by weight was 68% relative to the untreated weedy check. With pyridate, control was increased to 84%. Comparable results were obtained with Florida beggarweed. Control of both species was enhanced by the addition of 2,4-DB (0.22 kg/ha), indicating a possible synergistic effect. These results indicate that these combinations may have potential for dinoseb replacement. While absorption of <sup>14</sup>C-pyridate was evident in peanuts and pertinent weeds, however the rate and amount of absorption did not appear to correlate with sensitivity.

## Extension Industry

FOLICUR™ (BAY HWG 1608) - Characterization of a New Interesting Fungicide for Peanut Diseases. H. J. ROSSLENBROICH\* and K. A. NOEGEL, MOBAY Corporation, Vero Beach, FL and Kansas City, MO.

Folicur™, tested for several years in the U.S. under the code name BAY HWG 1608, is a new, very efficacious, triazole fungicide for control of peanut diseases. First synthesized by BAYER AG, West-Germany, it is being developed by MOBAY, Kansas City, for the U.S. market. Folicur™ is a broad-spectrum fungicide with favorable toxicology. Folicur™ also exhibits excellent activity against cereal diseases, *Mycosphaerella* spp. on bananas, *Botrytis* on grapes and rusts on seed grasses. Folicur™ is very effective as a seed treatment against seed-borne diseases of cereals, corn and rice at very low concentrations. Folicur™ acts as a protectant and an eradicant. It is transported acropetally inside the plant and is evenly distributed in the leaf tissue. As with many other triazole fungicides, Folicur™ interferes with the fungal sterol biosynthesis. Besides the C14-demethylation, Folicur™ inhibits an additional enzyme of the ergosterol biosynthesis.

FOLICUR: A New Fungicide for the Control of Peanut Disease, R. D. Rudolph, Mobay Corporation, 1587 Phoenix Blvd., Suite 6, Atlanta, Georgia 30349.

FOLICUR was tested extensively for peanut disease control from 1982-1986 as BAY HWG 1608. Excellent early and late leafspot control, with yield increases over Bravo, were consistently observed in both University and Mobay test plots. More recently FOLICUR has been shown to provide commercially acceptable control of peanut rust and white mold. In addition, suppression of *Rhizoctonia* limb rot has been observed. Toxicological, environmental, and residue studies necessary for registration are in progress. With excellent efficacy against leafspots well documented, current performance testing emphasizes efficacy against other diseases of peanuts.

Spotless - A New Fungicide and Plant Growth Regulator for Peanuts. D. L. KENSLEY, JR., Chevron Chemical Company, Ocoee, FL 32761.

Spotless is a new sterol inhibiting fungicide currently being developed by Chevron Chemical Company. It has activity against a wide range of plant diseases caused by Ascomycetes, Basidiomycetes and Deuteromycetes. It has shown considerable promise on peanuts since it controls early and late leafspot, rust, and white mold; and suppresses Rhizoctonia limb rot. It also functions as a plant growth regulator on peanuts, by reducing excessive vegetative growth. Details on the fungicidal activity and plant growth regulating activity of Spotless will be presented. Test results also will be shown which demonstrate that the activity of Spotless is not reduced by rainfall that occurs more than 1 hour after application.

Select: A New Selective Postemergence Grass Herbicide. J. C. HULBERT, Chevron Chemical Company, Tucker, GA 30084.

Select, common name clethodim [(E,E)-(±)-2-[1-[[[(3-chloro-2-propenyl)oxy]imino]propyl]-5-(ethylthio)propyl]-3-hydroxy-2-cyclohexen-1-one] is a new selective postemergence grass herbicide under development by Chevron Chemical Company, Agricultural Chemicals Division. Select, a member of the herbicide class, cyclohexanedione-oxime, is being developed for use in soybeans, cotton, peanuts, potatoes, alfalfa, sugar beets and many vegetable crops for control of a wide range of annual and perennial grasses. Single applications of 84 to 140 gm ai/ha provide effective control of annual grasses and johnsongrass [*Sorghum halepense* L. Pers.]. Rates of 280 gm ai/ha or multiple applications of lower rates may be required for some perennial grasses such as bermudagrass [*Cynodon dactylon* L. Pers.]. The addition of an oil concentrate (2.34 L/ha) is recommended to achieve control at desired rates for all postemergence applications. For optimal results, Select should be applied when grasses are actively growing and less than 20 cm in height. Rate response is correlated to plant maturity at application. Preemergence activity on annual grasses has been observed at rates of 140 to 280 gm ai/ha from preplant incorporated and preemergence applications. Antagonism has been reported with certain postemergence broadleaf herbicides when either tank-mixed or applied sequentially with Select.



Benchmark: A New Broadleaf Herbicide in Cotton, Peanuts and Sorghum. J. C.

HULBERT and D. D. ROGERS, Chevron Chemical Company, Tucker, GA 30084.

Benchmark (RE-40885) [5-(methylamino)-2-phenyl-4-(3-trifluoromethylphenyl)-3(2H)furanone] is a new broad spectrum herbicide invented by Chevron Chemical Company, Agricultural Chemicals Division. It is being developed for control of broadleaf and grassy weeds in cotton, peanuts, sorghum, and sunflower. Other crops presently known to show some degree of tolerance to Benchmark include certain small grains, peas, safflower, certain vegetable crops, and tree and vine crops. In the furanone class of chemistry, Benchmark is formulated as a 75% wettable powder and kills plants primarily through inhibition of carotene synthesis. Use rates vary depending on application method and soil type. Benchmark is effective applied preplant incorporated, preemergence, directed postemergence (southeastern cotton) and at-cracking or postemergence over-the-top (peanuts). Coarse and medium soils with 2% or less organic matter require 0.5 to 0.75 lb ai/A for either preplant-incorporated or preemergence applications. At-cracking, directed-postemergence and postemergence treatments require 0.2 to 0.3 lb ai/A plus 1% (v/v) X-77 spreader to be effective on weed seedlings in the cotyledonary to 3-leaf stage. Benchmark can be applied postemergence in peanuts at 0.5 to 0.75 lb ai/A plus 1% (v/v) X-77 to control weeds in the 3 to 5-leaf stage of development and provide further preemergence activity. Benchmark appears to be compatible in tank mixture with postemergence grass herbicides. Preliminary findings suggest that susceptible crops may be planted back into soil treated at recommended rates as soon as 50 days after application. Economically important broadleaf weeds controlled by Benchmark include sicklepod (*Cassia obtusifolia*), Florida beggarweed (*Desmodium tortuosum*), a number of annual morningglory species (*Ipomoea* spp.) velvetleaf (*Abutilon theophrasti*), prickly sida (*Sida spinosa*), spurred anoda (*Anoda cristata*), hemp sesbania (*Sesbania exaltata*), black nightshade (*Solanum nigrum*), common lambsquarters (*Chenopodium album*), and smartweed (*Polygonum* spp.) as well as 12 other species. Grasses controlled or suppressed include barnyardgrass (*Echinochloa crus-galli*), foxtail species (*Setaria* spp.), crabgrass species (*Digitaria* spp.), crowfootgrass (*Dactyloctenium aegyptium*) and seedling johnsongrass (*Sorghum halepense*).

## Tomato Spotted Wilt Virus

Economically Important Crop Plant Hosts of TSWV other than Peanut. D. H. Smith, Texas A&M Univ., Texas Agr. Expt. Sta., Agr. Res. Sta., Yoakum, TX 77995.

The tomato spotted wilt virus (TSWV) has been reported on all continents but Antarctica. TSWV is a thrips-transmitted virus. The host range of TSWV is exceeded only by a few other plant viruses. TSWV is transmitted by Frankliniella occidentalis, Thrips tabaci, Frankliniella schultzei, Frankliniella fusca, and Scirtothrips dorsalis. In addition to a large number of weed hosts, some examples of crop plant hosts are: tomato, tobacco, pepper, Begonia, Dahlia, pineapple, potato, mung bean, lettuce, papaya, artichoke, Gladiolus, Petunia, and Pisum sativum. TSWV produces a wide array of symptoms, and several strains of the virus have been reported. Development of management strategies will be improved when there is more known about the complex interactions involving the hosts, vectors, and environmental factors.

Research on Tomato Spotted Wilt Virus at ICRISAT. D.V.R. REDDY, ICRISAT, Patancheru, 502 324, India. Tomato spotted wilt virus (TSWV) causes economically important diseases on several crop species in India, including bud necrosis of groundnut. ICRISAT initiated research on TSWV in 1976; the virus has been characterized, purified, antiserum produced, and detection methods refined. The role of thrips in transmission has been determined, screening methods established and sources of "field resistance" identified. An integrated disease management practice has been worked out for the region of India around Hyderabad. A simple detection method for TSWV suitable for use in disease surveys has been developed and utilised in several groundnut growing countries. Efforts are underway at the ICRISAT Centre to develop cultivars with resistance to TSWV and the vector thrips.

Entomological Aspects of TSWV, with Special Reference to the South Texas Peanut Agroecosystem. H. B. HIGHLAND\*, Texas Agricultural Experiment Station, Pearsall, TX 78061; P. LUMMUS, Texas Cooperative Extension Service, Pearsall, TX 78061; J. W. STEWART, Texas Cooperative Extension Service, Uvalde, TX 78801; J. W. SMITH, Jr., Dept. of Ent., College Station, TX. 77843; F. MITCHELL, Texas Agricultural Experiment Station, Stephenville, TX 76401; C. COLE, Texas Cooperative Extension Service, Bryan, TX 77806.

