1990 PROCEEDINGS

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GRADUATE STUDENT COMPETITION

Evaluation of Peanut Genotype for Resistance to *Sclerotinia minor* Using Two Detached Shoot Techniques. G. F. CHAPPELL*, J. C. WYNNE, and M. K. BEUTE. Department of Crop Science and Department of Plant Pathology, North Carolina State University, Raleigh, NC 27695-7616.
Two in vitro tests were used to evaluate different levels of resistance of peanut genotypes to *Sclerotinia minor*. The first test utilized wound inoculation to assay for internal metabolic resistance. The second technique utilized nonwound inoculation and reflects the plants ability to inhibit penetration as well as internal lesion expansion. The results of the in vitro tests were then correlated with field reports to determine if in vitro tests are predictive of the in vivo results. Based on the results of this test, detached shoot techniques are valuable methods for evaluating the different types of resistance of peanut genotypes to *Sclerotinia minor*. These two methods allow for rapid detection of both metabolic and physiological resistance to the pathogen. Since field resistance is determined by a combination of metabolic, physiological and architectural characteristics, and their interaction in response to the fungus, evaluation methods that only incorporate one or two of the factors may not yield results that are predictive of the true resistance capabilities of the genotype.

Possible Role of Pods In Seasonal Fluctuations of *Pythium* Spp. Populations In Peanut Soil. R. K. SOUFI* and A. B. FILONOW. Department of Plant Pathology, Oklahoma State University, Stillwater, OK 74078-9947.

Field plots (4 rows/plot) at Ft. Cobb, OK were planted to peanut cv. Florigiant, soybean cv. Forrest, or left fallow. There were 5 replicate plots per treatment in a randomized complete block design. Soil in each row was sampled 17 times from preplant to harvest. Populations (propagules (p)/g soil) of *Pythium* spp. in samples were assayed by plating soil dilutions on a selective medium. Populations in soils showed small weekly fluctuations of 13-45 p/g, and they generally did not differ (P=0.05) until 65 days after planting (DAP), when the population in the peanut soil (78 p/g) was greater (P=0.05) than those in the soybean (34 p/g) or fallow soil (32 p/g). The peanut population decreased by the next week and thereafter few differences (P=0.05) were observed in populations (25-65 p/g) until 100 DAP when the population in soybean soil proliferated to 127 p/g. This population was not greater (P=0.05) than those in the fallow or peanut soil. At harvest (148 DAP) populations in peanut soil (52 p/g) increased (P=0.05) again compared to the fallow (18 p/g) or soybean soil (25 p/g). Fluctuations in populations during the season did not appear to be related to fluctuations in soil temperature or matric potential. As the season progressed, the frequency of *Pythium* spp. isolated from peanut pods increased. In a growth chamber experiment Florigiant plants were grown in Ft. Cobb soil in small pots nested inside larger pots. Pegs were trained into the inner or outer pots to give soil with no pods, 50% of available pods or 100% of available pods. Soil with 100% pods had greater (P=0.05) *Pythium* populations than soil with no pods. Populations in soils with 50% were greater than those in soil without pods, but differences were not significant (P=0.05). Populations in soils with roots or pods increased and declined during the experiment, similar to the fluctuations observed in the field. In soil without roots or pods, populations were relatively stable over time. Results implicate pod development as a prime factor in seasonal fluctuations of *Pythium* spp. in peanut soil.

Comparison of Green Leaf Area Index, Dry Weight, Disease Intensity and Percent Reflectance Measurements as Inputs for Modeling Yield Losses in Peanuts. A. A. ALMIHANNA* and F. W. NUTTER, JR., Department of Plant Pathology, University of Georgia, Athens 30602.

Yield loss models are developed in order to quantify the relationship between pest intensity and yield (or yield loss). Most yield loss models employ a visual measure of disease intensity as the independent variable, however, it has been hypothesized that absolute measurements of the total amount of green leaf area contributing to pod initiation and development would have a better relationship to yield. The purpose of this research was to compare green leaf area index, dry weight, percent light reflectance, and disease intensity measurements as inputs for modeling yield losses caused by early and late leafspot. Greenhouse and field experiments were conducted to determine the relationships among input variables. A range of early season differences in green leaf area index (GLAI) were obtained by planting different seeding rates of Florunner and Southern Runner peanut in Plains, GA. The seeding rates were 2, 3, 4, 5, and 6 seeds/30 cm of row. Late season differences in GLAI were achieved by applying different a.i. concentrations (0.05X to 1.0X) of the fungicide chlorothalonil to obtain a range of defoliation values. Percent reflectance measurements explained 84% to 90% of the variation in GLAI over the growing season indicating that reflectance measurements can be used to monitor plant growth (and defoliation) in place of more labor intensive measurements such as GLAI and dry weight. Percent reflectance and GLAI values had a better relationship to pod yield than disease intensity measurements as indicated by higher coefficients of determination and lower standard errors of the estimate.

Effect of Processing Conditions on the Color, Headspace Volatiles and Sensory Characteristics of Peanut Paste. K. F. MUEGO* and A. V. A. RESURRECCION, Department of Food Science & Technology, University of Georgia Agricultural Experiment Station, Griffin, GA 30223.

The effects of temperature and number of water extractions on the color, headspace volatiles, flavor characteristics, and spreadability of peanut paste were determined. Two replications of shelled runner peanuts were water extracted using the following temperature (°C) - number of water extraction combinations: 60-2, 60-3, 60-4, 75-2, 75-3, 75-4, 90-2, 90-3, and 90-4. Water extracted peanuts were dried to a moisture content of not greater than 4% and milled into a smooth paste. Results indicate that lightness significantly decreased as number of extractions was increased. Chroma, a measure of color intensity, however, was not affected by temperature and number of extractions. The amount of headspace volatiles was significantly affected by temperature, decreasing as temperature was increased. Neither the flavor characteristics nor the spreadability of the paste were affected by temperature and number of extractions.

Physical and Sensory Qualities of Muffins Supplemented with Dried Fermented Peanut Milk. C. LEE* and L. R. BEUCHAT. Department of Food Science and Technology, University of Georgia, Agricultural Experiment Station, GA 30223-1797.

Peanut milk was fermented with mixed cultures of *Lactobacillus bulgaricus* and *Streptococcus thermophilus*. Analysis of headspace volatiles revealed that hexanal content steadily declined and essentially disappeared during fermentation, whereas acetaldehyde content increased. Changes in these volatile compounds were correlated with sensory evaluation scores which showed that a significant decrease in green/beany flavor and a significant increase in creamy flavor occurred as a result of fermentation. Fermented peanut milks were dried using a double-drum drier and the resulting powders were used as to replace buttermilk powder in muffins. Also, the performance of commercial sour cream and yogurt powders was evaluated. Muffins containing fermented peanut milk powder were not significantly different in volume and uniformity from those containing buttermilk, sour cream and yogurt powders, but had a higher contour profile than others. Objective measurement of external and internal color showed that there was no significant difference in lightness among muffins containing various fermented peanut and dairy milk powders. Sensory tests revealed that muffins containing fermented peanut milk, sour cream and yogurt powders were smoother in surface appearance than those containing buttermilk powder. There was no significant difference in top surface symmetry, sheen and internal cell size in muffins containing various powders. In addition, there were no significant differences in oiliness, sweet and bitter taste, and beany and sweet aromatic flavor among samples. It is concluded that fermented peanut powder can be substituted for buttermilk, sour cream and yogurt powders in muffins without resulting in significant changes in physical and sensory qualities.

A Response Surface Approach to Optimize Quality of Muffins Containing Peanut and Other Nonwheat Flours. S. D. HOLT*, A. V. A. RESURRECCION and K. H. McWATTERS. Dept. of Food Science and Technology, University of Georgia, Agricultural Experiment Station, Griffin, Georgia 30223.

The effects of variation in levels of peanut and other nonwheat flours on the quality of muffins were evaluated. Optimum formulations and prediction models were developed using mixture response surface methodology. Results indicated that as much as 41% peanut flour may be used to successfully replace wheat flour, either alone or in various combinations with cowpea and cassava flour. Peanut flour was characterized by bitter and sweet aromatic flavors and produced muffins with a dark, uneven surface appearance. Tunneling, cell size, volume and sheen were decreased with wheat flour substitution.

Nitrate Assimilation and Its Inhibitory Effect on Nodulation and Nitrogen Fixation in Peanut. S. B. STANFILL*[1], R. WELLS[1], D. W. ISRAEL[2,3], and T. W. RUFTY[1,3]. [1]Crop Sci. Dept., [2]Soil Sci. Dept., and [3]USDA/ARS, N. C. State Univ., Raleigh, NC 27695

Enhanced NO_3 uptake occurs in peanut when present in moderate to high concentrations, with concurrent inhibition of nodulation and N_2-fixation. North Carolina cultural practices often involve growing peanuts following corn resulting in moderate to high residual N. Effects of residual NO_3 on peanut N_2-fixation are poorly understood. Characterization of genotypic responses to nitrate is an important step in understanding nitrates involvement in nodule activity. Several genotypes {NC 7 (Virginia genotype) and two Spanish siblings (F_3 nodulating and F_5 non-nodulating lines derived from the cross PI 109839 X NC 17090)} were propagated in a growth chamber experiment. Seeds were germinated at 30°C for 72 hours in sterile potting soil. Viable seedlings were inoculated with Bradyrhizobium sp. (Arachis) strain NC 70.1 and transplanted in sand. Pots were watered daily with a Modified Hoagland's solution containing 0,2.5,5 or 10mM NO_3 enriched with 2.5 atom % ^{15}N. Plant harvests at 30 and 60 DAP provided tissue for measurement of growth, total N, NO_3, and ^{15}N partitioning. Nitrogenase activity was estimated via acetylene reduction. Plant dry weight was greatest in plants grown in 10mM NO_3. Average nodule weight and N $plant^{-1}$ decreased in excess of 2.5mM NO_3. Specific nitrogenase activity diminished markedly with the application of NO_3 with a decline from 40.2 to 25.0 µmoles C_2H_2 g hr^{-1} at 0 and 2.5mM NO_3, respectively. Nitrate and fixed N assimilation patterns will be elucidated by ^{15}N analysis.

Evaluation of Tip Culture, Thermotherapy and Chemotherapy for Elimination of Peanut Mottle Virus. W. Q. CHEN* and J. L. SHERWOOD. Department of Plant Pathology, Oklahoma State University, Stillwater, OK 74078. Present address of senior author: Department of Horticulture, University of Georgia, Athens, GA 30602.

Meristem and tissue culture, thermotherapy, and chemotherapy have been used to eliminate viruses from plants; but these procedures have not been fully evaluated for elimination of viruses from peanut (Arachis hypogaea L.). Some wild species of Arachis, maintained in collections as sources of genetic material for breeding programs, are susceptible to peanut mottle virus (PMV) and may harbor different strains of the virus. Because some germplasm material can only be vegetatively propagated, methods for elimination of PMV from peanut and related species are needed. This research addressed the applicability of tip culture, thermotherapy and chemotherapy in the elimination of PMV from peanut. Peanut plants (cvs Florunner and Pronto) were inoculated at the 2 leaf stage with PMV to obtain PMV-infected plants. Shoot tips from greenhouse grown plants (27 C) or from plants maintained at 35 C were cultured in vitro to regenerate plants (Chen et al. 1988 Proceed. APRES 20:42). In some experiments the medium was supplemented with ribavirin at 5 mg, 10 mg, 15 mg or 20 mg/L. No plants regenerated from shoot-tips taken from virus infected plants were found virus-free. After 45 days at 35 C, 93% of Florunner and 95% of Pronto tested negative for PMV by enzyme-linked immunosorbent assay (ELISA) of foliar tissue. When shoot tips from the plants that tested negative by ELISA were used for tip culture, no virus-free plants were obtained. No virus-free plants were obtained from tips cultured on medium supplemented with ribavirin. A combination of thermotherapy, tip culture, and chemotherapy resulted in obtaining virus-free plants. When shoot-tips were taken from plants maintained at 35 C, and the shoot-tips cultured on medium containing 20 mg/L ribavirin; 80% of Florunner and 100% of Pronto plants regenerated were negative for PMV.

In vitro Culture of Prequiescent Arachis hypogaea Embryos. TALLURY P. S. RAU*, H. T. STALKER and H. E. PATTEE. Crop Science Dept. and USDA-ARS, Botany Dept., North Carolina State Univ., Raleigh, NC 27695.

Introgression of desirable genes from wild Arachis species into the cultivated species, A. hypogaea L., is hampered in most cases by early degeneration of hybrid embryos. Although application of exogenous growth regulators can delay embryo degeneration in hybrid gynophores, the ability to recover hybrid plantlets remains difficult. To develop preabortion embryo recovery techniques, flowers and peg tips of A. hypogaea cv. NC 4 were used as test materials in three experiments designed to overcome discrepancies in previous tests and to further define optimal in vitro growth media. Experiment 1 was performed to increase the fertilization percentage in greenhouse-grown plants for in vitro experiments. The effects of natural selfing (no tripping), tripping flowers to enhance self-pollination, and pollination of emasculated flowers were compared. Peg tissues were collected at 1, 2, 3 and 4 days after pollination and embryo development determined. No significant differences were observed between tripped and untripped flowers, but pollination of emasculated flowers showed lower fertilization frequencies and relatively poor embryo development. Experiment 2 compared seven different basal media, each with two different sucrose concentrations (3.0 and 12.5%) for supporting embryo growth of 3-day-old peg tissues. After 21-day culture in dark at 25 $\pm$ 1^{o}C, Murashige and Skoog's (MS) medium with 3.0% sucrose was the best for supporting growth, followed by BII medium with 3.0% sucrose and N_6 medium with 12.5% sucrose. Experiment 3 compared the effect of an auxin (IAA) at two levels (1.0 and 1.5 ppm) and a cytokinin (Kn) at five levels (0.5, 0.75, 1.0, 1.25 and 1.5 ppm) using MS medium with 12.5% sucrose on 1- and 2-day-old peg tissues. A combination of 1.5 ppm IAA with 0.5 ppm Kn induced embryo growth to the multicellular, globular embryo stage. The next major step will be to induce embryo differentiation to obtain plantlets.

The Effect of Fungicide and Cultivar Selection on Performance of the Virginia Peanut Leafspot Advisory Program. R. M. CU*, P. M. PHIPPS, and R. J. STIPES. Tidewater Agr. Exp. Sta., VPI&SU, Suffolk, VA 23437.

A new computerized model for the Virginia peanut leafspot advisory has been developed according to specific growth responses of *Cercospora arachidicola* to weather conditions (Proc. Amer. Peanut Res. Educ. Soc. 21:16). Benefits of the new program in comparison to the first advisory model (Phytopathology 74:1189-1193) and a 14-day calendar program were demonstrated with Florigiant peanut and chlorothalonil at 1.26 kg/ha. To expand the utility of the new program and accommodate different management options available to growers, field tests were initiated to optimize program performance with various peanut cultivars and fungicides. The effect of cultivar selection was assessed in a split-plot design consisting of subplots with five cultivars (Florigiant, NC 6, NC 7, NC 9 and NC-V 11) and main plots treated with chlorothalonil at 1.26 kg/ha. Treatments included an untreated check and applications according to advisory thresholds, measured as "time-duration values" (TDV) of 48, 72, 96, and 120. In separate trials, five fungicides were tested at these TDV thresholds for application to Florigiant peanuts. Area under the disease progress curve (AUDPC) was used to determine the optimum TDV threshold for spraying cultivars and specific fungicides. The following three classes of cultivar susceptibility were apparent on the basis of significant differences (P=0.05) in AUDPC: Class 1 or highly susceptible, Florigiant and NC 9; Class 2 or moderately susceptible, NC 7 and NC-V 11; and Class 3 or moderately resistant, NC 6. Applications of chlorothalonil at 1.26 kg/ha, diniconazole at 0.14 kg/ha and terbutrazole at 0.126 kg/ha to Florigiant in 1988 were highly effective for leafspot control when applied at TDV=48. Chlorothalonil and terbutrazole also provided excellent control at TDV=72 and TDV=96, whereas only terbutrazole continued to provide disease control up to TDV=120. Applications of chlorothalonil (1.26 kg/ha) provided better disease control than similar treatments with terbutrazole (0.126 kg/ha), propiconazol (0.12 kg/ha), or diniconazole (0.09 kg/ha) at TDV=48, 96 and 120 in 1989. Cupric hydroxide (1.8 kg/ha) provided good leafspot control only when applied on a 14-day spray schedule in 1988. Yield data did show consistent differences between treatments with chlorothalonil, terbutrazole, diniconazle, or propiconazol. Results indicated that adjustments in the TDV threshold can further improve the efficiency of disease control with specific fungicides and cultivars.