The thrips species in the U. S. that have been shown to be capable of transmitting TSWV are Frankliniella occidentalis (Pergande), Frankliniella fusca (Hinds), and Thrips tabaci Lind. Only F. occidentalis and F. fusca have been shown to infest peanuts in the U. S., and therefore must be considered the primary vectors of Tomato Spotted Wilt Virus (TSWV) in this crop. Thrips species found in South Texas peanuts include F. occidentalis, F. fusca, Frankliniella tritici (Fitch), Microcephalothrips abdominalis (Crawford, D. L.), and Caliothrips sp. Previous work has shown that F. fusca transmitted TSWV at consistently higher rates than did F. occidentalis. The transmissibility of TSWV by Frankliniella spp. found on peanuts in the U.S. using peanuts has not been tested. Low numbers of alate thrips were captured using sticky cup traps near South Texas peanut fields in late February, with higher catches occurring between mid April and mid May. Using Burlese funnels and native flowering plants in Frio Co. Texas prior to peanut emergence, many thrips species, including F. occidentalis, were found through the winter and spring months. F. fusca was not found on any of the native plants surveyed during the winter and early spring months.

Pathological Aspects of TSWV in South Texas. M. C. BLACK, Texas A&M University Agricultural Research and Extension Center, Uvalde, TX 78802-1849.

The first recorded occurrence of tomato spotted wilt virus (TSWV) on U.S.A. peanuts was in 1971, but incidence was not high until after 1984 in South Texas. Spotted wilt was diagnosed in most Southeastern states on several crops in 1986. The TSWV host range is more than 250 species. No obvious acreage or population changes occurred after 1984 among the several crop species, broadleaf weeds, woody brush species or ornamentals that are hosts. Certain thrips species are vectors of TSWV, but there is no evidence that a more vector efficient thrips species has been introduced. It has been previously recognized that several TSWV strains infect other crops, but no study has been done on variation among strains infecting peanut. It is possible that an exotic strain was introduced or that a mutation or recombination occurred in South Texas, resulting in a change in the pathogen population. Virus strain changes could alter the range of symptoms, symptom severity, vector efficiency and the number of winter and summer weed hosts. South Texas growers primarily attempted disease control in 1987 with soil and foliar insecticides. A few growers also separated late plantings from early planted peanuts, attempted broadleaf weed control in the vicinity of fields, and planted a tall grass barrier crop in 1987. Disease control efforts in future seasons are expected to involve less insecticide usage than in 1987 and more attention to separating plantings, weed and brush control, barrier crops, and varieties with partial resistance. Small plot 1986 variety tests suggested that partial resistance exists in certain breeding lines and in Southern Runner variety. Breeders are encouraged to use spotted wilt resistant lines as parents in future crosses.

## THE PRESIDENT'S REPORT

D. Morris Porter

The American peanut industry is noted worldwide for the production of high quality peanuts. Our industry has enjoyed little competition from abroad. Our world position was envied by the other peanut producing countries. However, peanut trade groups recently visiting Europe report that the export pipelines are now filled with peanuts produced from other countries. These peanuts are of good quality and are available at lower prices. These facts are alarming. We were informed in an earlier presentation as to what steps were necessary for our industry to continue its domination in the export marketplace. We were told that quality was what had given our peanut industry its competitive edge in the past. To successfully compete with the peanut growers of China, Argentina, Africa, and other countries, our growers must not only continue to produce high quality peanuts but they must also produce them more efficiently. Our ability to produce premium quality peanuts in an efficient manner will determine whether or not our growers can compete in the world marketplace. More importantly, however, it will determine if we can compete even on the national level.

The use of agrichemicals is a needed and accepted practice in peanut production throughout all peanut production areas of the United States. These chemicals enable the American peanut grower to produce peanuts efficiently. However, the presence of undesirable chemical residues in foods is an area of concern. Consumers do not want residue-containing foods in the marketplace. Growers neither wish to produce nor sell peanuts containing harmful residues. Our ability to produce residue-free peanuts is a challenge to the American peanut industry.

Peanut growers must continually attempt to maximize production but must do so under production regimes that conserve both soil and water resources. Most growers are blessed with both fertile soils and adequate water resources. These resources are, however, being pushed to the limit. Our ability to produce quality peanuts efficiently under production regimes that conserve our water and soil resources is being challenged.

Several key issues vital to the survival of the American peanut industry have been discussed. These issues are not simple problems requiring simple answers. They are complex and will be difficult to resolve. Cooperation between all facets of the peanut industry will be the key to our successes in solving these problems. The importance of research in problem solving can be found in the words of Mr. Richard Lyng, Secretary of the U. S. Department of Agriculture who recently said:

"The basic purpose of American research is not simply to increase production, but to find answers to the challenges society and agriculture face today and those they will certainly face tomorrow."

I believe that our Society, The American Peanut Research and Education Society, can lead the way in finding the answers to today's problems as well as those of tomorrow. The problem areas identified are not insurmountable, however, only when challenged will solutions prevail. The future successes of the American peanut industry will depend partially on our Society's success in solving the prevailing problems. The role of our Society is more important today than ever before. Our Society, its research arm and its extension arm, will rally to the tasks laid before it. Our Society will meet these challenges. We have in the past and we will in the future.

In closing, I want to express my deepest appreciation to all of you for your support, cooperation, and encouragement during my term as your president. It has been my pleasure to serve you. I thank you for allowing me this honor.

AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY

Board of Directors Meeting

Marriott Hotel, Orlando, Florida

July 13, 1987

President Morris Porter called the meeting to order at 7:05 p.m. Those present were: D. M. Porter, J. R. Sholar, W. D. Branch, G. A. Buchanan, D. H. Smith, W. E. Dykes, J. C. Wynne, E. J. Williams, D. L. Hartzog, H. E. Pattee, R. A. Taber, E. B. Whitty, T. A. Coffelt, N. L. Powell, D. W. Gorbet, C. S. Kvien, and G. W. Harrison.

Ron Sholar presented the Executive Officer report.

Bill Branch presented the American Society of Agronomy (ASA) liaison report. Approximately 5000 individuals attended the annual meeting of ASA. The next meeting will be November 29 to December 4, 1987 in Atlanta, GA. Report accepted.

Gale Buchanan gave the report from the Southern Agricultural Experiment Station Directors. He expressed concern on behalf of the Station Directors concerning changes in federal regulations on how much research will be done. Report accepted.

Don Smith presented the nominating committee report. The following nominations were made:

President	-Dan Gorbet, University of Florida
President-elect	-Hassan Melouk, Oklahoma State University
Executive Officer	-J. Ronald Sholar, Oklahoma State University
USDA Representative to Board of Directors	-Floyd Adamsen, USDA-ARS

Report accepted.

W. E. Dykes presented the Finance Committee report. During 1986-87, the cash position was enhanced by \$3500. The society has continued to operate on a "flat" annual budget with income only slightly greater than expenditures. The Finance Committee proposed a change in annual dues as follows:

Type Membership	Present Dues	Proposed Dues
Individual	\$ 15	\$ 25
Student	4	5
Institutional	15	15
Organizational	25	35
Sustaining	100	125

The Finance Committee report was accepted including the change in annual dues. Change in dues will be presented to membership during business meeting on July 17, 1987, and if approved would be implemented with 1988-89 fiscal year.

The Peanut Quality Committee report was given by Jay Williams. Report was accepted.

The Public Relations Committee report was made by Dallas Hartzog. Letters of invitation to join APRES have been mailed to potential sustaining members. The press was contacted about the annual meeting. Four long-time leaders in the peanut industry passed away during the last year. These were: Emory Cheek, Georgia; Frank Britt, Sr., Alabama; Nat Person, Texas; and Ruth Moore, Virginia. The report was accepted.

The Golden Peanut Award Committee report was given by Morris Porter. Bud Redlinger, Stored Grain Entomologist stationed in Savannah, Georgia, was the recipient of the last Golden Peanut Award. The report was accepted.

The Fellows Committee report was made by Harold Pattee. No nominations were received during the fiscal year. A discussion ensued on how to encourage nominations of deserving members to receive the fellow designation. The report was accepted.

The Bailey Award Committee report was presented by Ruth Ann Taber. Seven manuscripts were reviewed by the committee for the Bailey Award. The Bailey Award Committee made six recommendations concerning this award:

- 1) Senior author must be a society member.
- 2) Senior author must deliver the paper or paper will be disqualified.
- 3) One nominee should be selected per paper section.
- 4) All nominees should receive a certificate of merit.
- 5) Requirements of eligibility be listed on call for papers.
- 6) Special award for best graduate student paper.

The report was accepted and the six proposals will be voted on by general membership at the business meeting on July 17, 1987.

The Site Selection Committee report was made by Ben Whitty. The sites for future annual meetings are:

- 1988 - Sheraton Kensington, Tulsa, Oklahoma
- 1989 - Winston Plaza, Winston-Salem, NC, July 11-14, 1989
- 1990 - Atlanta or Savannah, Georgia

The report was accepted.

The Publication and Editorial Committee report was given by Terry Coffelt. The committee recommended that Craig Kvien and Corley Holbrook be named as co-editors of Peanut Research. This change is necessitated by the death of Emory Cheek and retirement of Aubrey Mixon. The following Associate Editors for Peanut Science have been nominated:

- |                  |                  |
|------------------|------------------|
| Entomology       | -Robert Lynch    |
| Plant Physiology | -Craig Kvien     |
| Plant Breeding   | -Charles Simpson |
| Soils            | -Floyd Adamsen   |
| Plant Pathology  | -Fred Shokes     |
| Engineering      | -F. Scott Wright |

The committee recommended that the President write a letter of appreciation to the Director of the Florida Experiment Station for publishing the Proceedings of the Quality Symposium held in conjunction with the 1986 Annual Meeting. The committee also recommended the President appoint an Ad Hoc Committee to study replacing Peanut Science and Technology. The report was accepted.

The Program Committee report was made by Dan Gorbet. One hundred twelve (112) papers were presented at the 1987 annual meeting in Orlando. The report was accepted.

An Ad Hoc Committee report on APRES membership in CAST was made by Norris Powell. The committee recommended that APRES petition to become a member of CAST. The current cost is \$1.30 per member. The report was accepted.

An Ad Hoc Committee report was made by Terry Coffelt on APRES participation in the Kvien-Hammons Data Base. The Committee recommended that the proposal that APRES participate in funding the Kvien-Hammons Data Base not be approved due to excessive cost. The Committee felt the Data Base was an excellent idea but too expensive for APRES to fund. The report was accepted.

Johnny Wynne moved that an Ad Hoc Committee be appointed to study the issue of graduate student papers. After discussion, the motion was passed.

President Porter discussed the process and reason for decreasing the price of Peanut Science and Technology.

The meeting was adjourned.

Minutes of the Regular Business Meeting of the  
AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY  
Marriott Hotel, Orlando, Florida  
July 17, 1987

The meeting was called to order by President Morris Porter at 8:20 a.m. The following committee reports were made and accepted:

Executive Officer

Nominating Committee

Finance Committee - The proposal to increase dues as outlined in the Finance Committee report passed.

Program Committee

Peanut Quality Committee

Public Relations Committee

Bailey Award Committee - All six recommendations concerning the Bailey Award as detailed in the Bailey Award Committee report were approved by the general membership. Requirements for consideration for the Bailey Award will be published in the January issue of Peanut Research and the Proceedings of the annual meeting. A motion was passed which directs the President to appoint an Ad Hoc Committee to study a graduate student session. The committee will report at the 1988 annual meeting.

Publication and Editorial Committee

Fellows Committee

Site Selection Committee

Ad Hoc Committee on CAST - Motion to petition for membership in CAST passed.

AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY

Balance Sheet for FY1986-87

<u>ASSETS</u>	<u>June 30, 1987</u>	<u>June 30, 1986</u>
Cash in Checking Account	\$ 17,946.42	\$ 17,512.14
Certificate of Deposit #1	13,027.11	12,026.94
Certificate of Deposit #2	8,375.64	7,877.05
Certificate of Deposit #3	7,571.20	7,000.00
Money Market Account	18,478.60	17,470.31
Savings Account (Wallace Bailey)	1,125.10	1,131.04
Inventory of Books	<u>39,399.36</u>	<u>41,167.28</u>
TOTAL ASSETS	\$105,923.43	\$104,184.76
 <u>LIABILITIES</u>		
None	\$ 0.00	\$ 0.00
 FUND BALANCE	<u>\$105,923.43</u>	<u>\$104,184.76</u>
 TOTAL LIABILITIES AND FUND BALANCE	<u>\$105,923.43</u>	<u>\$104,184.76</u>



AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY

Statement of Activity for Year Ending

<u>RECEIPTS</u>	<u>June 30, 1987</u>	<u>June 30, 1986</u>
Registration	\$ 10,427.54	\$ 5,455.00
Membership	12,327.00	16,298.24
Special Contributions	2,100.00	7,000.00
Differential Postage	2,703.00	2,380.00
Ladies Activities	0.00	380.00
Peanut Science and Technology	3,662.93	4,686.11
Quality Methods	481.25	465.90
Proceedings & Reprint Sales	48.00	92.75
Peanut Science Page Charges & Repr.	10,978.90	8,894.72
Checking Account Interest	948.35	1,024.87
Savings Account Interest (Wallace Bailey)	62.60	74.69
Money Market Account Interest	1,008.29	1,152.07
Certificate of Deposit #1 Interest	1,000.17	939.48
Certificate of Deposit #2 Interest	498.59	555.93
Certificate of Deposit #3 Interest & Prin.	571.20	7,000.00
<b>TOTAL RECEIPTS</b>	<b>\$46,817.82</b>	<b>\$56,399.76</b>
<u>EXPENDITURES</u>		
Annual Meeting	\$ 7,755.69	\$ 5,829.53
Membership	49.00	7.00
Office Supplies	1,299.89	3,147.12
Secretarial Services	8,047.00	7,620.75
Postage	1,442.00	1,935.80
Travel-Officers	969.57	289.63
Corporation Registration	10.00	60.00
Legal Fees	100.00	118.20
Sales Tax	60.33	77.73
Proceedings	4,321.00	3,978.32
Peanut Science	17,000.00	21,500.00
Peanut Science & Technology	106.22	122.07
Peanut Research	1,938.01	1,538.81
Quality Methods	0.00	0.00
Bank Charges	83.98	1.00
Money Market Account	0.00	0.00
Certificate(s) of Deposit	0.00	7,000.00
Miscellaneous	60.00	287.95
<b>TOTAL EXPENDITURES</b>	<b>\$43,242.69</b>	<b>\$53,513.91</b>
<b>EXCESS RECEIPTS OVER EXPENDITURES</b>	<b><u>\$ 3,575.13</u></b>	<b><u>\$ 2,885.85</u></b>
Cash in Checking Account:		
July 1, 1985 - \$24,348.46	June 30, 1986 - \$17,512.14	
July 1, 1986 - \$17,512.14	June 30, 1987 - \$17,946.42	

## NOMINATING COMMITTEE REPORT

The committee is pleased to nominate the following persons:

PRESIDENT-ELECT Hassan A. Melouk  
USDA-Department of Plant Pathology  
Oklahoma State University  
Stillwater, OK 74078

EXECUTIVE OFFICER J. R. Sholar  
376 Ag. Hall  
Oklahoma State University  
Stillwater, OK 74078

### BOARD OF DIRECTORS

USDA Representative Floyd J. Adamsen, USDA  
P. O. Box 7099  
Suffolk, VA 23437

1986-87 Nominating Committee:

R. C. Schools  
J. M. Troeger  
D. H. Smith, Chairman

## FINANCE COMMITTEE REPORT

July 14, 1987

The Finance Committee met on July 14, 1987, at the Marriott Hotel, Orlando, Florida. The auditor's report and Peanut Science Editor's report were reviewed and found to be in order.

The Cash position of the Society was enhanced by \$3,506.59; the inventory of Peanut Science and Technology was reduced by \$1,767.92 (77 books), thereby increasing the net worth by \$1,738.67.

Present Net Worth: \$105,923.43.

The Committee prepared a proposed budget (see next page), and made the following recommendations to the Board of Directors.

It is recommended that membership dues be changed as follows:

Individual	Present \$ 15	Proposed \$ 25
Student	4	5
Institutional	15	15
Organizational	25	35
Sustaining	100	125

Respectfully Submitted,

Finance Committee:

W. E. Dykes, Chairman  
J. S. Kirby  
R. W. Mozingo  
C. E. Simpson  
R. K. Howell

AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY

1987 - 1988 Budget

<u>RECEIPTS</u>	87-88 <u>Proposed Budget</u>
Registration	\$ 9,000
Membership	12,000
Proceedings and Reprint Sales	100
Special Contributions	3,000
Peanut Science and Technology	3,000
Peanut Science Page Charges and Reprints	13,250
Differential Postage Assessment-International members	2,500
Interest	4,000
APRES Methods Books	<u>350</u>
TOTAL RECEIPTS	\$ 47,200
<u>EXPENDITURES</u>	
Proceedings - Printing and Reprints	\$ 4,500
Annual Meeting	6,500
Secretarial	8,600
Postage	2,000
Office Supplies	1,000
Travel - Officers	1,000
Miscellaneous	500
Peanut Science	21,925
Peanut Science and Technology	400
Bank Charges	100
Peanut Research	2,200
Legal Fees	1,000
APRES Methods Books	<u>500</u>
TOTAL EXPENDITURES	\$ 50,225
Excess Receipts over Expenditures	\$ (3,025)
Cash - Beginning of Period	\$ 66,592.61
Cash - End of Period	\$ 63,567.61

## PUBLIC RELATIONS COMMITTEE REPORT

The public relations committee sent announcements of the annual meeting of APRES to 24 contacts in the farm publications business. The public relations committee requested the Florida delegation notify the newspapers, radio, and television stations in the Orlando area as they deemed appropriate.

The 1986 public relations committee had prepared a list of companies engaged in agri-business and with direct interest in the well-being of the peanut industry. Some 34 companies were identified who might have interest in becoming sustaining members of APRES. This committee sent a letter to 34 companies inviting them to become sustaining members. This list has been given to our executive officer, Ron Sholar.

Respectfully submitted,

D. L. Hartzog, Chairman  
D. M. Hogg  
P. M. Phipps  
W. Fugate  
H. A. Melouk  
D. A. Knauff  
E. J. Long

## RESOLUTIONS

Whereas, J. Emory Cheek, a co-editor of PEANUT RESEARCH for the past 15 years, died of a heart attack on June 14, 1987. He was 48.

During his tenure as librarian at the University of Georgia's Coastal Plain Experiment Station (CPES) at Tifton, Georgia, Cheek made substantial contributions to peanut researchers everywhere.

His association with the Station began in the mid-50's. During those years he used accrued leave from his desk job each fall to collect cotton boll samples for quality tests by USDA-ARS breeders. As assistant librarian he became a virtual encyclopedia of information in several disciplines, marking articles of interest in obscure publications for the many scientists involved in the cooperative state-federal research programs at CPES.

Emory Cheek was mainly responsible for assembling the world's most extensive collection of publications concerning peanuts. The books, theses, dissertations, bulletins, circulars, journal article reprints, miscellaneous and popular articles in the collection now number in the thousands. All peanut research and education personnel in Georgia -- and many from outside the state and nation -- have benefitted directly from the availability of this peanut collection.

Included in the CPES library is a special section containing more than 600 master's theses and doctor's dissertations. These (and others not in the collection but known to him) were documented in seven publications entitled "List of Theses and Dissertations on Peanut and Peanut-Related Research," Numbers 1 through 7, issued from 1969 through 1982, containing 734 titles.

Cheek was Co-Editor of APRES PEANUT RESEARCH from September 1972 until his death. In addition to working with the other co-editor writing and editing the "News", he handled the duties of "publisher" and "circulation manager." He had a part in developing 69 issues, from volume 10, issue 24 through volume 24, issue 102, or fully two-thirds of all issues of PEANUT RESEARCH.