Peanut Butter Rheology: An Assessment of Homogenization and Sugar Type and Levels in Texture Modification. M. O. OGWAL*, J. C. ANDERSON and B. SINGH, Department of Food Science & Animal Industries, Alabama A&M University, Normal, AL 35762.

Ten alternate formulations of peanut butter were prepared by additions of either 0, 2, 4, 6 or 8% (nominal) sucrose or fructose and each of the ten were subjected to homogenization employing 0, 3000, 6000, and 9000 psi to study the effects of composition and processing on the realized products. Apparent viscosities were measured employing an LVT model Brookfield viscometer with a T-F spindle and rotation of 0.3 rpm after equilibrating the samples to 37°C. Analysis of variance study produced an extremely significant separation of the viscosity measures on the basis of sugar type. Further regressional analyses produced separate but similar model equations to describe the measured results: App. visc.sucrose (cps) = 2032 - 0.066*(Press) + 95.6*(%level) with an r^2=0.85 estimated and also App. visc.fructose(cps) = 2182 - 0.069*(Press) -118*(%level) and r^2=0.83. Peanut butter manufacturers may be able to predict the extents of apparent viscosity reductions that may be realized by selecting the levels and types of sugar addition as well as the extent of pressures used for homogenization treatments.

Density Distributions of Aflatoxin Contaminated Peanuts. V. GNANASEKHARAN*[1], M. S. CHINNAN[1] and J. W. DORNER[2]. [1]Dept. of Food Science and Technology, Georgia Agricultural Experiment Station, Griffin, GA 30223-1797; [2]USDA, ARS, National Peanut Research Laboratory, Dawson, GA 31742.

Samples of peanuts cv Florunner were randomly drawn from a commercial color sorter reject stream, to increase the chances of acquiring aflatoxin contaminated samples. Two hundred samples from each size range (jumbo, medium and No.1) were utilized to map the density distributions of aflatoxin contaminated peanuts. A water displacement technique developed in this laboratory, that practically eliminates water absorption by the nuts, was used to determine individual kernel densities. A two parameter logistic function was found to be most appropriate for modelling the density data. To facilitate widespread practical applicability, predictive models were developed for the cumulative density distributions of each size range. The same kernels were split and studied for internal discoloration and/or fluorescence under long range UV light, these being indicators of possible contamination. The suspect kernels are being individually quantitated for aflatoxins by reverse phase high performance liquid chromatography. This data would allow correlation of aflatoxin levels with density on an individual kernel basis hence, minimizing the extreme variability associated with sampling for aflatoxin contamination. The predictive models developed in this study could be used in the design and assessment of density based separation techniques for aflatoxin contaminated peanuts from uncontaminated peanuts.

Resistance to Grey Mould (*Botrytis cinerea*) in some Peanut (*Arachis hypogaea*) genotypes in Zimbabwe Z.A. Chiteka. Crop Breeding Institute, Department of Research and Specialist Services, Box 8100, Causeway, Harare, Zimbabwe.

Forty long season peanut genotypes belonging to the sub species hypogaea were evaluated for resistance to grey mould (*Botrytis cinerea*). The sites were at Harare Research Station (altitude 1506 m.a.s.l) and Gwebi Variety Testing Centre (altitude 1448 m.a.s.l). Inoculation was by naturally occurring inoculum under field conditions. The incidence of disease was 100 percent in all plots with the susceptible check variety Flamingo. Genotypes were rated for the level of disease infection using two methods, a 0 to 6 scale where 0 = no disease and 6 = all stems affected with more than 70% of the crown affected and by an index of infection determined by counting the total number of stems and the number of stems affected during the mid pod filling phase. The most resistant genotypes gave seed yields which were 1.50 to 2.35, 1.20 to 1.65 times higher than the susceptible check variety Flamingo at Harare and Gwebi respectively. The *Botrytis* rating on a 0 to 6 scale were negatively and moderately correlated ($P<0.001$) with pod and seed yield at both sites ($r = -0.518$ to -0.457). The 0 to 6 rating scale was a quicker method to use under field conditions and was more closely and more consistently correlated with yield and yield components. The most resistant genotype was 92/7/103 and which gave mean seed yields of 4.09 and 4.87 t/ha at Harare and Gwebi respectively.

The Effects of Fungicides on Yield and Grade of Florunner and Southern Runner Peanuts. J. C. JACOBI* AND P. A. BACKMAN. Dept. of Plant Pathology, Alabama Agricultural Experiment Station, Auburn University, Alabama 36849.

The effect of fungicide program and cultivar (Florunner vs. Southern Runner) on peanut disease severities, pod yield, and grade were evaluated in field tests conducted from 1987-1989. Leafspot control programs included reduced (4 spray) and conventional (7 spray) schedules with several contact and systemic fungicides. Terbutrazole (0.25 kg a.i./ha), and diniconazole (0.28 kg a.i./ha), were substituted for chlorothalonil (1.26 kg a.i./ha), at sprays 3, and 5 of a 14-day spray schedule, while, flutolanil (1.12 kg a.i./ha) was tank mixed with chlorothalonil for the same two sprays. All three treatments reduced the incidence of both southern stem rot (*Sclerotium rolfsii*) and limb rot (*Rhizoctonia solani*) on both cultivars as compared to chlorothalonil alone. In addition, yields were increased 44-49% and 24-39% for Florunner and Southern Runner, respectively. Both cultivar and fungicide treatment had an effect on grade data. No differences were found between cultivars in %TSMK. However, there were significant differences between cultivars in %ELK with Florunner averaging 24%, while Southern Runner averaged 18%. Kernel damage (%DK) was 6.1% and 1.8% for chlorothalonil treatments of Florunner and Southern Runner peanuts, respectively. In Florunner peanuts the addition of terbutrazole to the chlorothalonil spray program increased %ELK from 23.3% to 28.3% and reduced %DK 6.1% to 2.1% as compared to chlorothalonil alone, while Southern Runner's values were unaffected. The majority of kernel damage in this test was caused by fungi.

Estimates of Heritability and Correlation Among Three Mechanisms of Resistance to Aspergillus parasiticus in Peanut. S. D. UTOMO*, W. F. ANDERSON, J. C. WYNNE, M. K. BEUTE, W. M. HAGLER, JR. and G. A. PAYNE. Depts. of Crop Science, Plant Pathology and Poultry Science, North Carolina State Univ., Raleigh, NC 27695.

The heritability of three mechanisms of resistance to aflatoxin including dry-seed resistance (DSR), aflatoxin-production resistance (APR), and preharvest-infection resistance (PIR), as well as phenotypic correlations among the mechanisms, was estimated. Forty-five F_2-derived F_6 families of two crosses, AR-4/NC 7 and GFA-2/NC 7, were evaluated using a randomized complete block design with three replications. To evaluate DSR, sterilized rehydrated seed were inoculated by a spore suspension of Aspergillus parasiticus strain NRRL 2999 (5 X 10^5 spore/mL). Percent infection was recorded after 8 days of incubation at 25 C. To evaluate APR, the seed coat was removed from five seeds which were then sterilized, rehydrated, inoculated, and incubated for 4 days at 29 C. Samples were analyzed using an HPLC to determine aflatoxin production. Plants of each family were evaluated for PIR in the greenhouse and inoculated at 40 days after planting (DAP). Drought stress was applied at 60 DAP to induce A. parasiticus infection. Seeds from each plant were harvested, dried, and plated in malt salt agar, and the percent infection was recorded after 8 days. In cross AR-4/NC 7, heritability estimates of DSR, APR, and PIR were 0.55±0.23, 0.20±0.25, and 0.27±0.25, with family means ranging from 7-95%, 7.95-43.62 ppm, and 0-100%, respectively. In cross GFA-2/NC 7, heritability estimates of DSR, APR, and PIR were 0.63±0.21, 0.47±0.22, and 0.33±0.26, with family means ranging from 25-98%, 14.73-69.62 ppm, and 0-100%, respectively. The means of the three traits in cross AR-4/NC 7 were generally lower than those of cross GFA-2/NC 7. In both crosses, there was no significant correlation among the three mechanisms of resistance, indicating that the three mechanisms are controlled by different genes. Selections from cross GFA-2/NC 7 should produce a larger number of progenies with resistance than selections using AR-4/NC 7.

Analysis of Seed Storage Proteins in Arachis Species Using SDS-PAGE Electrophoresis. C. M. BIANCHI-HALL*, R. D. KEYS and H. T. STALKER. Dept. of Crop Science, North Carolina State Univ., Raleigh, NC 27695.

Fifty-eight accessions of wild peanuts (Arachis sp.) introduced from South America were analyzed for seed storage protein composition using SDS-PAGE electrophoresis. The objective of the study was to evaluate variability among accessions in section Arachis and to classify taxa based on protein composition. Proteins were extracted twice by grinding 1 g of whole seeds per 25 mL borate buffer (pH 8, 50 mM). After grinding, 2 ME (8.6 M) and SDS (17 g/L) were added to extractions and samples were agitated for 1 hr. The supernatant was collected and centrifuged at 30,000xg for 30 min, transferred to 1-mL microtubes and stored at -40 C. Electrophoresis samples were prepared with 30 µL of supernatant, 60 µL of tricine buffer (0.1 M), 30 µL of 2 ME, 20 µL of SDS, and 2 µL of BPB (0.5%). These samples were run on SDS-PAGE 12-21% gradient gels at 1.25 watts power for 7 hr. Gels were stained with coomassie blue, photographed, and optically scanned. Although many dark and lightly stained bands were observed, only the major bands corresponding to the acidic and basic arachin proteins were compared. In the region corresponding to the acidic arachin proteins, one to five bands were observed, while the region corresponding to the basic arachin had two to five bands. A group of three to seven minor bands separated the acidic and basic arachin proteins. The 58 accessions were grouped into five classes based on electrophoretic mobility of the acid arachins. Additional subgroups were made based on the characteristics of the basic arachins. The high resolution of gels allowed a clear assessment of the large amount of variability in protein composition present in the wild species of peanuts and should aid in defining phylogenetic relationships in Arachis.

Mechanical Inoculation of Tomato Spotted Wilt Virus on Peanut. T. E. CLEMENTE*, A. K. WEISSINGER and M. K. BEUTE. Departments of Plant Pathology and Crop Science, North Carolina State University, Raleigh, NC 27695-7616.

Mechanical inoculation efficiency of tomato spotted wilt virus on peanut was tested utilizing 4 carborundum grit sizes and a 0.01M Tris (pH 7.8) buffer with 0.1% cysteine and 0.01M sodium sulfite, with and without 2.5% nicotine amendment in a completely randomized design. Genotype Pronto was used in the experiments. Eight day old peanuts grown under low light intensity were rub inoculated on three fully expanded leaves with virus-infected sap from Nicotiana benthamiana. Virus symptoms on peanut developed 8-10 days post-inoculation. Significant reduction in root and shoot weights along with decreased nodulation of infected plants were observed. Virus was detected via an immuno-dot blot assay in roots and shoots in 81% of inoculated plants 21 days post-inoculation; no virus was detected in the uninoculated controls. Preliminary results indicate light intensity as a critical factor for efficient mechanical inoculation of the virus on peanut. Carborundum grit size and nicotine amended buffer did not influence inoculation efficiency.

PHYSIOLOGY AND SEED TECHNOLOGY

Peanut Roots. An Enigma? D. L. KETRING* and J. L. REID. USDA-ARS, Plant Science Research Laboratory, Cooperative with Dept. of Agronomy, Oklahoma State University, Stillwater, OK 74075.

The largest detriment to crop productivity is available water. The supply of water for crop biomass accumulation is provided from the soil reservoir by the root system. The extent to which roots explore the soil profile for water and their ability to extract water from the soil reservoir determines the amount of water moving through the plant. The amount of water moving through the plant (transpiration) is linearly related to biomass accumulation. In this study, growth of roots of two cultivars (Florunner and Okrun) was examined under field conditions using soil coring techniques and visual observations at the end of the season. Soil type was a Teller loam (fine, mixed, thermic Udic Argiustoll). Experimental design was a randomized block with three replications, two cultivars, and three irrigation treatments. Studies were conducted in 1988, which was a hot, dry season. Root length density (RLD) and root weight density (RWD) of roots in the soil profile were not significantly different between genotypes or among irrigation treatments. However, RLD and RWD differed by day after planting (DAP) and depth increment in the soil. At 45 DAP, roots had penetrated to a depth of 120 cm. The shallowest depth increment (0-15 cm) had the highest mean RLD, which increased to 2.1 cm/cm^3 at 80 DAP. Subsequent depths (15-30, 30-45, and 45-60 cm) showed a similar pattern, while 15-cm depth increments from 45 to 120 cm had a nearly constant RLD from 45 to 80 DAP. After 80 DAP the 75-to-120 cm depths were not sampled due to inability of the coring tube to penetrate these soil layers even in the well-watered treatment. At 45 DAP, water extraction was found to a depth of 105 cm in the driest treatment. Thus peanut roots were established deep in the soil profile prior to the onset of low soil moisture conditions even in a loam type soil.

Changes in Seed Quality During Peanut Seed Development and Maturation. J. M. FERGUSON*, Crop Science Department, North Carolina State University, Raleigh, North Carolina 27695.

The Hull-Scrape Technique of determining peanut (*Arachis hypogaea* L.) maturity has been adopted by many producers. Further studies are needed, however, to determine if this method can be used by peanut seed producers to indicate when a majority of the seeds have reached maximum quality potential. NC 7 and NC 9 peanuts were planted in May of 1989 on the Peanut Belt Research Station near Lewiston, NC and traditional production practices were followed. Two rows 7.6 m long and two replications of each variety were dug at weekly intervals beginning on September 18. The pods were pulled by hand immediately following digging and separated into six maturity categories as determined by the Hull-Scrape Technique. Seed moisture and dry weight were determined for each maturity class and the remaining pods were dried at ambient temperatures. The peanuts were stored at 10°C and shelled by hand to avoid any mechanical damage that could result in reduced seed quality. Peanuts harvested on different dates will be kept separate to determine if the environment during seed development and maturation has an affect on seed quality. Seed viability, germination and vigor will be determined for all maturity classes from each digging date. All seed quality tests will follow established AOSA rules.

A Comparison of Different Methods of Accelerated Aging of Peanut Seeds. R. Z. BAALBAKI* and R. D. KEYS, Dept. of Crop Science, North Carolina State University, Raleigh, North Carolina 27695-7620.

Two new methods of accelerated aging were compared to the presently used method. The "Test Tube" method consisted of placing seeds in porous test tubes and incubating them in water at a constant temperature of 41 °C for 0 to 8 hours. The "Sealed Bag" method consisted of placing dry seeds in sealed plastic bags and incubating them for 0 to 8 days at 45 °C. All tests were performed on two lots of high and low viability peanut seeds. Results indicated that the common method of aging seed by exposure to high relative humidity and temperature has many disadvantages. First, chemical seed treatment before incubation had a significant and varying effect on final germination results such that treated and untreated seeds could not be compared by the same test. Second, conditions of high temperature and humidity promoted fungal growth that affected the seeds during incubation and germination. Results of the "Test Tube" method were also significantly affected by seed treatment. The advantages of this test over the first were its short duration and elimination of the effects of fungal attack. However, neither aging method can be said to be the same as that expected under normal conditions. The "Sealed Bag" method allowed for seed aging under dry conditions, thus aproximating the actual aging process. Since chemical treatment did not significantly affect final results, direct comparisons of treated versus untreated seeds were possible. The range of response also allows for flexibility in choosing the degree of aging desired. Finally, unlike the other two methods, there was virtually no seed loss during the process, an important consideration when seed supply is limited.