Cheek is survived by his wife, a son, a daughter, his mother, and two brothers.

Therefore, be it resolved that we remember with reverence the life of Mr. Cheek and his contributions to peanut education.

Whereas, the late Mr. Frank Britt of Enterprise, Alabama, devoted 33 years of his life to agriculture and the production of peanuts, and

Whereas, Mr. Britt served 20 years as a member of the Board of Directors and 12 years as an officer of the Alabama Peanut Producers Association, actively promoting the peanut industry through university research and improved marketing, and

Whereas, Mr. Britt unselfishly gave of himself to his family, his church, and his community.

Therefore, the American Peanut Research and Education Society adopts this resolution on this day July 17, 1987, recognizing and remembering Mr. Frank Britt for his devotion and service to the peanut industry.

Whereas, Nat K. Person, a Research Agricultural Engineer of the Texas Agricultural Experiment Station, Texas A&M University System, passed away on March 30, 1987. Person, age 57, was an APRES member, formerly serving on the APRES Board of Directors. He made fine contributions in the development of peanut drying criteria and drying systems.

Therefore, the American Peanut Research and Education Society adopts this resolution on this day July 17, 1987, recognizing and remembering Mr. Person for his devotion and service to the peanut industry.

## PUBLICATION AND EDITORIAL COMMITTEE

Five committee members and two guests were present at the annual meeting, July 14, 1987, at Orlando, Florida. The following reports were read and approved: Report on Peanut Science by Harold Pattee; Report on Quality Methods by Esam Ahmed; Report on Peanut Research by Corley Holbrook; Report on Proceedings by Terry Coffelt; Report on sales of Peanut Science & Technology (see below) by Ron Sholar; Report by Ad-hoc committee to develop policy on publication of symposia proceedings. The committee recommends that publication of symposia papers be encouraged and that symposia organizers should work with Gale Buchanan, liaison with Southern Agricultural Experiment Station Directors, to finance publication of these symposia.

The committee recommends that Corley Holbrook and Craig Kvien be elected as co-editors of Peanut Research.

The committee recommends that Scott Wright (Engineering), Bob Lynch (Entomology), Fred Shokes (Pathology), Charles Simpson (Breeding and Genetics), Craig Kvien (Physiology), and Floyd Adamsen (Soils) be elected as Associate Editors of Peanut Science and that one associate editor position remain open until next year to be filled in the area of Breeding and Genetics.

The committee recommends that an ad-hoc committee be appointed to study the need for revising Peanut Science and Technology and report their recommendations to the Publications & Editorial Committee in Tulsa next year.

The committee recommends that the President of APRES write a thank you letter to the Dean for Research, IFAS, Univ. of Fla. for publishing the 1986 Quality Symposia.

The committee expresses appreciation to our editors, authors, reviewers, and other contributors to our Society publications.

Respectfully submitted:

C. S. Kvien  
A. M. Schubert  
D. J. Banks  
R. J. Henning  
A. B. Rogerson  
H. E. Pattee, Ex-Officio  
E. M. Ahmed, Ex-Officio  
C. C. Holbrook, Ex-Officio  
T. A. Coffelt, Chairman

## PEANUT SCIENCE AND TECHNOLOGY

### SALES REPORT 1986-87

	<u># of books sold</u>	<u>Remaining inventory</u>
Beginning inventory		1793
1st Quarter	31	1762
2nd Quarter	12	1750
3rd Quarter	19	1731
4th Quarter	15	1716
	<u>77 books</u>	

77 books x \$22.96 = \$1,767.92 decrease in value of book inventory

1716 x \$22.96 = \$39,399.36 total value of remaining book inventory

Number of books sold in 1985-86 - 102 books

## PEANUT QUALITY COMMITTEE REPORT

The meeting was convened at 3:00 P.M., July 14, 1987.

Harold Pattee distributed copies of the book 'Peanut Quality', an outgrowth of the Quality Symposium at the 1986 APRES meeting.

Melanie Miller of the National Peanut Council (N.P.C.) presented an update of the N.P.C. Peanut Quality Task Force that was co-chaired by Russell Schools and Ron Henning. The Task Force identified quality factors that should be addressed and evaluated for improvement. These quality factors were then prioritized by the industry. The Quality Committee discussed these factors and commended the N.P.C. Task Force for their outstanding efforts. Bob Petit made the motion that the N.P.C. Quality Task Force Report be included in the APRES Quality Committee Report. The motion passed. Melanie Miller also reported the establishment of the Peanut Foundation. The Peanut Foundation will begin accepting grant proposals and providing partial funding for research needs identified by the Task Force.

Norman Lovegren presented a report on a method of obtaining reproducible volatile profiles from peanut butter by gas chromatograph. These profiles include nine major compounds or groups of compounds that contribute or detract from acceptable flavor.

The Committee discussed and recommended that APRES schedule a symposium on chemical residues within the 1988 APRES program. Funding could be sought from outside sources if needed. The Committee also recommended that APRES schedule a similar symposium on the subject of aflatoxin and aflatoxin tolerance levels.

The motion was made and passed that the Quality Committee draft a resolution supporting the establishment of uniform and reasonable tolerance levels for pesticide residues. The resolution is to be presented to the Society for endorsement and copies of the resolution are to be sent to the Senators and Representatives in each of the peanut producing states and also sent to the EPA.

### Members in attendance:

E. Jay Williams, Chairman  
N. V. Lovegren  
R. E. Petit  
T. H. Sanders  
T. B. Whitaker  
K. Warnken

### Visitors present:

John Haney  
Freddie McIntosh  
Jim Davidson  
John Smith  
J. W. Dickens  
Tom West  
Russell C. Schools

Joe Pominski  
John R. Vercelotti  
Wilda H. Martinez  
Gale Buchanan  
John Troeger  
Fleet Sugg  
Sam Ahmed

## RESOLUTION

Whereas the American Peanut Research and Education Society (APRES) is a society devoted to the furtherance of research and education on the properties, production, and use of the peanut,

Whereas a wide variation in pesticide residue tolerance levels for peanuts exists across state lines,

Be it resolved that the Board of Directors and Membership of the American Peanut Research and Education Society endorse Senate Bill S835 and House Bill HR1778 setting uniform and reasonable national guidelines for pesticide residue tolerance levels.

## N.P.C. TASK FORCE SUMMARY

### I. AFLATOXIN

#### Category 1

- Develop technology to identify aflatoxin at the first point of sale.
- Develop educational programs to encourage separate harvest, storage and handling of stressed peanuts.
- Improve warehouse ventilation and reduce foreign material prior to storage.
- Discourage blending of contaminated kernels back into edible lots.
- Provide dollar incentive to growers to provide aflatoxin-free peanuts.

#### Category 2

- Encourage continued research to identify factors contributing to the development of aflatoxin at all stages of production, handling, storage and processing.
- Develop improved process for removal of all aflatoxin contaminated kernels (including LSKs).
- Address different aflatoxin acceptance levels (export and domestic).

#### Category 3

- Develop aflatoxin resistant variety.
- Improve hull quality through breeding.

### II. CHEMICAL RESIDUES

#### Category 1

- Promote through education the proper use of crop protectants.
- Promote industry proactivity with respect to the fate of crop protectants.
- Appoint industry spokesperson supported by pool of technical resource people to interact with government regulatory agencies and media regarding issues.
- Educate consumers of necessity and safety of chemical use in wholesome food production.
- Seek legislation to set uniform tolerance levels to be consistent with EPA.

#### Category 2

- Develop more accurate, rapid methodology to assess undesirable chemical residues.
- Develop cultural practices to minimize chemical residues.

#### Category 3

- Develop chemicals with minimum residue.
- Continue breeding for pest resistant varieties.
- Develop methodology to detoxify chemicals.

### III. FLAVOR

#### Category 1

- Encourage harvest at optimum maturity.
- Educate farmers and custom dryers on proper curling and relationship to flavor.
- Change minimum screen sizes to remove immature peanuts that cause off flavor.
- Improve handling and storage of farmer stock and shelled peanuts at all levels.



#### Category 2

- Promote continued research on all market varieties to identify and define causes for flavor variations.
- Develop/utilize computerized drying systems to facilitate optimum drying.
- Define relationship between seed size, maturity and flavor.

#### Category 3

- Test for maturity as an addition to grading.
- Develop new concept of curing to preserve/enhance flavor.
- Identify the relationship to growing conditions (environment) to flavor.
- Discover the relationship (if any) of chemical residues to flavor.
- Develop economic incentives to promote factors that positively influence flavor.
- Develop varieties with superior flavor characteristics.
- Develop economic incentive to promote the factors which positively influence flavor precursors.

### IV. FOREIGN MATERIAL

#### Category 1

- Develop educational program to create awareness and reduction of foreign material at all levels.
- Identify best point of separation.
- Improve cleaning facilities at shelling level.
- Change grading system regulations to allow removal of LSKs and foreign material at farm level.
- Develop better nutsedge control.

#### Category 2

- Develop technology to accurately and consistently reflect foreign material in sample.
- Provide economic incentive/penalty to encourage adoption of technology to minimize foreign material.
- Develop improved sampling methods to reduce sampling error.
- Instigate cultural research to minimize foreign material contamination.
- Design new equipment to remove foreign material at all levels.

### V. MATURITY

#### Category 1

- Design/utilize educational programs to show added value by harvesting peanuts at optimum maturity.

#### Category 2

- Improve grading system to better measure maturity and provide economic incentive/penalties to promote it.
- Improve economic disease control programs to prevent early harvest.
- Describe relationship of maturity to milling quality.
- Provide more specific maturity parameters by varieties, including uniform definitions.
- Improve pre-harvest sampling methods for determining maturity.
- Determine effect of cultural practices on maturity.