<u>Changes in Electrophoretic Profiles of Peanut Storage Proteins Under Different Storage Conditions and Durations</u>. R. D. KEYS* and R. Z. BAALBAKI. Dept. of Crop Science, North Carolina State University, Raleigh, NC 27695-7620.

Gradient SDS-PAGE was used to study the dynamics of storage protein mobilization during the germination process. That information was in turn correlated with viability, seedling fresh and dry weight, seedling length, and seed leachate electrical conductivity of three peanut varieties. The experiment was conducted under ambient, refrigerated and frozen storage conditions over a 12 month storage after harvest and shelling. Results indicated a slowdown in reserve protein mobilization that was highly dependant upon storage condition and duration. Lots that retained a high degree of viability exhibited an orderly rate of protein mobilization through seven days of germination, as indicated by their electrophoretic protein profiles. Lots with poor viability had a more random pattern or little protein mobilization. Seedling fresh weight was a good measure of vigor, while dry weight and seedling length showed little variation and was a poor measure of vigor. Conductivity was significantly affected by storage condition, changing greatest in ambient stored seed and least in refrigerated or frozen stored seed. While ambient stored seed had a significant decline in viability over 12 months, refrigerated stored seed had only a small decline and frozen stored seed had a small initial decline that stabilized over time. These results indicate ambient storage is good only for a short time while refrigerated storage is good for short to long term storage and frozen storage is good for long term storage of Virginia type peanuts.

Sensitivity of Peanut to Temperature Change. G. HOOGENBOOM*, K. J. BOOTE, AND J. W. JONES. Department of Agricultural Engineering, Georgia Station, University of Georgia, Griffin, GA 30223-1797; and Department of Agronomy and Department of Agricultural Engineering, University of Florida, Gainesville, FL 32611.

One of the possible effects of global climate warming is a change of the air temperature. PNUTGRO Version 1.02, a computer model which simulates growth, development, and yield of peanut (*Arachis hypogaea* [L]), was used to predict the effect of temperature change on peanut production in the Southeastern U.S.A. 15 sites were selected in Alabama, Georgia, and Florida, representing the main peanut growing region. Four simulations with historical weather data for the years 1981 - 1985 as input were made for each location. Following these standard simulations, the daily minimum and maximum air temperature were modified with -1, -2 and -3 °C, and with +1, +2, +3, and +4 °C, respectively to study the effect of either a temperature decline or temperature rise on peanut production. A detailed daily analysis of one site, i.e Tifton, Georgia, showed that there was a very strong seasonal and temporal variability of biomass and pod production. This was not only caused by a year-to-year temperature variation, but also due to the irregularity of both precipitation events and amounts. A comparison between all sites displayed a strong spatial variability with respect to prediction of maturity and final pod yield, even for sites located relatively close within the same state. The model predicted that for all locations a temperature decline will increase biomass production and final pod yield. A rise in the daily temperature will cause a decrease in pod yield production. This is mainly caused by a strong interaction between the temperature and the general life cycle of the peanut plant. If the temperature increases, the plant will develop faster and flower and mature earlier. This will reduce the number of effective pod filling days and the size of the canopy which produces the carbohydrates for partitioning to the pods. At the same time maintenance and growth respiration rates increase with an increase in temperature, and photosynthetic rates decrease at higher temperatures, causing a reduction in net pod growth rate. It can be concluded from the predictions of the PNUTGRO model that the peanut production in the Southeast will decrease if the temperature rises.

Effects of Soil Water Deficits On Physiological and Growth Responses of Peanut. J. M. BENNETT*, P. J. SEXTON, AND K. J. BOOTE. Dept. of Agronomy, University of Florida, Gainesville, FL 32611.

Although peanut (*Arachis hypogaea* L.) yields are commonly reduced by soil water deficits, specific mechanisms responsible for the lower yields are often not obvious. Field and greenhouse experiments were conducted in 1989 and 1990 to determine the effects of soil water deficits on water relations, stomatal activity, vegetative development, pod initiation, and pod and seed growth rates of Florunner peanut. A field experiment included a well-watered treatment as well as a treatment which was sheltered from rainfall for 25 d at the beginning of reproductive development. Treatment combinations consisting of both wet and/or dry rooting and pegging zones were imposed in greenhouse studies. Drought delayed the beginning of linear seed growth by approximately 10 d in the field study and reduced flower and peg production when plant water deficits became severe. Many pegs which formed during the imposed drought remained viable and developed into mature pods following relief of the water stress. In greenhouse studies, a dry pegging zone caused more pegs to fail to develop into pods, or slowed the progression of pods through phenological stages. Pod growth rates were 14 to 42% greater when the pegging zone was moist, even though adequate water was supplied to the rooting zone. Seed and pod calcium concentrations were also lower when growth occurred in a dry pegging zone. The higher failure rate of pegs coupled with lower pod and seed growth rates in dry soil are at least partially responsible for lower peanut yields during periods of drought.

On-Farm Testing of the PNUTGRO Crop Growth Model in North Florida. K. J. BOOTE*, J. M. BENNETT, J. W. JONES, AND H. E. JOWERS. Depts. of Agronomy and Agric. Engineering, Univ. of Florida, Gainesville, FL 32611; and Florida Cooperative Extension Service, Univ. of Florida, Marianna, FL 32446.

The peanut crop growth simulation model, PNUTGRO, is a process-oriented model which simulates daily growth and development, soil-crop water balance, and final pod yield of peanut (*Arachis hypogaea* L.) as a function of weather inputs, soil information, cultivar, and management practices. The PNUTGRO model has been developed from research data but validated only in research plots. In order to evaluate potential grower and extension applications of the model, we conducted on-farm trials to determine the ability of PNUTGRO to predict growth, soil water balance, and pod yield of Florunner peanut in producer fields in North Florida in 1988 and 1989. Weather and irrigation data were recorded with automated instrumentation and grower management practices recorded. Initial samples were taken for soil fertility, soil water content, and nematode assay. At 4-week intervals, soil water content was sampled, and crop dry matter accumulation, leaf area index, and number and dry weight of pods were measured. For 1988, the original untested PNUTGRO model was run using weather, soil, and management data. Simulated growth was somewhat greater than observed growth in disease-free fields, but the model seriously over-estimated growth and yield in fields with root-knot nematode and white mold (problems the model was not designed to simulate). The model was then calibrated to the growth observed for 1988, and on-farm field trials were conducted again in 1989. When run with sampled weather, rainfall, and irrigation data from 1989, the predicted pod yields were generally within 400 to 500 kg ha^{-1} of measured yields, although vegetative growth was somewhat over-predicted. The 1989 season was unique because the weather was much wetter and temperatures more optimum (not as high or as low) compared to 1988. The 1989 crop developed much faster, had less vegetative growth, and allocated a higher fraction of dry matter to pods than the 1988 crop. From this experience, we plan to make further improvements to the model. We hope to continue "on-farm testing" of the PNUTGRO model to evaluate the usefulness of the model in differing environments.

Measurement of Pod Maturity Color with a Chroma Meter. E. JAY WILLIAMS. USDA-ARS, Coastal Plain Experiment Station, Tifton, Georgia 31793.

A chroma meter was used to detect the color of peanut pods after their exocarps were removed. Maturity was determined by the hull scrape method as used for pod maturity profiles. The chroma meter illuminated an 8 mm spot on the basal segment with a pulsed xenon arc lamp. Three silicon photocells detected the output of the arc lamp; three additional photocells detected the primary stimulus values for red, green, and blue light. An interface provided computer control and data acquisition. Chromaticity values were recorded in the $L^*a^*b^*$ color space notation for hue, value, and chroma. Regression analysis was used to determine the best fit model for maturity (r^2=.93). The calibration data was tested for accuracy against other pod sets measured with the chroma meter. Discriminant analyses showed predicted maturity to fall within 1 to 2 divisions of the hull scrape classification. Visual observations of pods re-sorted by the chroma meter suggested improved classification over the original sort.

MYCOTOXINS

Aspergillus flavus and A. niger Contamination of Groundnut in Niger. F. WALIYAR. Groundnut Improvement Program, ICRISAT Sahelian Center, B. P. 12404, Niamey, Niger (via Paris)

During the 1989 rainy season, 25 lines, including germplasm of advanced Aspergillus flavus resistant breeding lines and some cultivars from West Africa, were tested in three locations (Sadoré, Bengou and Maradi) in Niger. Seed collected from field trials were tested in the laboratory to estimate seed contamination by A. flavus. More than 50% of the seed were infected by A. flavus at Sadoré. Average seed contamination depended on the location (25% at Sadoré, 13% at Bengou, and 13% at Maradi). Significant differences between genotypes were found. Genotypes 55-437 and J 11 were the least contaminated lines. Among the ICRISAT advanced A. flavus resistant breeding lines ICGV 87107, ICGV 87094 and ICGV 87110 were the least contaminated. At the same locations trials were conducted to estimate the yield and plant losses from seedling disease of groundnut, using 2 fungicides to control seedling diseases. Seeds were treated with thiram or Corvet CM at the rate of 3 g kg^{-1} seed. The percentage of unprotected plants that died after emergence in the non fungicide treatment ranged from 19 - 43 $\pm$ 3.2%. Seed treated with fungicide produced higher yields than the untreated control. ICGS 11 showed a high percentage of plant losses in all three locations in the untreated plots. There was no significant differences between the two fungicides.

Fungicide Effectiveness for Control of Fungal Invasion and Aflatoxin Contamination in Peanut Kernels. K.L. BOWEN* and P.A. BACKMAN, Dept. of Plant Pathology, Alabama Agricultural Experiment Station, Auburn University, AL 36849-5409.
Fungicides used for control of southern stem rot (Sclerotium rolfsii) and limb and pod rot (Rhizoctonia solani) have also been found to reduce fungal damage affecting seed quality. Starting in 1988, the fungicides, terbutrazole, flutolanil, and diniconazole were applied to peanuts in addition to standard foliar sprays for leafspot control with chlorothalonil. Kernels harvested from these plots were evaluated for infection by Aspergillus spp., other soil-borne fungi, and aflatoxins. In 1988, peanuts from irrigated plots, that were treated with these fungicides, showed no significant differences in incidence of fungal invasion. However, peanuts from plots treated with each of these fungicides had lower aflatoxin contamination than plots treated with only chlorothalonil. In 1989, similar studies were conducted in non-irrigated plots. Peanuts from plots treated with each of these fungicides had lower fungal infestation and flutolanil-treated peanuts had lower aflatoxin contamination than peanuts from control plots. In both years, the use of these fungicides resulted in higher yields and improved crop value.

Screening Peanut Genotypes for Resistance to Aflatoxin Accumulation. D. M. WILSON*, W. D. BRANCH, R. W. BEAVER and B. W. MAW. University of Georgia, Coastal Plain Experiment Station, Tifton, GA 31793. Mycotoxin Analysis Research Center, Department of Plant Pathology; Department of Agronomy; Mycotoxin Analysis Research Center, Department of Plant Pathology, and Department of Agricultural Engineering.

During 1988 and 1989, preliminary screening trials were conducted under two rainout shelters to determine possible differential aflatoxin production among the following four peanut genotypes: 'Florunner' which is the most popular runner-type cultivar in the southeast; 'Sunbelt Runner' and 'Tifrun' which are also runner cultivars developed and released from Georgia; and the Tifton-8 germplasm line. In 1988, the rainout shelters failed due to old sensors malfunctioning during critical rainy periods. Thus, this extra moisture eliminated aflatoxin and any test results. However in 1989 after repairs the shelters performed as expected, and drought stress was quite severe and uniform. The results obtained show significant genotypic differences within one shelter but not another. Overall, Tifton-8 had a significantly lower aflatoxin content than Tifrun and Florunner, Sunbelt Runner was intermediate. These data strongly suggest that differences do exist among certain peanut genotypes for aflatoxin production, however additional studies are needed to perfect this screening technique to identify valuable genetic sources.

Degradation of Aflatoxins B1, B2, G1, and G2 in Solution. R. W. BEAVER and D. M. WILSON. Mycotoxin Analysis Research Center, Department of Plant Pathology, Coastal Plain Experiment Station, University of Georgia, Tifton, Georgia, 31793-0748.

The stability of aflatoxin standards in 50% aqueous methanol, 50% aqueous acetonitrile, and aqueous methanol or acetonitrile containing 0.5% acetic acid was determined at -20°C and at room temperature in both light and dark. Aflatoxins G1 and G2 were less stable under all conditions than were aflatoxins B1 and B2. All four toxins degraded more rapidly at room temperature when exposed to room light than at room temperature in the dark. Addition of 0.5% acetic acid to either the aqueous acetonitrile or aqueous methanol solutions substantially reduced the degradation of all four toxins. However, peanut extracts (in 80% aqueous methanol) seemed to stabilize the aflatoxins and no substantial toxin degradation was observed over the course of 24 hours even in extracts stored at room temperature exposed to light.

Changes in Isozyme Patterns of *Aspergillus flavus* Group spp. Infected Peanut Cotyledons from Plants grown under Drought Stress. J.B. SZERSZEN* and R.E. PETTIT. Dept. of Plant Pathology and Microbiology, Texas A&M University, College Station, TX 77843-2132.

Isozyme profiles of buffer-extractable cotyledonary proteins from *Aspergillus flavus* and *A. parasiticus* infected peanut kernels from 5 cultivars grown under drought stress and normal irrigation were assayed electrophoretically by means of microprocessor-controlled IEF-PAGE (pI 3-9) and discontinuous native-PAGE (gradient 8-25%). Drought stress was imposed 100 days after planting until harvest. Testa-free viable kernels, hydrated previously to 25% of moisture, were inoculated with conidia of the aspergilli (7 X 10^6 per ml), and sampled every 6 hr during 72 hr of incubation (dark, 32C, 95% RH). Total protein profiles of non infected cotyledons from drought-stressed and irrigated plants were identical. Both fungi caused qualitative and quantitative changes of ADH, ACPH, ALPH, EST, LAP, PER, 6-PGD, MDH, and G-6PD within 12-72 hr of incubation. Aspergilli infected cotyledons from drought-stressed plants exhibited differences in banding patterns and activities of ACPH, ALPH, EST, MDH, and G-6PD, when compared to infected cotyledons from plants grown under irrigation. Drought-stressed cultivar TX 798736 showed the most isozyme changes among cultivars tested. Drought stress can predispose viable peanut kernels to altered enzymatic reactions occurring during early stages of infection by *Aspergillus flavus* group spp.

The Use of a Biocompetitive Agent to Control Preharvest Aflatoxin in Drought Stressed Peanuts. J. W. DORNER*, R. J. COLE and P. D. BLANKENSHIP. USDA, ARS, National Peanut Research Laboratory, 1011 Forrester Drive, S. E., Dawson, GA 31742.