#### Category 3

- Develop short season/high yield varieties.
- Develop predictive models to predict maturity based on environmental parameters.
- Improve/develop varieties with uniform maturity/disease resistance.

## PROGRAM COMMITTEE REPORT

Members of the Technical Program Committee, Local Arrangements and Ladies' Program Committee are listed in the program and at the end of this report. These committees were chaired by Dr. Dave Knauff, Dr. Ben Whitty, and Mrs. Mary Ann Whitty, respectively. These chairpersons and the members of these committees made a great contribution to the success of our meetings. On behalf of our Society I want to extend our sincere appreciation to them.

The arrangement of sessions and presentations by the Technical Program Committee is given in the program. There were 112 presentations that included an industry-extension symposium and a symposium on tomato spotted wilt virus. For the first time there was a hands-on session on computer software. Topics of other sessions included breeding and genetics, entomology, pathology, processing and utilization, production technology, weed science, mycotoxins, physiology, harvesting, storage, handling, and marketing.

The Local Arrangements Committee provided the logistical support for the meetings. Their efforts arranged for hotel accommodations, on-site registration, exhibits, visual aids, tours, transportation, information on local attractions, social functions, and the business meeting. This committee worked with the sponsor, Rhone-Poulenc, to arrange the ice cream reception and the business meeting breakfast, as well as with Fermenta Plant Protection on their dessert reception and with Uniroyal on their barbecue. A number of exhibitors and other companies contributed toward the cost of the coffee breaks and ladies program.

The Ladies' Program Committee provided for coffee breaks, tours, and information for the ladies and families attending the meeting. Information on local attractions (Disney World, Epcot, etc.) was very helpful.

Florida was pleased to host the 1987 APRES meeting in Orlando. We sincerely hope the meetings were informative and enjoyed by all attending.

### Program Committee

Daniel W. Gorbet, Chairman

#### Local Arrangements

Ben Whitty, Chairman  
John Baldwin  
Mark Braxton  
Danny Colvin  
Frank Gardner  
Tim Hewitt  
Tom Kucharek  
Freddie McIntosh  
Jack Oswald  
Bob Short  
Buster Smith  
Dick Sprenkel  
Glenn Stocks  
Greg Watson  
Harry Wood

#### Technical Program

David Knauff, Chairman  
Sam Ahmed  
Jerry Bennett  
Ken Boote  
Barry Brecke  
Luther Hammond  
Al Norden  
Fred Shokes  
Bill Tappan  
Joe Funderburk  
S. M. Basha

#### Ladies' Hospitality

Mary Ann Whitty, Chairman  
Elaine Bennett  
Linda Boote  
Susie Colvin  
Sue Funderburk  
Opal Gardner  
Mary Francis Gorbet  
Dottie Hammond  
Ruby McIntosh  
Diane Oswald  
Pat Shokes  
Carolee Broyles-Sprenkel

PROGRAM  
for the  
Nineteenth Annual Meeting  
of the  
American Peanut Research and Education Society, Inc.

Tuesday, July 14

1:00-8:00 APRES Registration  
1:00-5:00 Ladies' Registration  
1:00-5:00 Ladies' Hospitality

COMMITTEE AND BOARD MEETING

1:00 Assoc. Eds.-PEANUT SCIENCE  
1:00 Site Selection  
1:00 Public Relations  
2:00 Finance  
2:00 Bailey Award  
2:00 APRES-CAST  
3:00 Publications and Editorial  
3:00 Peanut Quality  
3:00 Peanut Crop Advisory  
7:00 Board of Directors  
8:00 Ice Cream Reception sponsored by Rhone-Poulenc, Inc.

Wednesday, July 15

8:00-5:00 APRES Registration  
8:00-10:00 Ladies' Hospitality  
9:30-5:00 Exhibits

GENERAL SESSION  
D. M. Porter, presiding

8:30 Call to Order - Morris Porter  
Invocation - Fred Shokes  
8:35 Introduction of Guest Speaker - C. E. Dean  
8:40 Agriculture in an Urban State - J. M. Davidson, Dean for Research,  
IFAS, University of Florida  
9:00 Introduction of Keynote Speaker - R. J. Henning  
9:05 Keynote Address - International Marketing of U.S. Peanuts,  
Jeannette H. Anderson, Director, International Marketing,  
National Peanut Council  
9:30 Presidential Address - D. M. Porter  
9:40 Presentation of Honary Awards - D. M. Porter

9:55        Announcements  
             Ben Whitty, Local Arrangements  
             David Knaft, Technical Program

10:00        Break

### THREE CONCURRENT SESSIONS

SESSION A - BREEDING AND GENETICS  
SESSION B - HARVESTING, STORAGE, HANDLING AND MARKETING  
SESSION C - ENTOMOLOGY

#### SESSION A - BREEDING AND GENETICS C. C. Holbrook, presiding

10:30        Yield comparison of pure-line selections derived from concurrent peanut breeding programs in Georgia and Zimbabwe - W. D. Branch\* and G. L. Hildebrand.

10:45        Use of pedigreed natural crossing in breeding peanuts in Virginia - T. A. Coffelt.

11:00        Use of inbred backcross line method in peanut - J. C. Wynne\*, M. K. Beute, C. T. Young, W. V. Campbell, D. M. Porter and T. A. Coffelt.

11:15        Utilization of Chinese peanut germplasm in variety development - D. M. Porter\*, T. A. Coffelt, R. W. Mozingo, and J. C. Wynne.

11:30        Breeding for pod rot resistance: progress and problems - O. D. Smith\*, S. M. Aguirre, W. J. Grichar, and C. E. Simpson.

11:45        Resistance of an international collection of peanut genotypes to insects in North Carolina, Philippines and Thailand - W. V. Campbell\*, J. C. Wynne, M. Keerati-Kasikorn, S. Sirisingh, C. Adalla and E. P. Cadapan.

12:00        Lunch

#### SESSION B - HARVESTING, STORAGE, HANDLING, AND MARKETING T. H. Sanders, presiding

10:30        Screening runner-type farmers stock peanuts before storage - J. W. Dickens\* and J. I. Davidson, Jr.

10:45        Modeling quality in bulk peanut drying - J. M. Troeger.

11:00        Storability of farmers stock peanuts at two moisture levels in mechanically and naturally ventilated miniature warehouses - J. S. Smith, Jr.\* and T. H. Sanders.

11:15        Peanut quality evaluation using the alcohol meter - H. E. Pattee\*, J. W. Dickens, J. A. Singleton and A. B. Slate.

11:30        Peanut demand estimates and consumers' costs of the peanut program - J. D. Schaub.

11:45        An analysis of the need for and acceptance of different methods for marketing peanuts - D. H. Carley\* and S. M. Fletcher.

12:00        Lunch

#### SESSION C - ENTOMOLOGY J. E. Funderburk, presiding

10:45        Effect of monocrotophos on thrips population, yellow spot virus and peanut yield - S. Sirisingh\* and S. Pitak.

- 11:00 Entomopathogens for suppression of lesser cornstalk borer - M. E. Gilreath\* and J. E. Funderburk.
- 11:15 Discussion
- 11:30 Evaluation of chlorpyrifos-methyl as a protectant of farmers' stock peanuts - F. H. Arthur\* and L. M. Redlinger.
- 12:00 Lunch

### THREE CONCURRENT SESSIONS

- SESSION A - EXTENSION-INDUSTRY SYMPOSIUM  
 SESSION B - PROCESSING AND UTILIZATION  
 SESSION C - PATHOLOGY

#### SESSION A - EXTENSION-INDUSTRY SYMPOSIUM Ben Whitty, presiding

- 1:00 Panel Discussion: Agricultural Chemical Use and Peanut Marketing
- Production Aspects - Al Allison  
 The Shellers' Situation - Ron Henning  
 Concerns of a Peanut Manufacturer - Claude Jones  
 Viewpoint of Chemical Manufacturers - Sidney Fox
- Group Discussion
- 2:45 Break

#### SESSION B - PROCESSING AND UTILIZATION E. M. Ahmed, presiding

- 1:30 Destruction of aflatoxin by microwave oven and chlorine gas - E. M. Ahmed\* and C. I. Wei.
- 1:45 Comparison of processing methods for the preparation of a bland peanut paste - B. L. Santos\* and A. V. A. Resurreccion.
- 2:00 Sweetener effect on the flavor profile of peanut butter made with Virginia type peanuts - M. D. Keziah\* and C. T. Young.
- 2:15 Flavor-maturity relationship of Florunner peanuts - T. H. Sanders\*, J. R. Vercellotti and G. V. Civile.
- 2:30 Peanut butter analysis: A technique for obtaining reproducible volatiles profiles from peanut butter - N. V. Lovegren\*, H. P. Dupuy, J. R. Vercellotti, and T. H. Sanders.
- 2:45 Grading peanut butter using video image analysis techniques - T. B. Whitaker\*, J. W. Dickens and A. B. Slate.
- 3:00 Break

#### SESSION C - PATHOLOGY F. M. Shokes, presiding

- 1:30 Activity of diniconazole on foliar and soilborne peanut pathogens in vivo and in vitro - T. B. Breneman\*, A. S. Csinos, and R. H. Littrell.
- 1:45 Disease assessment and growth analysis to estimate quantitatively the effect of *Cercospora* leafspot on the growth of Florunner peanut - G. Bourgeois\* and K. J. Boote.
- 2:00 Influence of chlorothalonil applied in irrigation water on yield and foliage residue - R. H. Littrell.