A three year study was conducted to evaluate the use of a biocompetitive agent as an effective management strategy for preharvest aflatoxin contamination. The strategy involved the incorporation of a non-aflatoxin producing strain of *Aspergillus parasiticus* into the soil of our environmental control plot facility. The agent was tested by subjecting the peanuts to ideal conditions for preharvest aflatoxin contamination and comparing the effects with non-treated controls. The biocompetitive agent has maintained a dominance over the wild, toxigenic strains of *A. flavus*/*parasiticus* for the three year period with no further addition of fungal propagules after the first year. This treatment also resulted in a significant reduction in aflatoxin in edible grade peanuts compared to non-treated controls. Results from the first year showed that control, non-treated peanuts averaged 522 ppb aflatoxin, while biocontrol treated peanuts averaged 11 ppb. The second year, controls contained 96 ppb compared with 1.1 ppb in treated peanuts. The third year controls were 241 ppb and treated peanuts 40 ppb. Also of significance, soil populations of the biocompetitive agent were not higher than populations of wild strains of *A. flavus*/*parasiticus* that were present in untreated peanut soils subjected to late-season drought stress. This is an important ecological consideration related to ultimate implementation of this strategy.

Testing Bacillus subtilis as a Possible Aflatoxin Inhibitor in Stored Farmers Stock Peanuts. J. S. SMITH, JR.*, J. W. DORNER and R. J. COLE. USDA, ARS, National Peanut Research Laboratory, 1011 Forrester Drive, S. E., Dawson, GA 31742.

A strain of *Bacillus subtilis* from Japan was tested to determine its capability of inhibiting aflatoxin production in farmers stock peanuts during storage. Samples of florunner cultivar farmers stock peanuts at 7.1 and 25.1% moisture content were treated with three concentrations of *B. subtilis* and placed in a miniature semi-underground warehouse for 56 days. Relative humidity and temperature were controlled for the first 13 days of storage. All treatments were replicated including non-treated controls. Storage conditions were monitored at 30 minute intervals throughout the test period. After storage, samples were shelled and analyzed for aflatoxin by high pressure liquid chromatography. Results indicated that *B. subtilis* did not satisfactorily inhibit aflatoxin production during storage of farmers stock peanuts at high moisture contents comparable to those encountered from warehouse leaks or condensation drip lines.

PLANT PATHOLOGY AND NEMATOLOGY

Infection of Peanut by Aspergillus niger. S. S. ABOSHOSHA, H. A. MELOUK*, D. H. SMITH and P. P. 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 ± 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 ± 1 C in darkness. After 6 days of incubation lesions bearing abundant conidia of A. niger had developed on the hypoctyls. All peanut entries tested were susceptible to this isolate of A. niger.

Improved Southern Blight Control with Peanut Canopy Opener and Banded Reduced Fungicide Rates. R. V. STURGEON, JR.* Plant Health Services, Inc. Stillwater, Okla. 74075

Southern blight (Sclerotium rolfsii) control programs are usually recommended at conventional high broadcast fungicide rates. More judicious fungicide use can be accomplished by reducing rate per acre and applying fungicide only in primary infection target area. Field observations indicate primary infections generally occur at base of peanut plant. Hence, reduced fungicide rates banded around base of plant should improve control. Tests were initiated to determine effect of targeting fungicide to center of plant row and reducing fungicide rates. PCNB at one half recommended rate was as effective as full rate applied in 175 mm band covering base of plant with prototype of Peanut Canopy Opener in controlling S. rolfsii and increasing yields. PCNB at one half recommended rate applied in 175 mm band was as effective as full rate and one half rate applied in 350 mm band. Reduced rates of propiconazole (Tilt 3.6) applied at one half recommended rates in 175 mm band with Peanut Canopy Opener was as effective as full rate applied over row. Peanut Canopy Opener is designed similar to a planter shoe with spread rear wings. The unit is mounted on applicator so it can be lowered into peanut row spreading foliage and opening canopy, allowing fungicide granules to drop around base of plant or sprays to reach soil and lower parts of the plant.

The Effects of the Fungicide Propiconazole on the Groundnut Shell Mycobiota.

R. E. BAIRD*, T. B. BRENNEMAN, D. K. BELL, AND A. P. MURPHY. Department of Plant Pathology, Coastal Plain Experiment Station, University of Georgia, Tifton, GA 31793.

A total of 4,296 fungal isolates were cultured from groundnut shells (*Arachis hypogaea* L.) obtained from two sites located near Tifton, Georgia, U.S.A. At the two locations plots were oversprayed with chlorothalonil and different treatments of propiconazole were applied. Nearly two-thirds of the isolates were members of the Fungi Imperfecti. The most frequently observed species were from the form-genera *Alternaria*, *Botryodiplodia*, *Curvularia*, *Epicoccum*, *Fusarium*, *Nigrospora*, *Phoma*, *Rhizoctonia*, and *Trichoderma*. The pesticide applications showed little or no effect on isolation frequency at one test site, but significant differences were observed between the fungicide applications for many of the above listed genera at the second location. No single treatment caused the majority of differences. Isolation frequencies of the nine most common genera indicated significant differences on malt extract agar, potato dextrose agar, and tannic acid benomyl agar media for only *Botryodiplodia* and *Nigrospora*.

AU-Pnuts Leafspot Advisory System: Validation of Recommended Sprays.

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A peanut leafspot management program developed for Alabama peanut fields was validated at Auburn University's Wiregrass Substation, Headland Alabama, in a field that was left fallow the previous year. Rules for fungicide use were based on historical analysis of leafspot epidemics and expert opinion. An environmental driving variable called 'rainy days' was selected based on occurrence of daily precipitation greater than 0.1 inch. Applications with chlorothalonil (Bravo 720, 1.75 l/ha) were initiated when 7 such days occurred after peanut plants cracked the soil. Subsequent applications were considered 10 d after previous treatments and were applied when: (i) 3 rainy days had occurred, (ii) 2 rainy days had occurred and the chance of rain over the next 5 days averaged $\geq$ 20%, (iii) 1 rainy day occurred and the chance of rain averaged $\geq$ 40%, or (iv) no rainy days had occurred but the chance of rain averaged $\geq$ 60%. An experiment was designed to judge the effects of each of our recommended sprays on leafspot epidemics. The experimental design was a randomized complete block with 6 replications, and 9 treatments of plots receiving: (1) all recommended sprays, (2) no recommended sprays, (3) the first spray after 9 rainy days (delayed start), and (4-9) all sprays except one of the 6 recommended sprays. Our results show that for rotated peanuts, treatments early in the season or late in the season did not contribute as much to AUDPC accumulation as treatments in midseason. Conversion of AUDPC's to estimated yield loss showed that missing sprays 2, 3 and 4 translated into losses of 387, 520 and 325 lb/ac, while delayed start and missing sprays 1, 5 and 6 translated into losses of 161, 83, 113, and 17 lb/ac. Further research will be required to determine rules for nonrotated peanuts and validations will continue in 1990.

Evaluation of Predictive Systems for Timing of Peanut Leafspot Fungicide Applications. P. A. BACKMAN*, J. C. JACOBI, and D. DAVIS; Dept. of Plant Pathology; and Dept. of Entomology, Auburn University, Alabama 36849.

It is generally recognized that peanut farmers applying fungicides on a 14-day programmed schedule are probably overtreating when conditions are hot and dry, and undertreating when conditions are very wet. Further, the new leafspot tolerant cultivar Southern Runner probably needs fewer fungicide applications to achieve maximum yields than does the Florunner cultivar. In 1989, we established an experiment on rotated peanuts to evaluate the Neogen Envirocaster in comparison to a set of expert rules for peanut leafspot treatment that we call "AU-Pnuts". Both of these predictive systems were compared to the standard 14-day program. The standard 14-day program made 7 applications of Bravo 720 during the 1989 peanut growing season (which was a very wet season), while the Neogen system made 5 applications, and AU-Pnuts made 6 applications. While all programs provided adequate control and equivalent yields, disease control on Florunner as well as Southern Runner peanuts was best with the AU-Pnuts program, followed by the 14-day standard schedule, with the Neogen system last. The Neogen system did not use predicted weather like the AU-Pnuts program, and thus had difficulties when predicted tropical depressions made conditions too wet to spray for several days in succession. In addition, the Neogen model seemed to overly reduce the importance of several short infection periods that were closely linked in time. The data presented indicate that predictive programs can be developed for Southeastern peanuts that will allow for reductions in frequency of pesticide applications. The applications made are more timely since they are coordinated with infection periods for the peanut leafspot fungi.

Disease.Pro - A Computerized Disease Assessment Training and Evaluation Program. F. W. NUTTER, JR.* and O. WORAWITLIKIT. Department of Plant Pathology, University of Georgia, Athens 30602

Accurate and reliable disease proportion measurements are essential for evaluating disease control tactics (fungicide efficacy, foliar disease resistance, etc.) and programs (calendar vs weather-based fungicide schedules). A computer program written in BASIC was developed for the purpose of evaluating and improving the ability of disease assessors to accurately and more precisely estimate disease proportion (area of diseased leaf tissue/total leaf area of a leaf). A color monitor (CGA, EGA, or VGA capability) is used to display a simulated diseased peanut leaf and the operator is asked to provide his/her estimate of the disease proportion. The program is flexible in that disease proportions may be generated for several diseases. These are: early leafspot, late leafspot, mixed leafspots or peanut rust. The operator also may select the size of lesions (small, medium, large, or random lesion sizes) that appear on the simulated leaf. The program allows for both tabular and graphical display of the operator's performance in estimating disease proportion. Actual minus the estimated values are plotted on the Y-axis against the actual disease proportions on the X-axis. This provides a graphical representation of how each individual perceives various disease levels. Tabular data may be output to another file for statistical analysis. The program allows for drill and practice sessions since the operator may choose to have the computer show the actual disease proportion after the operator keys in his/her disease proportion estimate to provide immediate feedback. Pre-testing and post-testing sessions can be conducted without displaying the actual disease proportion to document improvement. In a 1-hr session, 50 out of 55 students in an introductory plant pathology course at the University of Georgia significantly improved their ability to estimate disease proportions of late leafspot (random lesion size) as measured by (i) a higher coefficient of determination (r^2) relating the actual proportion (X) to the estimated value (Y) and (ii) a regression coefficient (slope) which was closer to 1.0 in post-tests compared to pre-tests. Disease.Pro is currently being used as a training tool in industry and to teach students principles of disease assessment.

Effect of the Herbicides Ethalfluralin and Vernolate on the Net-blotch Disease of Peanut Pods. Y. BEN-YEPHET*, S. MHAMEED, Z.R. FRANK, J. KATAN, Dept. of Plant Pathology, A.R.O., The Volcani Center, Bet Dagan, Israel; Dept. of Plant Pathology and Microbiology, The Hebrew Univ. of Jerusalem, Faculty of Agriculture, Rehovot, Israel

Five field experiments were conducted during three successive years to evaluate the effect of ethalfluralin and vernolate on net-blotch disease incidence. In the first three experiments, the treatments consisted of the nematicide fenamiphos, and the soil disinfestants metham-sodium and methyl bromide, with and without the herbicides. In the two other experiments the effect of each herbicide separately and in a mixture was evaluated. Incidence of diseased pods in the plots treated with ethalfluralin and vernolate (ranging from 38–86%) was significantly higher than in the control plots without herbicides (ranging from 25–42%) in the five field experiments. Disease level in fenamiphos- and metham-sodium-treated soil, with and without herbicides, was similar to that observed in the control plots without herbicides. Application of methyl bromide alone or with herbicides, practically eliminated the disease. In the two field experiments with the herbicides, but without the soil disinfestants, disease incidence following ethalfluralin treatment was 54% and 65% as compared with the control without herbicide, 41% and 42%. Addition of vernolate to ethalfluralin had no effect on disease incidence. Toxicity tests with the herbicides in growth media observed that, ethalfluralin was toxic to bacteria but not to fungi or actinomycetes; vernolate was not toxic to any of the microorganisms. Infestation of soil with pure cultures of actinomycetes, isolated from diseased pods resulted in net-blotch disease on the pods and the organisms was re-isolated. In conclusions: ethalfluralin alone and in combination with vernolate increased the incidence of net-blotch disease of peanut pods; vernolate alone had no effect on disease incidence. The disease was controlled with methyl bromide but not with metham-sodium or fenamiphos. This indicates that the disease is caused by biotic agents, but probably not a fungus or nematode. Microorganism toxicity tests with ethalfluralin together with plant inoculations with specific organisms suggest that Actinomycete spp. are involved in the disease syndrome.

Effects of Different Parts of Rye Plants on Yield and Populations of Rhizoctonia solani anastomosis Groups 4 and 2 Type 2 in Peanut Shells.
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Florunner peanut was grown in 0.9 m diameter field microplots of Fuquay loamy sand (Arenic Plinthic Paledult; pH 6.3; OM 0.55%) infested or noninfested with Rhizoctonia solani anastomosis group (AG) 4 or AG-2T2. Seed were planted 3 weeks after incorporation of different parts of rye plants in the soft dough stage of maturity into the soil, and pods were dug, cured, harvested and weighed 130-135 days after planting. Pods were maintained at 23-25 C and 35-55% RH until microfloral assays were made. Yields from the fungi-rye treatments follow: AG-4; 42, 30 and 19% greater yields with roots-stems-heads (whole plants), stems-heads (shoots) and no rye, respectively, compared with (cpw) roots: AG-2T2; 1, 21 and 9% greater yields with whole plants, shoots and no rye, respectively, cpw roots; Noninfested; 10, 15 and 8% greater yields with whole plants, shoots and no rye, respectively, cpw roots. Reisolation frequencies of AG-4 and AG-2T2 from shells from fungi-rye treatments follow: AG-4; 15, 38 and 19% fewer colonies with whole plants, shoots and no rye, respectively, cpw roots; AG-2T2; no reduction of colonies with whole plants, shoots and no rye, respectively cpw roots; Noninfested; AG-4, one colony; no AG-2T2. Yields were increased more with whole plants and shoots in the presence than absence of AG-4, and with shoots but not whole plants in presence than absence of AG-2T2. Rye roots appeared to reduce yields in the presence or absence of either AG and to increase recovery of AG-4 but not AG-2T2 from shells. AG-4 is highly virulent to all parts of Florunner seed and seedlings but not to crown and brace roots of field corn seedlings. AG-2T2 is highly virulent to crown and brace roots of corn seedlings and older plants but not to peanut seed and seedlings. Neither AG is highly virulent to crowns and roots of rye plants. Reduction or suppression of pathogenesis of both AGs is desirable, however, because peanut pods (seed and/or shell) are symptomless carriers of both AGs and crown and brace roots of corn are symptomless carriers of AG-4.

Production of Peanut Seed Free of Peanut Mottle- and Peanut Stripe Viruses in Florida. F. W. ZETTLER*, M. S. ELLIOTT, D. E. PURCIFULL, and G. I. MINK. Dept. Plant Pathology, Univ. Florida, Gainesville 32611 and Dept. Plant Pathology, Washington State Univ., Prosser 99350.

Seed of *Arachis hypogaea* cultivars Florunner, Florigiant, Southern Runner, and Sunrunner and 35 breeding lines were indexed for PMoV and PStV by indirect ELISA using cotyledonary tissues as antigens (Demski and Warwick. 1986. Peanut Sci. 13:38-40). Seed determined to be free of both viruses were sown in 3 gal pots in a greenhouse at Gainesville. Seedlings were individually inspected prior to anthesis for virus symptoms and indexed for PMoV and PStV by SDS immunodiffusion serology (SIS). Three PMoV-and 1 PStV-infected plants were detected among the 1822 greenhouse-grown plants and were removed. Neither PMoV nor PStV were detected by SIS in 184 samples from a field sown exclusively with virus-free, greenhouse-produced seed (VFS) and isolated by about 5 miles from any other peanut plantings. PMoV, but not PStV, was detected by SIS in 3 plantings of VFS located within 1 mile of commercial peanut fields (103/139, 23/98, and 338/504 samples indexed). Both PMoV (46/54) and PStV (24/54) were detected in a field sown with VFS, which was adjacent to a field sown with seed harvested from a site where PStV has existed since 1983. PStV was not detected in greenhouse-derived Sunrunner peanuts, which were field-grown in 1987 (61 samples indexed), 1988(121 samples indexed), and 1989 (198 samples indexed).

Status of Sclerotinia minor in Commercial Peanut Seed Lots from Oklahoma. H. A. MELOUK*, C. BOWEN, and K. E. JACKSON, USDA-ARS and Dept. of Plant Pathology, Oklahoma State University, Stillwater 74078-9947.

One hundred sixty-three peanut seed samples of Spanish (cv. Pronto and Starr) and runner (cv. Florunner and Okrun) type, representing harvests of 1988 and 1989, were obtained from the seed laboratories of the Oklahoma Crop Improvement Association (Stillwater, OK) or the Oklahoma Department of Agriculture (Oklahoma City, OK). The samples were obtained to determine the incidence of infection or contamination with *S. minor*. Seed samples received either were not treated or had been treated with commercially approved protectants. All seed samples were cleaned by submerging and agitating seed for 1 minute in 0.2% aqueous solution of non-scented liquid dish soap and then rinsing twice in deionized water. Seed from 1988 was surface disinfested by soaking in 1.1% aqueous solution of sodium hypochlorite (NaClO) for 2 minutes, and then placing between four layers of cheesecloth for ten minutes before plating on potato-destrose agar containing 100 ug/ml streptomycin sulfate (SPDA). Seed from 1989 was treated similarly except disinfestation with NaClO was not performed. Up to 250 seeds from each sample were plated on SPDA, with five seeds per petri plate (9 cm). Plates were incubated in darkness for 10-14 days at 25 C and then examined for growth of *S. minor* from seeds. Only one sample of Okrun/treated seed from the 1989 harvest, obtained from the Oklahoma Crop Improvement Association, was positive and had less than 0.4% infection or contamination with *S. minor*. These data show that less than 1% of samples from the commercial peanut seed lots obtained from the above mentioned sources were infected or contaminated with *S. minor*.

Potential Benefit of Chemical Management of Sclerotinia Blight in Peanut. K. E. JACKSON* and H. A. MELOUK. Dept. of Plant Pathology and USDA-ARS, Oklahoma State University, Stillwater, OK 74078-9947.

The benefit of fungicides applied to cv 'Florunner' infected with *Sclerotinia minor* was determined from a three year study at the Caddo Research Station, Ft. Cobb, Oklahoma. A randomized complete block design with four replications was used and plots were 3.65 X 12.2 m with row spacing of 0.91 m. Fungicides were applied with a wheelbarrow plot sprayer equipped with three fan tip nozzles per row calibrated to deliver 374 L water per ha. Percent Sclerotinia blight incidence was taken during the season and the area under disease progress curve (AUDPC) was determined. Plots treated with iprodione, dicloran (DCNA), and the combination of iprodione - DCNA had a significantly (P=0.05) lower percent Sclerotinia blight incidence, AUDPC, and significantly higher pod yields than the non-treated control. Although not statistically significant, plots treated with the combination of iprodione - DCNA had a higher pod yield and lower disease rating than either iprodione or DCNA treated plots. After subtracting the cost of fungicide treatment, the combination of iprodione - DCNA had the highest net dollar increase per hectare followed by DCNA, iprodione, and non-treated control. A significant negative correlation (r = -0.6696) between percent Sclerotinia Blight at harvest and pod yield was obtained from 188 observations over four years, likewise a significant negative correlation (r = -0.6457) was obtained between AUDPC and pod yields. The results indicated that an additive effect on control of Sclerotinia blight, pod yield increase, and net dollars per hectare occurred when iprodione - DCNA combination was applied, either as a tank mix or alternating between DCNA and iprodione applications.

Single and Mixed Infections of Groundnut (Peanut) with Groundnut Rosette Virus (GRV) and Groundnut Rosette Assistor Virus (GRAV). O. A. ANSA, C. W. KUHN*, S. M. MISARI, J. W. DEMSKI, R. CASPER, and E. BREYEL. Institute for Agricultural Research, Ahmadu Bello University, Zaria, Nigeria; Division of Plant Pathology, University of Georgia, Athens, GA 30602; Federal Biological Research Center, Braunschweig, West Germany.

Two viruses are always associated with the groundnut rosette disease in the field. GRV (group unknown) is responsible for leaf symptoms and rosetting, and GRAV (luteovirus) is necessary for aphid transmission of both viruses. Four treatments were established to study the effect of single and mixed infections on groundnut genotype F 452.4: (i) GRAV alone was aphid-inoculated from symptomless plants which tested positive for luteovirus by ELISA, (ii) sap from GRV (green rosette strain)-infected plants (tested negative for luteovirus by ELISA) was mechanically inoculated to test plants, (iii) GRV + GRAV was aphid-inoculated from green-rosetted plants which had been aphid-inoculated, and (iv) control plants were mechanically rubbed with 0.1 M potassium phosphate buffer (pH 7.4) containing 1% magnesium bentonite and 0.2% mercaptoethanol. Plants maintained in 15 cm plastic pots in a screenhouse were sprayed regularly with an insecticide to prevent aphid infestation. Measurements of five plant growth components were made 110 days after inoculation. GRAV plants had no symptoms and were similar to control plants with regard to shoot weight, root weight, number of pegs, and number of pods; pod weight was reduced. The weights of shoots, roots, and pods of GRV-infected plants were significantly reduced; number of pegs and pods were unchanged. The mixed infection reacted in a synergistic manner, with all five components being significantly different from GRV plants. The most dramatic effect of the mixed infection was on peg number and pod weight. Pod weight was reduced 92% in comparison to 16 and 36% for GRAV alone and GRV alone, respectively. A second experiment supported the synergistic interaction with GRAV and GRV in groundnut. Although GRAV alone causes no leaf symptoms, the virus may play a major role in the severe rosette and stunt symptoms observed in the field.

Quantifying Late Leafspot in Resistant Peanut Genotypes With Visual and Reflectance-based Assessments. F. M. SHOKES*, D. W. GORBET, and F. W. NUTTER. No. Florida Research and Education Center, Quincy, FL 32351; Agric. Research and Education Center, Marianna, FL 32446; and Dept. of Plant Pathology, Univ. of Georgia, Athens, GA 30601.

Visual assessments of late leafspot were compared to reflectance-based assessments on seven peanut genotypes in 1987 and 1988. Tests were conducted in a field at the Dozier Boys School, Marianna, Florida. The genotypes were i) Southern Runner (SR), a partially resistant cultivar, ii) 72x93-6-1-3-2-b3-B (BL-1), 72x93-6-1-3-1-2-b3-B (Bl-2), UF 81206, 79x2A-6-5-2-1-b2-B (BL-3), and UF 81206-1, five leafspot-resistant breeding lines, and Florunner (FR), a susceptible cultivar. Late leafspot was assessed five times in 1987 and six times in 1988. Assessments were made using the Florida 1-10 scale and compared to results of reflectance (800 nm band) measured with a multispectral radiometer. Visual ratings were always higher (9.9) for FR than all other genotypes and reflectance ratings were lower (ca 22.7) by the end of the season. Southern Runner and BL-3 had the next highest visual ratings (ca 7.0) and the next lowest reflectance (34.5 - 40.5). The lowest visual ratings and highest reflectance were obtained with UF 81206 and BL-3. Disease progress curves for both types of assessment intersected at 105 & 120 days after planting (DAP) for SR, 108 & 121 DAP for BL-1, 107 & 121 DAP for BL-2, 123 & 136 DAP for UF 81206, 124 & 131 DAP for BL-3, 122 & 143 DAP for UF 81206-1, and 97 & 94 DAP for Florunner, for 1987 and 1988, respectively. The multispectral radiometer measurements adequately described disease progress on all of the genotypes. Visual and reflectance measurements may allow a better ranking of genotypes using the intersection of the curves than with either method alone.

Peanut Genotype Effects on Occurrence of Cercospora arachidicola and Cercosporidium personatum in North Carolina. B. B. SHEW* and M. K. BEUTE. Depts. of Crop Science and Plant Pathology, North Carolina State University, Raleigh, NC 27695-7616.

Peanut genotypes (Florigiant, Florunner, Southern Runner, NC 6, GP-NC 343, and NC 3033) were planted in 120 (1988) or 144 (1989) 9.8 x 3.7 m plots, which were separated by at least 7.3 m of corn on all sides. The genotypes had various levels of partial resistance to early leafspot caused by *Cercospora arachidicola* (CA), late leafspot caused by *Cercosporidium personatum* (CP), or both diseases. A potted plant infected with CA, CP, or CA+CP was placed in the center of designated plots in early August as a source of inoculum. No infected plants were placed in control plots. Areas under disease progress curves were calculated based on visual estimates of incidence of total leafspot (AUC-T) and late leafspot (AUC-L). Defoliation data also were taken and an index combining incidence of both leafspots and defoliation was calculated (AUC-I). Although all measures of leafspot (AUC-T, AUC-L, and AUC-I) were greater in 1989, CA predominated in 1989 and CP predominated in 1988. In 1988, plots with CP or CA+CP added had much higher AUC-T, AUC-L, and AUC-I than plots with CA or check plots. In contrast, added inoculum was much less important in 1989; AUC-T and AUC-L were unaffected by added inoculum. CP or CA+CP caused a small but significant increase in AUC-I. Genotype performance also was dependent on source of inoculum in 1988, but not in 1989. In 1989, genotypes with low resistance to both CA and CP (Florunner, Florigiant) had greatest AUC-I, whereas GP-NC 343, which has moderate resistance to both pathogens, had smallest AUC-I. Genotypes with resistance to only one pathogen (NC 6, NC 3033, Southern Runner) had intermediate AUC-Is. Florunner had larger AUC-P than Florigiant in both years.

Impact of Chemical-Use Restrictions on Disease, Weed, and Insect Management in Peanuts.

P. M. PHIPPS*, D. A. HERBERT, J. W. WILCUT, C. W. SWANN, G. G. GALLIMORE, and D. B. TAYLOR, Tidewater Agr. Exp. Sta., VPI&SU, Suffolk, VA 23437.

Labeled pesticides for production of peanuts were sorted into groups having LD_{50} values >50, >500, and >5000 mg/kg of body weight. Pesticides were also sorted according to labels which allow feeding treated vines, hay and hulls to livestock. Field trials were conducted at two locations in 1989. Pesticides and rates were selected from each group on the basis of label directions, field history, diagnostic tests offered by the extension service, crop scouting, and overall best management practices (bmp's). Treatments included: 1) bmp's with no restrictions on pesticide selection, 2) bmp's with pesticides having an LD_{50}>50, 3) bmp's with pesticides having an LD_{50}>500, 4) bmp's with pesticides having an LD_{50}>5000, and 5) bmp's with pesticides which allow feeding treated vines, hay and hulls to livestock. Treatments were replicated four times in a randomized complete block design, and plots included eight 12.2-m rows, spaced 0.9-m apart. Yield and crop value averaged 3489 kg/ha and 2465 dollars/ha in plots managed with no pesticide-use restrictions. Yield and value were reduced by all systems where pesticide-use restrictions were imposed. Significant reductions (P=0.05) occurred in both tests when bmp's were limited to pesticides with an LD_{50}>5000 (yield, 2737 kg/ha; value, 1889 dollars/ha), and in one test when bmp's employed pesticides without feeding restrictions (yield, 2228 kg/ha; value, 1530 dollars/ha). The elimination of aldicarb (1.12 kg/ha) in furrow with the restriction to LD_{50} levels >50 resulted in a significant increase in thrips injury and root galling caused by *Meloidogyne hapla* at both locations. The shift from chlorothalonil (1.26 kg/ha) to cupric hydroxide (1.8 kg/ha) due to limitations on feeding treated vines, hay or hulls to livestock resulted in significant increases in leafspot and defoliation caused by *Cercospora arachidicola*. Significant increases in the biomass of weeds resulted with the elimination of vernolate (2.24 kg/ha), alachlor (2.24 kg/ha), acifluorfen (0.28 kg/ha), and bentazon (0.84 kg/ha) in plots restricted to bmp's with chemicals having an LD_{50}>5000. Production cost (incl. materials, labor, and equipment) averaged $525/ha with no pesticide-use restrictions, $485/ha with pesticides of a LD_{50}>50, $388/ha with pesticides of a LD_{50}>500, $193/ha with pesticides of a LD_{50}>5000, and $412/ha with pesticides that allow feeding treated vines, hay and hulls to livestock. The mean total of pesticide applied in each program was 25.8, 25.2, 19.6, 9.8 and 25.0 kg/ha, respectively.

Comparison of the Number of Stem Lesions Caused by *Cercosporidium personatum* in Florunner and Southern Runner Cultivars.

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Twelve lateral branch stems were collected from each plot of Florunner and Southern Runner peanut cultivars in three field sites in 1989. Treatments evaluated included combinations of each of the two genotypes with different rates and application methods of chlorothalonil. Number of lesions caused by *Cercosporidium personatum* per stem and number of lesions per stem length were determined for each stem. Number of lesions per stem of Florunner was 11.8, 1.1, and 0.1 in plots treated with no fungicide, 0.62 and 1.23 kg/ha chlorothalonil respectively, whereas number of lesions in Southern Runner was 3.8, 0.1 and 0.1 for those same treatments. At the first location at the Bowen Farm, stem lesion counts were 18.9, 7.7 and 0 for Florunner receiving no fungicide, 1.23 kg/ha chlorothalonil via standard chemigation and 1.23 kg/ha chlorothalonil via ground spray, and counts were 5.3, 1.5, and 0.4 for Southern Runner for those treatments. In a second Bowen Farm location, stem lesion counts in Florunner were 20.1, 0.52, and 0.1, and counts in Southern Runner were 3.7, 0.2, and 0.1 in plots receiving no fungicide, 1.23 kg/ha chlorothalonil via an underslung boom on the irrigation pivot, and 1.23 kg/ha chlorothalonil by ground spray respectively. Number of lesions per stem length reflected similar trends. Maintenance of healthy stems in Southern Runner may partially explain the reduced pod loss to late leafspot in this cultivar in comparison to Florunner. Susceptibility of stems to infection by *C. personatum* may be another parameter to consider in the evaluation of peanut genotypes for resistance and tolerance to this pathogen.

Effects of Diniconazole on Soilborne Pathogens, Aflatoxin Formation, Plant Growth, and Pod Yields of Irrigated and Nonirrigated Peanuts. T. B. BRENNEMAN*, D. M. WILSON, R. W. BEAVER, and A. P. MURPHY. Department of Plant Pathology, Coastal Plain Experiment Station, University of Georgia, Tifton, GA 31793.

Florunner peanuts planted in irrigated and nonirrigated plots were sprayed four times with 0, 0.06, 0.12 and 0.25 lb diniconazole/A in 1988 and 1989. The 0 and 0.25 lb/A treatments were infested with a conidial suspension of *Aspergillus flavus*, and populations of *A. flavus* and *A. niger* were monitored in the soil throughout the season as well as in the shells and seed after harvest. Diniconazole treatment had no effect ($P \leq 0.05$) on populations of *A. flavus* in the soil or shells, but did reduce populations in seed in 1989. The fungicide had no effect on soil populations of *A. niger* but reduced them in both shells and seed. Artificial infestation with *A. flavus* significantly increased soil populations of that fungus but had little effect on shell or seed isolations. Irrigation consistently resulted in decreased frequencies of both *A. flavus* and *A. niger* from shells and seed. Irrigation had no effect on soil populations of *A. niger* and variable effects on *A. flavus* populations. Aflatoxin was detected only in 1989. Concentrations were 11 and 2 PPB for the nonirrigated and irrigated plots, respectively. Neither fungicide or inoculation affected aflatoxin levels. Aflatoxin concentrations were significantly correlated ($P = 0.0001$) with *A. flavus* populations in both shells and seed ($R^2 = 0.70$ and 0.57, respectively). Higher rates of diniconazole provided excellent control of stem rot (*Sclerotium rolfsii*) and Rhizoctonia limb rot (*R. solani*) which was reflected in a yield increase of approximately 1200 lb/A in 1989. Disease incidences and yield differences were not as great in 1988. Irrigation increased yields by 851 and 1392 lb/A in 1988 and 1989, respectively. The mean length of main stems was 18.2 and 12.9 inches for the irrigated and nonirrigated plots, respectively. Diniconazole at the two highest rates also significantly reduced main stem lengths. Overall, diniconazole was very effective in controlling plant growth and the major yield limiting soilborne pathogens, but was not effective in reducing *A. flavus* populations or aflatoxin development.