- 2:15 Incidence, severity and defoliation relationships between central and branch stems of Florunner peanut infected with late leafspot - F. W. Nutter, Jr.\* and S. C. Alderman.
- 2:30 Sporulation of Cercospora arachidicola - a major component of early leafspot disease forecasting - S. C. Alderman\* and F. W. Nutter, Jr.
- 2:45 Components of resistance to late leafspot in peanut (Arachis hypogaea L.) - Z. A. Chiteka\*, D. W. Gorbet, D. A. Knauff, F. M. Shokes, T. A. Kucharek and A. J. Norden.
- 3:00 Break

### THREE CONCURRENT SESSIONS

SESSION A - EXTENSION-INDUSTRY SYMPOSIUM  
 SESSION B - BREEDING AND GENETICS  
 SESSION C - PATHOLOGY

#### SESSION A - EXTENSION-INDUSTRY SYMPOSIUM Bob Nichols, presiding

- 3:00 Ole, a new chlorothalonil-based fungicide for peanuts - Don Guy.
- 3:10 Folicur™ (Bay Hwg 1608) - characterization of a new interesting fungicide for peanut diseases - H. J. Rosslenbroich\* and K. A. Noegel.
- 3:20 Folicur™: a new fungicide for the control of peanut disease - R. D. Rudolph.
- 3:30 A new approach to reducing sclerotinia and stem blights in peanuts using tri-basic copper sulfate and Tenn-cop 5E - Arthur Golhke.
- 3:40 Spotless - a new fungicide and plant growth regulator for peanuts - D. L. Kensler, Jr.
- 3:50 Kylar - situation report - A. B. Rogerson.
- 4:00 Status report on the merger of Rhone-Poulenc and Union Carbide Agricultural Products Co. - Bill Rowe.
- 4:10 An update on performance of Temik brand aldicarb on peanuts in the southeast - A. R. Ayers.
- 4:20 Select: a new selective postemergence grass herbicide - J. C. Hulbert.
- 4:30 Benchmark: a new broadleaf herbicide in cotton, peanuts and sorghum - J. C. Hulbert\* and D. D. Rogers.
- 4:40 Performance of Gramoxone Super in peanuts - G. Chris Weed.
- 4:50 New label for Amiben (chloramben) herbicide for peanut weed control - Jesse Laprade.
- 5:00 Cobra: a new standard for peanut weed control - R. L. Nichols.
- 8:30 Dessert Social sponsored by Fermenta Plant Protection.

#### SESSION B - BREEDING AND GENETICS W. D. Branch, presiding

- 3:30 Genetic control of maturity in peanut - C. C. Holbrook\*, C. S. Kvien, and W. D. Branch.
- 3:45 Inheritance of a lethal seedling trait in Arachis hypogaea L. - D. J. Banks.

- 4:00 Inheritance of symbiotic nitrogen fixation in two peanut crosses - T. D. Phillips\*, J. C. Wynne, T. J. Schneeweis and G. H. Elkan.
- 4:15 Inheritance of morphological traits in peanut (*Arachis hypogaea* L.) - N. B. Essomba\*, T. A. Coffelt, W. D. Branch and S. W. Van Scoyoc.
- 4:30 Diallel cross analysis of six peanut cultivars in the F<sub>1</sub> and F<sub>2</sub> generation - A. Nava and A. Layrissé\*.
- 8:30 Dessert Social sponsored by Fermenta Plant Protection.

SESSION C - PATHOLOGY  
F. W. Nutter, Jr., presiding

- 3:30 Effect of planting date, seeding rate, growth regulator and fungicide on sclerotinia blight of peanut - P. M. Phipps.
- 3:45 In vitro suppression of *Sclerotinia minor* with metolachlor - K. E. Woodard, C. E. Simpson\* and T. A. Lee, Jr.
- 4:00 Spatial and temporal aspects of cylindrocladium black rot disease progress in peanut - A. K. Culbreath\* and M. K. Beute.
- 4:15 Inducing suppression to cylindrocladium black rot in field soil through crop rotation - J. R. Sidebottom\* and M. K. Beute.
- 4:30 Infection of peanut by *Aspergillus niger* - S. S. Aboshosha, H. A. Melouk\*, D. H. Smith and P. F. Lummus.
- 8:30 Dessert Social sponsored by Fermenta Plant Protection.

Thursday, July 16

- 8:00-12:00 APRES Registration  
8:00- 5:00 Exhibits  
8:00-10:00 Ladies' Hospitality

THREE CONCURRENT SESSIONS

SESSION A - PRODUCTION TECHNOLOGY  
SESSION B - WEED SCIENCE  
SESSION C - PATHOLOGY

SESSION A - PRODUCTION TECHNOLOGY  
D. L. Hartzog, presiding

- 8:00 Determination of national peanut poundage quota for 1987 - R. H. Miller.
- 8:15 Efficacy of tribasic copper sulfate and copper resinate against Sclerotinia blight, stem rot and leafspot diseases of peanuts - W. W. Osborne\*, J. D. Taylor and R. R. Boseman.
- 8:30 Field evaluation of bacterial antagonists for peanut leafspot control - H. W. Spurr, Jr.\* and W. Thal.
- 8:45 Effects of irrigation regime and season on growth and development of peanut genotypes - D. L. Ketring.
- 9:00 Response of Florunner peanut to water stress levels induced through irrigation timing by canopy temperature - A. M. Schubert\* and T. H. Sanders.
- 9:45 Break

SESSION B - WEED SCIENCE  
G. R. Wehtje, presiding

- 8:15 Acetanilide herbicide effects on peanut growth and development - J. Cardina\* and C. W. Swann.

- 8:30 Control of Florida beggarweed in peanuts with chlorimuron - B. J. Brecke.
- 8:45 Weed control in southeastern peanuts before, during and after dinoseb - D. L. Colvin.
- 9:00 Postemergence weed control in peanuts with Gramoxone® Super - J. N. Lunsford.
- 9:15 Season long annual grass control in peanuts with Fusilade® 2000 - J. N. Lunsford\*, B. Rogers, V. Greeson and H. Yonce.
- 9:30 Break

SESSION C - PATHOLOGY  
T. B. Breneman, presiding

- 8:00 A virus causing top paralysis of peanut - E. E. Wagih, H. A. Melouk\* and J. L. Sherwood.
- 8:15 Evaluation of peanut genotypes for peanut stripe virus (PSTV) infection using ELISA and dot-blot immunobinding assay - V. M. Aquino\*, J. W. Moyer and M. K. Beute.
- 8:30 Reaction of peanut genotypes to the rosette virus and its vector Aphis craccivora Koch - S. M. Misari\*, O. A. Ansa, J. W. Demski, C. W. Kuhn, R. Casper and E. Breyel.
- 8:45 Tomato spotted wilt virus on peanuts in Senegal? - J. Dubern, C. Huguenot and M. Dollet\*.
- 9:00 Tomato spotted wilt on peanuts in Alabama - A. K. Hagan, J. R. Weeks\*, R. T. Gudauskas, W. S. Gazaway and R. Shelby.
- 9:15 Spotted wilt and rust reactions in south Texas among selected peanut genotypes - M. C. Black\* and D. H. Smith.
- 9:30 Break

THREE CONCURRENT SESSIONS

SESSION A - TOMATO SPOTTED WILT VIRUS SYMPOSIUM  
SESSION B - PROCESSING AND UTILIZATION  
SESSION C - WEED SCIENCE

SESSION A - TOMATO SPOTTED WILT VIRUS SYMPOSIUM  
D. H. Smith, presiding

- 10:00 Economically important crop plant hosts of TSWV other than peanut - D. H. Smith.
- 10:15 Research on tomato spotted wilt virus at ICRISAT - D. V. R. Reddy.
- 10:35 Entomological aspects of TSWV, with special reference to the south Texas peanut agroecosystem - H. B. Highland\*, P. Lummus, J. W. Stewart, J. W. Smith, Jr., F. Mitchell, and C. Cole.
- 10:55 Pathological aspects of TSWV in south Texas - M. C. Black.
- 11:10 Discussion
- 12:00 Lunch

SESSION B - PROCESSING AND UTILIZATION  
E. M. Ahmed, presiding

- 10:15 Peanut skins: A potential source of dietary fiber for foods - R. L. Ory\* and G. J. Flick, Jr.



- 10:30 Fractionation of peanut seed proteins by high performance liquid chromatography - S. M. Basha.
- 10:45 Light and scanning electron microscopy of the peanut (*Arachis hypogaea* L. cv. Florunner) cotyledon after roasting - C. T. Young, W. E. Schadel, and R. H. Watkins\*.
- 11:00 Major sulfur compounds in peanut headspace - R. H. Watkins\* and C. T. Young.
- 11:15 Effect of temperature and time of roast on the color and headspace components of roasted peanuts - J. J. Heinis\*, C. T. Young and K. Trigano.
- 11:30 Preparation of mish from peanut milk - C. B. Chawan\*, D. R. Rao, B. Singh, and R. Muatine.
- 11:45 Lunch

#### SESSION C - WEED SCIENCE

J. Cardina, presiding

- 10:15 Effect of preemergence treatments of oxadiazon on peanuts - G. G. Barr\* and J. A. Barron.
- 10:30 Efficacy and behavior of imazethapyr in peanuts and associated weeds - T. A. Cole\*, J. W. Wilcut, T. V. Hicks and G. R. Wehtje.
- 10:45 Absorption, translocation and metabolism of chlorimuron as influenced by peanut maturity - J. W. Wilcut\*, G. R. Wehtje, T. A. Cole and T. V. Hicks.
- 11:00 The effect of Tough® on Florida beggarweed control and crop injury and yield of peanuts - J. S. Hickey\* and C. A. Clark.
- 11:15 Tough® 3.75EC - A new highly selective postemergence herbicide in peanuts - H. R. Bodingbauer\*, A. Zohner and M. Susani.
- 11:30 Control of broadleaf weeds in peanuts with pyridate alone and in combination with 2,4-DB - T. V. Hicks\*, J. W. Wilcut, T. A. Cole and G. R. Wehtje.
- 11:45 Lunch

#### THREE CONCURRENT SESSIONS

SESSION A - PRODUCTION TECHNOLOGY

SESSION B - PLANT PATHOLOGY

SESSION C - COMPUTER SOFTWARE DEMONSTRATIONS

#### SESSION A - PRODUCTION TECHNOLOGY

J. Beasley, presiding

- 1:30 Peanut inoculum evaluations - D. T. Gooden\* and H. D. Skipper.
- 1:45 Irrigation scheduling for peanut by predicting plant available water - N. L. Powell\*, F. S. Wright and B. B. Ross.
- 2:00 Irrigation method and water quality effect on peanut yields - F. J. Adamsen.
- 2:15 Subirrigation of peanuts using an existing drainage system - F. S. Wright\* and F. J. Adamsen.
- 2:30 Interaction and minimum sufficiency levels of K and Mg for peanuts grown on two sandy soils - M. E. Walker\*, T. P. Gaines and M. B. Parker.
- 2:45 Predicting the calcium requirement for peanuts - H. Smal\*, M. E. Sumner, and A. S. Csinos.