Relationship of Conventional and Conservational Tillage on Incidence of Peanut Leafspot. D. M. PORTER* and F. S. WRIGHT. USDA, ARS, Tidewater Agricultural Experiment Station, Suffolk, VA 23437

In a four-year field study, the effects of tillage method on the incidence of early leafspot caused by *Cercospora arachidicola* on peanut (*Arachis hypogaea*) was determined. Tillage treatments included conventional tillage (CT) and conservational tillage systems. Two methods of seedbed preparation including in-row tillage (NT) and band till (BT) were utilized in the conservational tillage system. In the conventional system, soil was moldboard plowed about 25 cm, disked, and planted. In the conservational system, winter cover wheat was killed with a herbicide. The 25-cm wide BT plots were prepared with a modified rotary tiller. The NT plots were planted directly into killed winter wheat cover without any soil preparation. Incidence of early leafspot was determined by calculating percentage leaflet defoliation, percentage of leaflet infection, number of leafspot lesions per plant, and the number of leafspot lesions per leaflet. Disease incidence was greater in CT plots than in BT or NT plots. Incidence levels varied with cultivar, rainfall patterns, and year. Rainfall and the number of days rainfall occurred could be related to disease incidence in all tillage plots. Disease incidence was less in the NC 6 cultivar than in Florigiant or VA 81B cultivars.

Pathogenicity of a Dicarboximide-Resistant Isolate of *Sclerotinia minor* to Peanut in Microplots Treated with Fungicides. F. D. SMITH*, P. M. PHIPPS and R. J. STIPES. Virginia Polytechnic Institute and State University, Tidewater Agricultural Experiment Station, Suffolk, VA 23437-0099.

A three-year study was initiated in 1987 to compare fungicidal control of Sclerotinia blight of peanut in microplots caused by a common field isolate (S-2) and a dicarboximide-resistant isolate (B-83-T2) of *Sclerotinia minor*. Microplots (four plots/treatment) consisted of 76-cm-dia fiberglass barriers that extended 15 cm above and below the soil surface. Florigiant peanut seeds were planted in May, and plants were later thinned to three/plot to simulate field density. Mature sclerotia were washed from cultures grown on autoclaved soil amended with corn meal (5% w/w) and incorporated into the upper 8 cm of soil in the microplots each year to obtain an inoculum density of 4 sclerotia/100 g soil for S-2 or 2 sclerotia/100 g soil for B-83-T2. The inoculum represented an equal mass since the sclerotial size of B-83-T2 was approximately twice that of S-2. Iprodione (1.12 kg/ha), vinclozolin (0.84 kg/ha) and RH-3486 (0.84 kg/ha) were applied three times at 4-wk intervals in 1987 and 1988, and twice in 1989. PCNB (5.60 kg/ha) was applied twice each year at 6-wk intervals. In October, disease incidence (lesions/plot) in untreated plots averaged 21.9 for S-2 and 20.5 for B-83-T2. Disease incidence was 97, 83, 33, 67 and 30% less in plots infested with isolate S-2, and 96, 55, 62, 25 and 20% less in plots infested with B-83-T2 when treated with RH-3486, vinclozolin, iprodione, PCNB and dicloran, respectively. Differences in disease incidence caused by isolates and following the same fungicide treatment were not significant at P=0.05. All fungicide treatments significantly increased yields in plots infested with S-2, but only RH-3486 and iprodione significantly increased yields in plots infested with B-83-T2. Thus, all fungicide treatments gave some control of B-83-T2 in microplot studies, suggesting that B-83-T2 possessed a low-level type of resistance. In 1989, sclerotia were collected from stem lesions in untreated plots and plots treated with iprodione, vinclozolin and RH-3486. The sclerotia were plated on glucose-yeast extract agar (GYEA), and the resulting 194 isolates were subsequently evaluated for dicarboximide resistance on GYEA containing 2.0 μg/ml iprodione. In plots originally infested with B-83-T2, resistance was detected in 52.9, 47.6 and 17.6 and 0% of isolates from plots treated with iprodione, vinclozolin, no treatment and RH-3486, respectively. Only one plot (vinclozolin-treated) originally infested with S-2 contained resistant isolates. Results of this study suggest that fungicides similar to RH-3486 will be effective in controlling dicarboximide-resistant isolates in a field situation. No resistant isolates were detected in surveys of commercial fields in Virginia.

Prediction of Sclerotinia Blight of Peanut Outbreaks Based on Soil Temperature at 5 cm. T.A. LEE, Jr.* Texas Agricultural Extension Service, Stephenville, Texas 76401. K.E. WOODARD and C.E. SIMPSON, Texas Agricultural Experiment Station, Stephenville, Texas 76401.

Sclerotinia blight caused by Sclerotinia minor continues to cause frequent damage in sporadic outbreaks in Texas peanuts. Laboratory studies have shown the optimium temperature range for this fungus to be 16° - 26°C in the presence of free moisture on the plant surface. Soil temperature monitoring studies at Stephenville, Texas have shown the fungus to no longer be active after the soil temperature at the 5 cm depth exceeds 28°C. Activity of the fungus reached a peak at 22°C and reduced activity in both directions from that point. Fungicide application timing based on this information has the potential for reducing the overall number of chemical applications needed during the season. At the same time, the control level is increased by making the fungicide available during the period of maximum vulnerability.

Reduced Rate, Narrow Band Applications of PCNB for Southern Stem Rot Control on Peanut. A. K. HAGAN* and J. R. WEEKS. Department of Plant Pathology and Entomology, respectively, Auburn University, AL 36849.

PCNB 10G and PCNB + ethoprop 10-3G, applied 80 to 90 days after planting (GS R5-R6) at rates of 5.6 and 11.2 kg/a.i./ha, respectively, on 10 cm (narrow) and 25 cm (standard) band widths were evaluated for the control of southern stem rot (Sclerotium rolfsii) on peanut in fields with a history of white mold. PCNB was evaluated in 1988 and 1989 while PCNB + ethoprop was tested only in 1989. A split-plot design with fields as whole plots and treatments as subplots was used. The experimental design in each field was a completely randomized block design of four replications with two row plots 0.9 m wide by 15.2 m in length. Disease loci counts were made after the plots were inverted. Plots were harvested 5 to 12 days later. Southern stem rot was severe both years. Narrow-band PCNB treatments reduced disease both years compared to the non-treated control; the standard-band-width treatments reduced disease in 1988. Similar stem rot damage was seen in 1988 and 1989 in plots treated with PCNB on narrow and standard band widths. Significant yield increases over those in the non-treated control were recorded both years in the narrow band PCNB-treated plots compared to one year with the standard band width treatment. PCNB + ethoprop applied on both the narrow and standard band widths resulted in reduced disease and higher yields than the non-treated control. Disease control and yield responses with both PCNB + ethoprop treatments in 1989 were similar to those in the plots treated with PCNB on narrow and standard band widths.

Effects of Tillage and Double-cropping with Wheat on Pest Management in Peanut. N. A. MINTON*, A. S. CSINOS, R. E. LYNCH and T. B. BRENNEMAN, USDA, ARS and Department of Plant Pathology, Coastal Plain Experiment Station, University of Georgia, Tifton, Georgia, 31793.

The management of nematodes, soil fungi, and insects was evaluated in peanut in a three-year (1987-1989) field study. A split-split plot design with six replications was used with winter crop (wheat or fallow) as whole plots, tillage treatments [minimum tillage (MT) or conventional tillage (CT)] as subplots and pesticides [control, aldicarb (3.4 kg ai/ha), flutolanil (2.2 kg ai/ha), or aldicarb + flutolanil (A+F)] as sub-subplots. Damage by the peanut root-knot nematode, Meloidogyne arenaria, was the same in peanuts grown double-cropped after wheat or fallow, but was less in CT than in MT plots. Damage by the lesion nematode, Pratylenchus brachyurus, did not differ in the tillage treatments or in the winter crop treatments. Aldicarb and A+F reduced galls on roots, pods and pegs caused by the root-knot nematode as well as lesions on shells caused by the lesion nematode. Sclerotium rolfsii damage was less severe in peanut following wheat than following fallow. In peanut after wheat, S. rolfsii was more severe in CT than in MT, but the reverse was true for peanut after fallow. Flutolanil and A+F reduced the number of S. rolfsii loci from an average of 19.0 per 15.2 m of row for untreated plots to 3.5 for treated plots. Rhizoctonia limb rot caused by Rhizoctonia solani was more severe in conventional-tilled than in minimum-tilled peanuts. The severity of the disease was reduced by flutolanil and A+F each year. Early in the growing season, aldicarb and A+F reduced damage from tobacco thrips, Frankliniella fusca, and potato leaf hopper, Empoasca fabae. However, late in the season when aldicarb had dissipated, numbers of velvetbean caterpillar, Anticarsia gemmatalis, larvae and three cornered alfalfa hopper, Spissistilus festinus, tended to be greater in aldicarb treated plots. Average peanut yields were the same in winter wheat and fallow plots, but were greater in conventional-till than in minimum-tilled plots. Mean yields across years, winter crops, and tillage treatments were increased 11%, 56% and 67% by aldicarb, flutolanil and A+F, respectively.

Influence of the Nematode Antagonist *Pasteuria penetrans* on Peanut Yield.

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The peanut root-knot nematode, *Meloidogyne arenaria* race 1, with and without the biocontrol agent *Pasteuria penetrans* was inoculated in microplots in the spring 1987. The plots were planted with peanut cv. Florunner in summer and cover crops of rye and hairy vetch, or were bare fallowed in winter. In 1987 and 1988, the peanut yield was greatly reduced ($P \leq 0.05$) in plots with and without the antagonist as compared with plots without nematodes. In 1989, however, peanut yield in plots with nematodes plus *P. penetrans* was 164 g/plot, compared with 262 and 100 g/plot in plots without nematodes or with noninfected *M. arenaria*, respectively ($P \leq 0.05$). The yield was not influenced by the cropping sequence during the 3 year study. The population density of *P. penetrans* increased from 0.11 spores/juvenile in soil in the fall 1987 to 7.6, 8.6, and 3.6 spores/juveniles in the fall 1989 in rye, vetch, or fallowed plots, respectively. The population density of *M. arenaria* without the antagonist decreased from >10,000/100 cm^3 soil in the fall 1987 to 170/100 cm^3 in the spring 1989 and increased again to 2,380/100 cm^3 in the fall 1989. Lower numbers ($P \leq 0.05$) of *M. arenaria* were extracted from soil in microplots infested with *P. penetrans* than in plots without the antagonist in the spring 1989 following vetch and in the fall 1989 in the plots of all three cropping sequences.

BREEDING AND GENETICS

Mechanical Inoculation To Study Resistance To Groundnut Rosette Virus In Groundnut (Peanut). P. E. OLORUNJU, C. W. KUHN, J. W. DEMSKI*, O. A. ANSA, and S. M. MISARI. Institute for Agricultural Research, Ahmadu Bello University, Zaria, Nigeria; Division of Plant Pathology, University of Georgia, Athens, GA 30602.

Under field conditions, groundnut rosette virus (GRV) is transmitted in association with groundnut rosette assistor virus by Aphis craccivora. Previous studies of resistance in groundnut to GRV have been done with aphid transmission, either in the field or in a glasshouse. Recently, we have routinely obtained 100% GRV infection of susceptible groundnut plants by mechanical inoculation. The procedure utilized young leaves from groundnut plants infected with GRV only, 0.1 M phosphate buffer (pH 7.4) containing 1% magnesium bentonite and 0.2% mercapto-ethanol, carborundum, and a pre-inoculation overnight dark treatment of 5-7 day-old test plants. Susceptible plants became infected with one inoculation. Multiple inoculations two or more days apart were required to induce mild symptoms, similar to the resistant reaction observed in the field, in about 50% of the resistant plants. Additional resistance studies were made with 380 F_2 plants from five crosses (resistant X susceptible genotypes). Segregation of the F_2 population was observed easily because susceptible plants were stunted and had dark green, rolled leaves, and resistant plants were not stunted and had a mild mottle. Four of the five crosses segregated with a ratio of 15 susceptible: 1 resistant, similar to results in the field. Furthermore, the fifth cross segregated with a ratio of 1 susceptible: 3 resistant, again similar to field results. Screening for resistance in breeding programs normally takes place in the early generations where large plant populations are involved, particularly with two recessive genes controlling resistance. This mechanical inoculation procedure can be used advantageously in GRV resistance breeding programs, such as (i) to eliminate unsuccessful crosses in the F_1 population, (ii) to predict what to expect in the field, and (iii) to identify and eliminate useless susceptible material from field studies. Moreover, the screening can be done in the noncropping season and completed in 3 to 4 weeks. Resistant plants can be transplanted into the field and evaluated for desirable agronomic characteristics.

Genetic Occurrence of Cytoplasmic Albino Peanut Seedlings. W. D. BRANCH* and C. S. KVIEN. Univ. of Georgia, Dept. of Agronomy, Coastal Plain Experiment Station, Tifton, GA 31793-0748.

Albino peanut (Arachis hypogaea L.) seedlings have frequently been found within early-segregating progenies from intersubspecific cross combinations. Previous inheritance studies have reported that these albinos were recessive to normal green seedlings in either digenic or trigenic models. However, recently we have also discovered albino peanut seedlings resulting from seed of white/green variegated-leaf plants. Such plants likewise produce both normal green and variegated plants in addition to the albino seedlings. A detailed tagging study was then conducted on several individual, reproductive leaf nodes. This test showed that seed originating from predominantly albino leaves produced albino seedlings, seed from all green leaves produced predominantly green plants, and seed from equally white/green variegated-leaf nodes again produced the three plant types. Thus, these variegated-leaf plants should be considered as a heterogeneous source of chloroplast. Further attempts to quantify the progeny rows from the variegated plants revealed ambiguous genetic proportions. Reciprocal crosses were next made between the variegated occurring albinos x F_2 nuclear albinos and between the green siblings. Wedge grafts of green mainstem scions were used to sustain growth and development of the albino parental stock. F_1 hybrid results strongly supports the cytoplasmic occurrence of the albino seedlings obtained from seed of these white/green variegated-leaf plants.

Introgression of Early Maturity into Arachis hypogaea L.

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Peanut breeding programs have put some efforts toward developing early maturing lines and cultivars during the past. With the arrival of Florunner and other high yielding varieties, effort has actually increased to try maintaining the high yield of these lines while reducing the time required for them to mature. Such effort is natural because few reasons can be cited for not wanting an earlier maturing cultivar. The South American Exploration Teams sponsored by the IBPGR have collected at least three annual, short-season wild *Arachis* species which are cross-compatible (i.e., section *Arachis*) with cultivated *A. hypogaea* L. One of these collections, Valls Simpson Gripp - 6416, collected in August 1981, has been observed to germinate, grow, flower, fruit, produce mature seed, and die in a period of 45 days. This life cycle was observed under natural conditions of drought stress at the end of the rainy season, but it still occurred in about one-half the time it takes the earliest known *A. hypogaea* to mature. Previous introgression work has shown a high degree of success by using *A. batizocoi* Krap. et Greg. as a bridge species between A genome wild *Arachis* and the cultivated peanut. The 6416 (A genome) has been crossed with the B genome *A. batizocoi* (GKP-9484), the chromosome number doubled, and then crossed to *A. hypogaea*. It took 32 months to break the dormancy on the seed from the 6416 x 9484 hybrid. The introgression program is now underway using several germplasm sources for the *A. hypogaea* parent, including Tamnut 74, TxAG-2, TxAG-5, Florunner, and NC-10c.

Stability of the Florigiant Peanut Cultivar and its Component Lines in Ten Environments.

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The peanut (*Arachis hypogaea* L.) cultivar, Florigiant, has been grown widely in the Virginia-North Carolina peanut production area since its release in 1961. During several years it has accounted for over 90% of the peanut acreage. The wide adaptability and stability over locations and environments have been attributed to the multiline nature of this cultivar. The objective of this study was to determine the stability of Florigiant and its seven component lines for yield and grade in ten environments. A randomized complete block design was used in each environment. Partitioning of genotype X environment interaction sum of squares, regression analyses, stability variances, and analyses of variance all indicate that the stability of Florigiant is due as much or more to its complex genetic background than to its composite nature. No significant differences were observed among the component lines or the component lines and Florigiant in these analyses. Any of the seven component lines should perform as well as Florigiant in the Virginia-North Carolina peanut production area.

Isozyme Variability Among Arachis Species. H. T. STALKER*, T. M. JONES and J. P. MURPHY. Dept. of Crop Science, North Carolina State Univ., Raleigh, NC 27695.

Isozymes have been used as markers in genetic studies for many crops. The objective of this investigation was to evaluate electrophoretic variability among Arachis species and assess its potential for genetic and germplasm introgression studies. One hundred thirteen Arachis species accessions plus the check cultivar NC 4 were surveyed. Starch gel electrophoretic analyses were conducted on three replications using a crude extract of macerated embryos and cotyledons on 11 gel systems. Large numbers of polymorphisms were found among the Arachis species. While only three banding patterns were observed for isocitrate dehydrogenate alcohol dehydrogenase and triose phosphatase isomerase, as many as eight were observed for phosphohexose isomerase and leucine aminopeptidase. Variation was observed for most isozyme systems among species within sections and between accessions of the same species. Polymorphisms were also observed between individual seeds of single accessions. This indicates that original seed collections may be highly variable even though most species analyzed are diploid and self-pollinating. Further, because Arachis species are highly polymorphic as compared to A. hypogaea, isozymes have the potential to be utilized as markers to follow introgression patterns for interspecific crosses.

Combining Ability Estimates for Maturity and Agronomic Traits in Peanut. NAAZAR ALI*, J. C. WYNNE and J. P. MURPHY. Dept. of Crop Science, North Carolina State Univ., Raleigh, NC 27695.

A major goal of peanut (Arachis hypogaea L.) breeding programs in North Carolina and Pakistan is to develop early maturing and large-seeded cultivars. Twelve crosses, generated by crossing three virginia-type adapted female parents (No. 334, Banki and NC 9) with four spanish-type early lines (ICGSE-4, ICGSE-130, ICGSE-147 and Chico) in an M x N mating design, were evaluated in F_1 and F_2 generations to determine the combining ability of the parents for maturity and other agronomic traits such as yield per plant, 20 pod length, seed number per 50 pods, 100 seed weight, and shelling percentage. The experiment was conducted in a randomized complete block design with three replications at two North Carolina locations during 1988 and 1989 for the F_1 and F_2 generations, respectively. General combining ability (GCA) estimates were highly significant for all the traits except for a maturity index in the F_1 (significant only at $p = 0.1$), and seed number per 50 pods in the F_2 generation. Specific combining ability (SCA) estimates were nonsignificant for all traits except 100 seed weight in the F_2 generation. Among male parents, ICGSE-130 gave good GCA for yield per plant, maturity, and 100 seed weight, whereas ICGSE-147 gave good GCA for 20 pod length and seed number per 50 pods. Among adapted female parents, NC 9--as expected since it is adapted to North Carolina--gave the best GCA for yield per plant, 20 pod length, seed weight, and shelling percentage. There was a highly significant correlation of maturity with seed number and shelling percentage, but a negative correlation with yield per plant, 20 pod length and 100 seed weight. Selection for early maturity and high yield in North Carolina should be practiced among progeny of NC 9 and ICGSE-130. F_3 progenies will be planted and evaluated in Pakistan for selecting best crosses under local climatic conditions.

Hand-Tripping Flowers Results in Seed Production in Arachis Lignosa.

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Arachis lignosa (Chod. et Hassl.) Krap. et Greg. nom. nud., a member of the Procumbensae series of the Erectoides section, from Paraguay, South America, produces very few seeds when grown in the United States. Trials were conducted in the greenhouse, growth chamber, and outdoors to determine if hand tripping the flowers would facilitate seed production. No pods were produced in any of the environments when the plants were allowed to pollinate naturally. However, hand tripping the flowers, especially in the greenhouse, resulted in significantly increased pod production. Scanning electron micrographs showed that the stigma of A. lignosa is more truncated and is elevated higher above the anthers than the stigma of A. hypogaea L. Consequently, the morphology of the flower probably restricts natural self pollination in the wild species. Results from the study suggest that seed production in A. lignosa is due more to pollination failure than to physiological self incompatibility.

Incompatibility During Late Embryogeny in Some Crosses of Arachis hypogaea X A. stenosperma and the Utility of Three Tissue Culture Methods for Hybrid Rescue.

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In three greenhouse experiments, attempts to cross A. hypogaea cv. Virginia Runner G-26 X A. stenosperma Krap. et Greg. nom. nud. have resulted in seed development to morphological maturity followed by degeneration. Pods become spongy 3 weeks after the peg penetrates the soil indicating an expansion of empty space between pod and seed tissues. Immature seed removed at this stage of development can be sterilized for embryo rescue. Embryos have been cultured under three different regimes to obtain hybrid plants. 1) Embryos cultured on high cytokinin medium for several weeks followed by transfer to low cytokinin frequently develop into plants with multiple shoots and weak roots. 2) Embryos undergo normal maturation and germination when exposed to media with high osmolarity for several weeks followed by transfer to GA_3-containing medium. 3) Embryo parts can be cultured on a medium supplemented with picloram where they will produce somatic embryos. The relative effectiveness of the three tissue culture methods is being compared with other similarly responding crosses.

Yield, Grade, and Leafspot Reaction of Interspecific Derived Peanut Lines. M. OUEDRAOGO*, O.D. SMITH, D.H. SMITH, and C.E. SIMPSON. Dept. of Soil & Crop Sciences, Texas A&M Univ., College Station, Tx 77843-2474; TAES Agric. Res. Stn., Yoakum, Tx 77995; and TAMU Res. & Ext. Center, Stephenville, Tx 76401.

$F_{4:5}$ and $F_{4:6}$ interspecific derived breeding lines were evaluated in the field for yield and grade, and in both the field and laboratory for disease reactions in 1988 and 1989. Parentage of the lines included Arachis species *cardenasii*, *chacoensis*, *batizocoi* and *hypogaea* subspecies *hypogaea* and *fastigiata*. The partial resistance to both early and late leafspot was compared among lines and with Southern Runner and Florunner. Leafspot was assessed in the field at two week intervals with both the Florida Scale, and with leafspot assessment in three canopy layers beginning with the onset of the disease. AUDPC's were calculated. Five to sixty percent fewer early leafspot lesions developed on some lines than on Southern Runner. Differences from Southern Runner in the number of late leafspot lesions were smaller and non-significant (P=.05) until 68 days after planting. Defoliation occurred mainly in the lower canopy. Detached leaves were inoculated with standardized conidial suspensions of either *Cercospora arachidicola* or *Cercosporidium personatum*. Conidia used in laboratory experiments were collected from infected plants in the field. Differences (P=.05) in latent period duration were found, but sporulation occurred on 90% of the lesions within 21 days after inoculation.

Response of Peanut Genotypes to Interference from Common Cocklebur. W. W. FIEBIG*, D. G. SHILLING, and D. A. KNAUFT. Dept. of Agronomy, University of Florida, Gainesville, FL 32611-0311.

Experiments were conducted in 1987 and 1989 near Gainesville, Florida to determine the effects of interference by common cocklebur on four peanut genotypes. At 45 days after planting (DAP), NC 7 was the only peanut genotype with reduced shoot dry weights from interspecific competition with common cocklebur in 1987. No shoot dry weight reductions were observed in 1989 at 45 DAP. At 90 DAP all genotypes except F8143B had reduced shoot dry weights from competition. All genotypes were affected at 135 DAP. Similar results were obtained for leaf area index, leaf dry matter, stem dry matter, and number of nodes on the mainstem. Pod dry weights in plots without competition were highest for NC 7, yet this genotype suffered the greatest yield reduction under interference from common cocklebur. F8143B was less susceptible to the influence of interference from common cocklebur and produced more pod dry weight than NC 7 under maximum competition each year of the study. At distances of 0-25 cm from cocklebur competition, NC 7 pod yields were reduced by 50%, while yields of BL-10, BL-8, and F8143B were reduced by 30%, 26%, and 13%, respectively.

Causes of Yield Stability in Peanut. D. A. KNAUFT*, C. C. HOLBROOK, K. J. BOOTE, and D. W. GORBET. Dept. of Agronomy, Univ. of Florida, Gainesville, FL 32611-0311; USDA-ARS, Coastal Plain Experiment Station, Tifton, GA 31793; Dept. of Agronomy, Univ. of Florida, Gainesville, FL 32611-0311; and Agricultural Research and Education Center, Marianna, FL 32446-9803.

Understanding the causes of yield stability in peanut would allow breeders to modify selection programs to develop cultivars with improved stability. Ten diverse peanut genotypes were grown for three years at three locations to assess yield stability. Parameters used to assess stability included mean pod yield, coefficient of variation, the coefficient of the regression of individual genotype yields on environmental yields, and the deviation of this regression. The same ten genotypes were grown at Gainesville, FL and Tifton, GA and sampled at 10-day intervals for growth analysis. Above-ground dry matter was separated into vegetative and reproductive portions. Virginia Red and Tifrun had below average coefficients of variation, regression coefficients, and deviations from regression and were considered the most stable genotypes. Georgia Red and Tennessee Red had above average values for these parameters and were considered the least stable genotypes. The latter two genotypes had among the lowest number of days to R3, the shortest effective seed filling periods, and the lowest total vegetative production while Virginia Red and Tifrun had among the highest number of days to R3 and the longest effective seed filling period.

RFLP Analysis of Peanut Cultivars and Wild Species. G. KOCHERT* and W.D. BRANCH. Dept. of Botany, University of Georgia; Dept. of Agronomy, Coastal Plain Experiment Station, University of Georgia.

Genetic variation in American peanut cultivars and related wild species was studied using restriction fragment length polymorphisms (RFLP). Total DNA was isolated from cultivars representing each of the market types of peanut commonly grown in the U.S, from Arachis monticola, and from 14 accessions of diploid wild species from section Arachis. DNA samples were digested with 7 restriction enzymes, transferred to nylon filters, and screened with nuclear DNA probes. The probes used were from a library of random *PstI* fragments, cloned in the plasmid pUC8 and pre-screened to remove chloroplast and repeated nuclear sequences. Very low levels of RFLP variation were found between the tetraploid cultivars, and A. monticola was essentially indistinguishable from the American cultivars. Abundant polymorphism was present between the diploid wild species, and each species could be identified by a unique pattern of restriction fragments. No two diploid species could be unambiguously identified as the ancestors of the tetraploid cultivars, but data from several probes indicated a possible relationship with A. duranensis and A. batizocoi. Our results to date suggest that RFLP mapping using conventional techniques will be difficult in American peanut cultivars because of the low level of RFLP variation. We are now using higher resolution techniques to detect genetic variation.

Characterization of the resistance of TP-135 to *Meloidogyne arenaria*. J. S. STARR*, and C. E. SIMPSON. Dept. Plant Pathology and Microbiology, Texas A&M University, College Station, TX 77843; Texas Agricultural Experiment Station, Stephenville, TX 76401.

TP-135 is a complex, interspecific hybrid derived from *Arachis hypogaea* cv. Florunner, *A. batizocoi*. *A. cardenasii*, and *A. chacoensis*, and is resistant to *M. arenaria*. More than 60 individuals from F3, F4, and F5 generations of TP-135 were evaluated for nematode resistance in greenhouse tests based on nematode reproduction. All plants were highly resistant to reproduction of the nematode. In another experiment, TP-135 was resistant to 10 geographically diverse populations of *M. arenaria* collected from Alabama, Georgia, Florida, North Carolina, South Carolina, and Texas. F1 progeny of crosses between Florunner or Tamnut 74 (female parent) and TP-135 (male parent) and ranged in reaction to the nematode from highly resistant to susceptible. Collectively these data suggest that the resistance of TP-135 to *M. arenaria* is stable, not segregating, effective against a wide spectrum of nematode populations, and is conditioned by multiple genes.

Inheritance of Resistance to *Sclerotinia minor* in Selected Spanish Peanut Crosses. L.G. WILDMAN, O.D. SMITH*, R.A. TABER, and C.E. SIMPSON. Dept. of Soil & Crop Sciences, and Dept. of Plant Pathology & Microbiology, Texas A&M Univ., College Station, TX 77843-2474; and TAMU Res. & Ext. Center, Stephenville, TX 76401

TxAG-5, a spanish germplasm line released jointly by the Texas Agricultural Experiment Station, USDA, and the Oklahoma Agricultural Experiment Station, was crossed in reciprocal to two spanish lines, BSS-56 and Sn73-30. Parent, F_1, F_2, BCF_1, and F_3 populations were evaluated under high natural inoculum for resistance to *Sclerotinia minor* using a disease rating scale 1 (no disease) to 5 (plant dead). The number of days from first appearance of the fungus until plant death was also recorded. F_1 generation plants of the Sn73-30 cross were susceptible, but the BSS-56 was intermediate and some TxAG-5 succumbed to the disease. F_2 distributions were continuous. F_2 genotypic frequency distributions based on F_3 and BCF_3 families were near continuous. Broadsense heritability estimates for disease rating for TxAG-5/BSS-56 and TxAG-5/Sn73-30 were 14 and 23%, respectively. Narrow sense heritabilities based on parent offspring regression of F_2 plants and F_3 families were 11% for BSS-56/TxAG-5 and 1% for Sn73-30/TxAG-5. Thus, progress through individual plant selection would have been of little effect.

Responses of Genotypes of Peanut to *Meloidogyne arenaria* and a complex of Soil-borne Diseases. D. W. DICKSON*, D. J. MITCHELL, D. W. GORBET and D. A. KNAUFT. Institute of Food and Agricultural Sciences, University of Florida, Gainesville 32611-0611.

Twelve cultivars (Early Bunch, Florigiant, Florunner, GK-3, GK-7, NC-7, NC-8C, NC-10C, Okrun, Southern Runner, Sunrunner, Tamrun 88) and two genotypes (79308-1, UF-81206) were evaluated in a field heavily infested with *Meloidogyne arenaria* race 1 and a complex of soil-borne pathogens (*Cylindrocladium crotalariae*, *Pythium myriotyum*, *Rhizoctonia solani*, and *Sclerotium rolfsii*). The genotypes were hand planted in paired, two-row plots that were 6.1 m long and replicated four times. Two rows of each four-row plot were fumigated 3 weeks preplant at a rate of 224 liters 1,3-D/ha applied broadcast. Symptoms of nematode and other soil-borne diseases were first observed 11 weeks after planting and their expression progressed until harvest 6-7 weeks later. In the untreated plots, UF-81206 showed less nematode damage than 79308-1, Tamrun, and GK-7 and less disease damage than 79308-1, Okrun, GK-7, NC-8C ($P \leq 0.05$). In treated plots Early Bunch and 79308-1 showed less resistance to nematode and disease damage than the remaining 10 cultivars ($P \leq 0.05$). Except for Early Bunch, Tamrun, 79308-1, and UF-81206, all genotypes produced higher yields in treated plots ($P \leq 0.05$). GK-7 produced the greatest yield response to 1,3-D (4.6 fold increase), whereas UF-81206 produced the least (1.6 fold increase). There were negative correlations between the population density of the second-stage juveniles of *M. arenaria* and yield ($r = -0.48$), nematode damage and yield ($r = -0.81$), and disease damage and yield ($r = -0.5$) ($P \leq 0.05$). Positive correlations existed between the population densities of the second-stage juveniles and nematode damage ($r = 0.36$) and disease damage ($r = 0.3$) ($P \leq 0.05$).