3:00 Peanut production technology in the eastern Caribbean - B. R. Cooper\* and M. Gordon.

3:15 Break

#### SESSION B - PLANT PATHOLOGY

D. H. Smith, presiding

1:30 Disease reaction of peanut CRSP introduced germplasm in Burkina Faso - P. Sankara\*, O. D. Smith, G. B. Parker, D. H. Smith, C. E. Simpson, and T. D. Riley.

1:45 Resistance to Sclerotinia minor in cultivated peanut - C. N. Akem\*, H. A. Melouk and O. D. Smith.

2:00 Responses of five peanut cultivars to field-inoculation with four endomycorrhizal fungi - R. A. Taber\*, R. E. Pettit, J. S. Neck, S. Rajapakse, O. D. Smith, D. H. Smith and W. L. Harman.

2:15 Rates, timing and methods for delivery of flutoloniol for control of soil-borne diseases - P. A. Backman\* and M. A. Crawford.

2:30 Nutritional factors involved in the peanut pod rot complex - A. S. Csinos\*, T. P. Gaines, and M. E. Walker.

2:45 Ecology of Rhizoctonia solani anastomosis group 2 types 1 and 2 and AG-4 on peanut, soybean, snap bean, blue lupine, corn, and sorghum - D. K. Bell\* and D. R. Sumner.

3:00 Break

#### SESSION C - COMPUTER SOFTWARE

1:00-  
3:15 Demonstrations of peanut crop growth models, expert systems, pest models, extension information delivery, and peanut literature database with authors present.

3:15 Break

#### THREE CONCURRENT SESSIONS

SESSION A - PRODUCTION TECHNOLOGY

SESSION B - MYCOTOXINS

SESSION C - PHYSIOLOGY

#### SESSION A - PRODUCTION TECHNOLOGY

D. L. Colvin, presiding

3:30 Tillage methods: Their effect on mineral content of peanut tissues - R. K. Howell\*, F. S. Wright and D. M. Porter.

3:45 Influence of reduced cost production practices on income from producing non-quota peanuts - D. L. Hartzog\*, N. R. Martin, Jr., J. A. Atwood and D. R. Parrish.

4:00 Intra-row seed spacing effects on five peanut cultivars - R. W. Mazingo\* and J. L. Steele.

4:15 Use of geocarposphere temperature as a tool in managing peanut production - J. I. Davidson, Jr.\*, P. D. Blankenship, T. H. Sanders, R. J. Cole and R. J. Henning.

4:30 PeanutPC: A user friendly peanut growth simulation model - L. J. Rainey\*, J. H. Young, and K. J. Boote.

5:30 Barbecue sponsored by Uniroyal Chemical.

SESSION B - MYCOTOXINS  
D. M. Wilson, presiding

3:30 The relationship of water activity and phytoalexin production to preharvest aflatoxin contamination of peanuts subjected to late-season drought stress - J. W. Dorner\*, R. J. Cole, T. H. Sanders and P. D. Blankenship.

3:45 Critical evaluation of an aflatoxin immunoassay quick-card test in farmers stock peanuts - R. J. Cole\*, J. W. Dorner, J. W. Kirksey and R. J. Henning.

4:00 Influence of tannin-related compounds on the growth of *Aspergillus parasiticus* and aflatoxin production - H. A. Azaizeh, R. E. Pettit\*, and R. A. Taber.

4:15 Density segregation of peanuts naturally contaminated with aflatoxin - J. W. Kirksey\*, R. J. Cole, J. W. Dorner, and R. J. Henning.

4:30 Comparison of immunochemical and chemical methods for aflatoxin determination in raw peanuts - D. M. Wilson\*, R. W. Beaver, R. C. Layton, A. L. Trantham, and D. L. McMillan.

4:45 A low-cost, microcomputer system to monitor and control an environmental control plot facility - P. D. Blankenship\*, B. W. Mitchell, R. C. Layton, R. J. Cole, and T. H. Sanders.

5:30 Barbecue sponsored by Uniroyal Chemical.

SESSION C - PHYSIOLOGY  
J. M. Bennett, presiding

3:30 Comparative studies on peanut seed germination - S. C. Mohapatra and J. H. Young\*.

3:45 The influence of a triazole regulator on the germination of peanuts from treated plants - D. J. Daigle\*, L. F. Ross, E. J. Conkerton, and C. S. Kvien.

4:00 Peanut seedling responses to root temperature controlled by a thermogradient sand box - R. M. Ahring, D. J. Banks\* and T. L. Springer.

4:15 Differences in competitive ability of single and mixed-strain inoculants for peanut - P. J. A. Wijewickrama, T. J. Schneeweis, J. C. Wynne\* and G. H. Elkan.

4:30 Effects of shading on the growth and nitrogen fixation of selected peanut cultivars - V. E. Matalog\* and H. D. Gross.

4:45 Validation of Pnutgro, a crop growth simulation model for peanut - K. J. Boote\*, J. W. Jones and G. Bourgeois.

5:30 Barbecue sponsored by Uniroyal Chemical.

Friday, July 17

7:30 Breakfast sponsored by Rhone-Poulenc, Inc.

Awards Ceremony

8:30 Business Meeting

9:55 Adjourn

#### BAILEY AWARD COMMITTEE REPORT

The 1987 Bailey Award for the best paper presented at the 1986 meeting in Virginia Beach, Virginia, went to J. H. Young and L. J. Rainey for their paper entitled "Simulation of Planting Date, Irrigation Treatment and Defoliation Effects on Peanut Yields Using PEANUT."

The selection process was basically the same as in previous years. One paper representing a particular subject matter was selected from the paper sections. Nominees were notified October 22, 1986, of their selection and asked to return their written manuscripts by March 1, 1987. Manuscripts were sent to committee members with the suggestion their evaluations of the manuscripts be sent to the Committee chairman by June 1, 1987.

The other papers nominated for their excellence and consideration by the committee included (alphabetically by senior author):

J. E. Bailey and C. A. Matyac. Analysis of Field Histories to Determine Best Control Practices for *Cylindrocladium* Black Rot of Peanuts.

Darold L. Ketring. Effect of Early Leaf Spot Invasion on Growth Analysis of Spanish Peanuts.

T. P. Mack and C. B. Backman. Abundance of Lesser Cornstalk Borer, *Elasmopalpus lignosellus* (Zeller), in Peanut Fields: Endemic and Outbreak Population Configurations.

A. J. Norden, D. W. Gorbet, D. A. Knauff, and C. Y. Young. Variability in Oil Quality Among Peanut Genotypes in the Florida Breeding Program.

Bhanu P. Ram, L. Patrick Hart, Richard J. Cole and James J. Pestka. Application of ELISA to Retail Survey of Aflatoxin B1 in Peanut Butter.

Gregory R. Sims, Glenn Wehtje, and John Wilcut. The Response of Peanut to the Herbicides Imazaquin and Chlorimuron.

The 1987 meeting of the Bailey Award committee of APRES was called to order at 7:15 p.m., July 14, 1987, in the Fan Palm room of the Orlando, Florida Marriott Hotel. Members present included Scott Wright, Charles Swann, Craig Kvien, Morris Porter, Fred Shokes, and Ruth Taber.

Items of committee business considered by members and recommended to the board included:

- 1) The senior author of a nominated paper must be a member of APRES.
- 2) The senior author of the paper must present the paper or else the paper is not eligible for the award.
- 3) One nominee should be selected per session.
- 4) All nominees should receive certificates of merit.
- 5) All matters relating to eligibility for the Bailey Award should be referred to on the "Call for Papers" mailout.
- 6) A graduate student paper award may be an appropriate addition to the awards each year.

#### Bailey Award Committee:

Ruth Ann Taber, Chairman  
Craig Kvien, Acting Chairman  
D. L. Ketring  
Scott Wright

Charles Swann  
Harvey Spurr  
Mark Black

#### FELLOWS COMMITTEE REPORT

The Fellows Committee did not receive any nominations in 1987 for fellowship in the American Peanut Research and Education Society. Members are encouraged to nominate deserving colleagues for this honor.

H. E. Pattee, Chairman  
L. D. Tripp  
A. J. Norden  
W. V. Campbell  
T. E. Boswell  
O. D. Smith  
C. T. Young

#### SITE SELECTION COMMITTEE

The meeting was called to order at 1:00 P.M. on July 14. Six members and one ex-officio member were present.

Ben Whitty made comments about the Orlando meeting. Information on rooms occupied and other information will be provided to the Oklahoma and North Carolina members.

Bobby Clary and Dick Berberet reported on the meeting scheduled for July 12-15, 1988, in Tulsa, Oklahoma. A contract has been signed with the Sheraton-Kensington. Room rates are a flat \$55.00. Literature on Tulsa was available in the registration area.

Fleet Sugg presented a proposed contract with the Winston Plaza Hotel for the 1989 meeting in Winston-Salem, North Carolina. The Winston Plaza is located near shopping areas and other hotels. There are several attractions in the Winston-Salem area. Fleet Sugg and Gene Sullivan will work out final details of the contract.

The committee adjourned at 2:15 P.M. Recommendations of the committee were presented to the Board of Directors meeting and the General Business Session.

Respectfully submitted:

E. B. Whitty, Chairman, Florida  
D. W. Gorbet, Florida  
B. L. Clary, Oklahoma  
R. Berberet, Oklahoma  
N. L. Sugg, North Carolina  
G. A. Sullivan, North Carolina  
R. E. Lynch, Georgia  
A. Csinos, Georgia

AMERICAN SOCIETY OF AGRONOMY  
LIAISON REPRESENTATIVE REPORT

The 78th annual meeting of the American Society of Agronomy (ASA) was held in New Orleans, Louisiana, November 30 - December 5, 1986. Nearly 5,000 attended this year's meetings and some 2,115 papers were presented. Six papers were included in a peanut breeding and genetics session chaired by C. C. Holbrook. Members of APRES were authors or co-authors on approximately 10 total presentations involving various aspects of peanut research.

ASA will discontinue the publication of the Crops and Soils magazine with the August-September 1987 issue, and the first issue of the new Journal of Production Agriculture is expected in September, 1987. New officers of the three sister societies (ASA, CSSA, and SSSA, respectively) are as follows: R. G. Gast, president, and D. A. Holt, pres.-elect of ASA; D. N. Duvick, president, and C. J. Nelson, pres.-elect of CSSA; and L. L. Boersma, president, and D. R. Keeney, pres.-elect of SSSA.

Atlanta, Georgia will host the 1987 meetings of the American Society of Agronomy from November 29 thru December 4, 1987.

Respectfully submitted:

Wm. D. Branch

Report of Ad-Hoc Committee to Study  
Kvien-Hammons Data Base

The committee made a study of the proposal for APRES to support the Kvien-Hammons Data Base. Some members of the committee are personally familiar with the Data Base, the comprehensive nature of the Data Base, and the potential usefulness of the Data Base to APRES members. However, the majority of the committee recommends that as presented the proposal should not be funded by APRES, because of the large financial commitment required (over \$20/member/year). Other reasons for not supporting the proposal were: only a small number of members would use the data base; purchase of a data base is not an appropriate activity for APRES; escalating costs in the future could result in an even greater financial burden; and finally that other APRES members have large data bases which may reduce the demand for this data base.

The committee extends its sincere thanks to Dr. Buchanan and the Georgia Coastal Plain Experiment Station for submitting the proposal and regrets that we cannot recommend funding the proposal at this time.

Respectfully submitted:

D. Smith  
H. Pattee  
C. Holbrook  
H. Melouk  
F. Shokes  
P. Backman  
T. Coffelt, Chairman

#### AD HOC COMMITTEE ON CAST

The meeting was called to order at 2:00 P.M. by chairman Norris L. Powell. There were three committee members and two guests present.

Chairman Powell stated that the purpose of the meeting was to formulate a recommendation to be presented to the Board of Directors as to whether or not APRES should petition to become a Sustaining Member Society of the Council for Agricultural Science and Technology (CAST). Chairman Powell also reported that the CAST exhibit had been received and was set up in the exhibit area for the meeting.

After considerable discussion about the purpose of CAST and the benefits and cost of APRES being a Sustaining Member Society it was the unanimous recommendation of the committee that APRES petition to become a Sustaining Member Society of the CAST consortium. A resolution in support of membership in the Council for Agricultural Science and Technology was approved by the committee for presentation to the APRES Board of Directors.

The meeting was adjourned at 2:55 P.M.

Respectfully submitted:

Norris L. Powell, Chairman  
Mark C. Black  
Gilbert R. Lovell

Resolution in support of membership in the Council for Agricultural Science and Technology:

WHEREAS the Council for Agricultural Science and Technology, otherwise known as CAST, is a 15-year old consortium of professional scientific societies dedicated to advancing the knowledge and understanding of the science which undergirds the modern U.S. food system by the lay public, and

WHEREAS CAST targets its task force reports at members of Congress, state legislatures, federal and state regulatory agencies, the news media and other segments of "the public" to increase this knowledge and understanding of agricultural science, and

WHEREAS CAST is now involved in familiarizing high school science and vocational agriculture teachers and students nationwide with the scientific aspects of food production and processing through "Science of Food and Agriculture" magazine, and thereby encouraging good young science students to consider careers in this area, and

WHEREAS CAST offers member societies the right to participate in the governance of the organization and to name qualified scientists to serve on task force teams which prepare its authoritative reports, and

WHEREAS the board and officers of the American Peanut Research and Education Society (APRES) endorse the public education mission and operating philosophy of CAST and choose to become involved and strengthen the participation of APRES members in CAST,

BE IT RESOLVED that the American Peanut Research and Education Society petitions the board of directors of the Council for Agricultural Science and Technology for enrollment as a Sustaining Member Society of the CAST consortium on this 17th day of July, 1987.

BY-LAWS  
of  
AMERICAN PEANUT 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 the 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 presentations 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 refresher 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 of such Committee may be temporarily replaced by an alternate selected by the agency or party served by such member, participant, or representative upon appropriate written notice filed with the president or Committee chairman 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.



#### 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 meeting. Minimum annual dues for the five classes of membership shall be:

- a. Individual memberships : \$ 25.00
- b. Institutional membership : \$ 15.00
- c. Organizational memberships: \$ 35.00
- d. Sustaining membership : \$125.00
- e. Student memberships : \$ 5.00

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 dues for the current year 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. The registration fee for student members shall be one-third that of members.

#### ARTICLE V. MEETINGS

Section 1. Annual meetings of the Society shall be held for the presentation of papers and/or discussions, 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. Also, opportunity shall be provided for discussion of these and other matters that members may 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, either on its own motion or upon request of one-fourth of the members. In either event, 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 chairman of each annual meeting of the society. Except for certain papers specifically invited by the Society president or program chairman 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 or projects by a portion of the Society membership, 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 to the extent they deem desirable.

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 project 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 immediate surviving 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 general meeting of this Society to the close of the next annual general meeting. The president-elect shall automatically succeed to the presidency at the close of the annual general meeting. If the president-elect should succeed to the presidency to complete an unexpired term, he 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 general 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 general meeting from nominees selected by the Nominating Committee or members nominated for this office from the floor. The president, president-elect, and surviving 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 yearly terms subject to appointment by the Board of Directors. The tenure of the executive officer may be discontinued by a two-thirds majority 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 general 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 chairman, responsible for development and coordination of the overall program of the educational phase of the annual meetings.

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 immediate past president able to serve
- c. The president-elect
- d. State employees' representative - this director is one whose employment is state sponsored and whose relation to peanuts principally concerns research, and/or educational, and/or regulatory pursuits.
- e. United States 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: e, 1972; d and f(1), 1973; and f(2) and f(3), 1974.

Section 3. The Board of Directors shall determine the time and place of regular and special meetings and may authorize or direct the president 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, operations, 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 desirable.

Section 7. An Executive Committee comprised of the president, president-elect, immediate surviving 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 chairman of each committee from among the incumbent committeemen. The Board of Directors may, by a two-thirds vote, reject committee appointments. Appointments made to fill unexpected vacancies by incapacity of any committee member shall be only for the unexpired term of the incapacitated committeeman. Unless otherwise specified in these By-Laws, any committee member may be re-appointed to succeed himself, and may serve on two or more committees concurrently but shall not hold concurrent chairmanships. Initially, one-third of the members of each committee will serve one-year terms, and one-third of the members of each committee shall serve two-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.

Section 3. The existing committees of the Society are:

a. Finance Committee: This committee shall include at least four members, one each representing State and USDA and two from Private Business segments of the peanut industry. 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 chairman 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 in the work of the Finance Committee under his chairmanship, whichever is later.

b. Nominating Committee: This committee shall consist of at least three members appointed to one-year terms, one each representing State, USDA, and Private Business segments of the peanut industry. 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 general meetings) prior to the election. No person may succeed himself as a member of this committee.

c. Publication and Editorial Committee: This committee shall consist of at least three members for three-year terms, one each representing State, USDA, and Private Business segments of the peanut industry. The members will normally serve two consecutive three-year terms, subject to approval by the Board. Initial election shall alternate from reference years as follows: private business, 1983; USDA, 1984; and State, 1985. 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 include at least 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 include at least seven members, one each representing the State, USDA, Grower, Sheller, Manufacturer, and Services segments of the peanut industry, and a member from the university of 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 Committee: This committee shall consist of at least 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 peanut production and with balance among state, USDA and private business. Terms of office shall be for three years with initial terms as outlined in Section 1 of this ARTICLE. The committee shall select from nominations received, according to procedures adopted by the Society (PI48-9 of 1981 Proceedings of APRES), qualified nominees for approval by the Board of Directors.

h. Golden Peanut Research and Education Award Committee: This committee shall consist of six previous Golden Peanut Award recipients, representing each of the three areas of peanut production. Terms of office shall be for three years as outlined in Section 1 of this Article. This committee shall serve as an advisory committee by screening nominations received by the National Peanut Council. The final selection shall be made by the National Peanut Council. For even-numbered years, the award shall be made for research accomplishments and for odd-numbered years, the award shall be made for educational accomplishments.

i. 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 chairman of the committee shall be from the state which will host the meeting the next year and the vice-chairman shall be from the state which will host the meeting the second year. The vice-chairman will automatically move up to chairman.

#### 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 a two-thirds vote of the general membership. Likewise, in a similar manner, a Division may be dissolved.

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

Section 3. Divisions 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 (chairman, vice-chairman to succeed to the chairmanship, and a secretary) and appoint committees, provided that 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 consistently with the provisions 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 Business  
Meeting of the American Peanut  
Research and Education Society,  
Inc., July 12, 1985, San Antonio,  
Texas

1986-87 APRES MEMBERSHIP

Individuals	475
Students	34
Organizations	62
Sustaining	26
Institutional	<u>110</u>
TOTAL	707

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