Field and Greenhouse Techniques for Evaluating Peanut Genotypes for Resistance to White Mold (*Sclerotium rolfsii*). C. C. HOLBROOK*, A. S. CSINOS and T. B. BRENNEMAN. USDA-ARS, and Department of Plant Pathology, University of Georgia, Coastal Plain Experiment Station, Tifton, GA 31793.

White mold (*Sclerotium rolfsii*) is a soil borne pathogen of peanuts which causes annual losses in Georgia of $20 to 40 million. The objectives of this study were to evaluate field and greenhouse screening techniques for identifying genetic resistance to white mold, and to examine 500 plant introductions for resistance to white mold. In 1988, five hundred genetically diverse plant introductions were grown in 6 foot plots with 2 replications in a field heavily infested with white mold. Plots were rated immediately before digging based on above ground damage, and immediately after digging based on below ground damage. Significant genetic variation was observed for both measurements and 91 entries were selected for further study. In 1989, these selection and susceptible and resistant checks were grown in the same field using 10 foot plots and 5 replications. Theses same genotypes were also examined in a greenhouse test using artificial inoculation. In comparison to check cultivars, the 1989 field results indicated that the preliminary field screen was effective in selecting resistant genotypes. Results from the greenhouse were inconsistent indicating a need for further research to refine a greenhouse screening technique. Based on these results the following plant introductions may serve as sources of resistance in cultivar development: P.I. 119877, P.I. 196627, P.I. 196654, P.I. 196660, P.I. 196667, P.I. 196725, P.I. 196768 and P.I. 210831.

WEED SCIENCE

Rate and Application Studies with Imazethapyr in Peanuts. F. R. WALLS,Jr.*, J. W. WILCUT and A. C. YORK. American Cyanamid Co., Goldsboro, NC 27530; Dept. of Agronomy, Coastal Plains Exp. Stn., Tifton, Ga. 31793 - 07418 and Crop Science Dept., North Carolina State University, Raleigh, NC 27695.

Field studies were conducted during 1989 to investigate rates and application timings of imazethapyr for weed control and peanut yields in North Carolina and Virginia. Pendimethalin was applied preplant incorporated at the rate of 1.0 lb ai/a to all plots except the weedy check. Application timings of imazethapyr evaluated included preplant incorporated (PPI), preemergence (PRE), at-cracking (AC) and postemergence (POE). Herbicide rates of .063 lbs ai/a alone and sequential applications of imazethapyr at either .032 lbs ai/a followed by .032 lbs or .063 lbs ai/a followed by .063 lbs ai/a were evaluated in these studies. All tests were conducted using a randomized complete block design. Test areas had infestations of common lambsquarter (Chenopodium album), spurred anoda (Anoda cristata), redroot pigweed (Amaranthus retroflexus), prickly sida (Sida spinosa) and morningglory species (Ipomeoea Sp.). Preplant incorporated, preemergence and at-cracking application timings at all rates tested of imazethapyr provided excellent (90%+) season-long control of common lambsquarter, spurred anoda, prickly sida and morningglory species. However, postemergence application timings of imazethapyr at rates of .063 lbs ai/a resulted in somewhat lower control (80-90%) for the same weed species. Crop tolerance was excellent with all application timings and rates. Yields from the imazethapyr treatments were equal to or better than the standard herbicide treatment.

Peanut Genotypes as Affected by Paraquat Dosage and Timing. D. L. COLVIN*, D.A. KNAUFT, and D. W. GORBET. Dept. of Agronomy, University of Florida, Gainesville, FL 32611, and Agricultural Research and Education Center, University of Florida, Marianna, FL 32446.

Field experiments were conducted during 1988 and 1989 in Gainesville, FL, and 1989 in Marianna, FL, to investigate effects of application time and dosage of paraquat on 12 peanut genotypes. Genotypes included were: New Mexico Valencia C, Georgia Red, F623, F87514, F87609, Sunrunner, F79308-1, Southern Runner, Florunner, GK-7, NC-7, and Florigiant. Paraquat treatments included a true at-cracking application, an at-cracking application followed by a sequential paraquat application fourteen days later, and an untreated check. The experiment was a split-plot design with the twelve genotypes as main plots and paraquat treatments as sub-plots. All plots were handweeded to insure that genotypes responded to paraquat per sé rather than to the level of weeds controlled by each treatment. Variable harvest dates occurred in accordance with relative genotype maturity. Plots that were handweeded only provided the highest peanut yield. New Mexico Valencia C, Georgia Red, F87514, F87609, Southern Runner, and Florunner yielded significantly less than their respective hand-weeded checks when a single at-cracking application of paraquat was applied. All genotypes, with the exception of F623, GK-7, NC-7 and Florigiant, yielded significantly less than their hand-weeded checks when two paraquat applications were made fourteen days apart. The most drastic yield reductions occurred with Valencia market types. Two applications of paraquat reduced grade with some cultivars and may have delayed maturity in others.

Florida Beggarweed: A Review. S. M. BROWN* and J. CARDINA. University of Georgia, Tifton, GA 31793; and Ohio Agricultural Research and Development Center, Wooster, OH 44691.

Florida beggarweed [Desmodium tortuosum (Sw.) DC.] is an erect, branched, warm season, annual legume which occurs in the Coastal Plain from North Carolina to Texas. Florida beggarweed was first collected and described in the West Indies by Swartz in late 1700 and transferred to the genus Desmodium by DeCandolle in 1825. In the 1800s until sometime in the mid-1900s, Florida beggarweed was widely grown as a forage and green manure crop in Florida and the Coastal Plain of Georgia and Alabama. Since the 1950s, it has become a major weed problem in these three states and is particularly troublesome in peanuts (Arachis hypogaea L.). In the presence of Florida beggarweed, peanut yield losses of up to 40% have been measured, primarily due to competition for water and light. A weed-free maintenance period of approximately 4 weeks is needed to prevent reductions in peanut yield due to Florida beggarweed competition. The weed also complicates disease control and harvest. Germination of Florida beggarweed occurs over a wide range of temperatures but is influenced more by soil moisture, rainfall events, and cultivation than by temperature. Emergence occurs from depths of up to 8 cm in the soil. The first eight leaves are unifoliate, while subsequent leaves are generally trifoliate. At maturity, Florida beggarweed may reach heights of 2.5 m and produce in excess of 10,000 seed/plant. Great variation exists in the population, as evidenced by varying observations about its growth, development, and competitiveness. Mechanical cultivation and chemical herbicide treatments are effective means of control. Dinoseb, paraquat, and chlorimuron are among the most efficacious herbicide treatments. Other chemical treatments which have considerable activity on Florida beggarweed include alachlor, metolachlor, and monocarbamide dihydrogen sulfate. Colletotrichum truncatum (Schw.) Andrus and Moore is a fungal pathogen that attacks Florida beggarweed in the cotyledon stage, but the fungus does not have sufficient herbicidal activity to be commercially feasible as a biological control agent.

Phytotoxicity and Peanut Recovery from Chlorimuron Tank Mixture Applications. W. C. JOHNSON, III* and S. M. BROWN. USDA-ARS, Coastal Plain Experiment Station, and University of Georgia, Tifton, GA 31793.

Chlorimuron is registered for use in peanuts as a late season postemergence treatment for salvage control of Florida beggarweed [Desmodium tortuosum (Sweet) DC.]. Since chlorimuron use in peanuts can correspond with other pesticide applications, the phytotoxicity of chlorimuron and possible tank mixtures were evaluated in 1989. All treatments were applied 60 dae to weed free peanuts, with hollow cone nozzles calibrated to deliver 103 l/ha at 207 kPa. Injury ratings for chlorosis, foliar burn, epinasty, growth reduction, and degree of stem discoloration were made 3, 6, 10, 20, 27, and 34 dat. Chlorimuron tank mixed with either a crop oil concentrate adjuvant or 2,4-DB caused significantly greater chlorosis and growth reduction than chlorimuron plus a non-ionic surfactant. Recovery from the injury symptoms was not rapid. Treatment differences in chlorosis and stem marking were not as evident 34 dat as they were in earlier evaluations. However, in some cases, they were still significant. Peanut yields and the degree of tomato spotted wilt virus symptom expression were not significantly affected by any of the chlorimuron treatments.

Weed Control in Peanut with Tycor (Ethiozin). R. D. RUDOLPH, W. D. ROGERS, D. M. HUNT*, and D. A. KOMM, Mobay Corporation, 1587 Phoenix Blvd., Suite 6, Atlanta, Georgia 30349.

Field studies conducted in the Southeastern U. S. from 1987 to 1989 indicate peanut is tolerant to Tycor (ethiozin) at herbicidially effective dosages. Peanut tolerance was observed at the highest dosage tested, 1.0 lb. ai/A, applied PRE, at-cracking or early POST. The minimum effective dosage for weed control was 0.75 lb. ai/A PRE, at-cracking, or POST. Good to excellent control of 14 different weed species was observed, including some of the most troublesome weeds in peanut. Good to excellent control of Florida beggarweed (Desmodium tortuosum (Sweet) DC.), redroot pigweed (Amaranthus retroflexus L.), common cocklebur (Xanthium strumarium L.), sicklepod (Cassia obtusifolia, L.), prickly sida (Sida spinosa, L.), and common lambsquarters (Chenopodium album L.) was observed with all application methods. Acceptable control of large crabgrass (Digitaria sanguinalis (L.) Scop) resulted only with the at-cracking application. Sicklepod control was good at 0.75 lb. ai/A and excellent at 1.0 lb. ai/A. Control was better with a Tycor + 2.67 lb. ai/A Lasso (alachlor) tank-mix than with Tycor alone. At all effective dosages, Tycor provided better sicklepod control when applied at-cracking than when applied PRE. Cocklebur control was best at 0.75 lb. ai/A Tycor + 0.07 lb.ai/A Pursuit (imazethapyr) applied at-cracking. Consistent grass control required a Tycor + grass herbicide tank-mix. Data suggests that Tycor or Tycor combinations can be used to effectively control most weed problems in peanut.

Cracking and Postemergence Herbicide Combinations for Weed Control in Virginia Peanuts. J. W. WILCUT* and F. R. Walls. Dep. of Agronomy, Coastal Plain Exp. Stn., P. O. Box 748, Tifton, GA 31793-0748 and American Cyanamid Corp., Goldsboro, NC 27530.

Field studies were conducted in 1989 to investigate combinations of cracking and postemergence herbicide applications for weed control, peanut yield, and net returns. Lasso was applied preemergence at 2.0 lb ai/acre to all plots except the weed-free and weedy checks. Four cracking (GC) herbicide applications evaluated included Lasso (2.0 lb/ac), Lasso plus Cobra (0.25 lb/ac) and surfactant (0.25%, v/v), Lasso plus Pursuit (0.063 lb/ac) and surfactant, and Lasso plus Gramoxone Super (0.125 lb/ac) and surfactant in a factorial arrangement with seven postemergence (POE) treatments for a total of 28 different treatment combinations. The POE treatment options included 1) no POE treatment, 2) Pursuit (0.063 lb/ac) plus 2,4-DB (0.25 lb/ac) and surfactant, 3) Basagran (0.50 lb/ac) plus Gramoxone Super (0.125 lb/ac) plus 2,4-DB, and surfactant, 4) Storm (0.75 lb//ac) plus 2,4-DB and COC (1.25%, v/v), 5) Tough (0.94 lb/ac) plus 2,4-DB, 6) Cobra (0.2 lb/ac) plus 2,4-DB, and surfactant, and 7) 2,4-DB. A weed-free and weedy check were included for comparative purposes. The test area was infested with common lambsquarters (Chenopodium album), spurred anoda (Anoda cristata), and morningglory species (Ipomoea sp.). Spurred anoda control from cracking treatments with no POE treatments was best with Pursuit>Cobra>Gramoxone Super>Lasso while cracking control for common lambsquarters was Pursuit=Cobra> Gramoxone Super>Lasso. Peanut yields from only cracking treatments was greatest with Pursuit (5430 lb/ac)>Cobra (4250 lb/ac)=Gramoxone Super (4030 lb/ac)>Lasso (2740 lb/ac). Net returns followed the same trend as yield data. Many systems with cracking and postemergence applications provided good weed control, high peanut yields and net returns.

Imazethapyr for Weed Control in Texas Peanuts. W. J. GRICHAR*, J. H. BLALOCK, and A. E. COLBURN. Texas Agricultural Experiment Station, Yoakum, TX 77995, Texas Agricultural Extension Service, Dallas, TX 75252, and College Station, TX 77843.

Field studies were conducted during the 1988 and 1989 growing season to evaluate weed control in peanuts with imazethapyr. A tank-mix of metolachlor at 1.68 kg/ha plus imazethapyr at 0.07 kg/ha applied preplant incorporated (PPI) or metolachlor applied PPI followed by imazethapyr applied at crack (AC) or postemergence (POST) resulted in better than 80% control of yellow nutsedge (*Cyperus esculentus* L.). Metolachlor applied PPI followed by imazethapyr applied preemergence (PRE) resulted in inconsistent yellow nutsedge control. Purple nutsedge (*Cyperus rotundus*) control was good with metolachlor plus imazethapyr in 1989 under a variable nutsedge population. Texas panicum (*Panicum texanum*) control with a tank-mix of pendimethalin at 1.12 kg/ha plus imazethapyr at 0.07 kg/ha applied PPI or pendimethalin applied PPI followed by imazethapyr applied PRE or AC provided control no better than trifluralin at 0.56 kg/ha. Imazethapyr plus ammonium nitrate provided better than 85% early season control of Texas panicum when applied POST to grasses less than 5 cm in height. However, by the end of the growing season, control was less than 75%. Control of broadleaf weeds such as copperleaf (*Acalypha ostryifolia*) or prickly sida (*Sida spinosa* L.) with imazethapyr at 0.07kg/ha applied PRE or 0.08kg/ha applied AC has provided excellent early season (>85%) control. Postemergence applications to spiny amaranth (*Amaranthus spinosus*) less than 10 cm tall provided better than 90% season long control. Sicklepod (*Cassia obtusifolia* L.) and crownbeard (*Verbesina encelioides*) control with imazethapyr was be inconsistent in one year of testing.

Timing of Postemergence Herbicides for Peanut Profitability. C. W. SWANN* AND J. W. WILCUT. Tidewater Agric. Exp. Stn., VPI & SU, P. O. Box 7219, Suffolk, VA 23437 and Dep. of Agronomy, Coastal Plain Exp. Stn., P. O. Box 748, Tifton, GA 31793-0748.

Field studies were conducted in 1988 and 1989 to investigate timing of postemergence herbicide application for weed control, peanut yield, and net returns. Alachlor was applied preemergence at 2.0 lb ai/acre to all plots except the weed-free and weedy checks. Herbicide systems evaluated included Storm (0.75 lb/ac) plus COC (1.25%, v/v), Storm plus DASH (1.25%, v/v), paraquat (0.125 lb/ac) plus X-77 (0.25%, v/v), paraquat plus bentazon (0.5 lb/ac) plus X-77, lactofen (0.2 lb/ac) plus COC (1.25%, v/v), and bentazon plus 2,4-DB (0.125 lb/ac) plus COC (1.25%, v/v) in a factorial arrangement with three application timings of cracking (GC), 2 weeks after cracking (2 WGC), or 4 WGC. The experimental area was infested with common lambsquarters (*Chenopodium album*), prickly sida (*Sida spinosa*), and morningglory (*Ipomoea sp.*). Storm, lactofen, and bentazon tank mixtures provided good control of common lambsquarters, morningglory species, and prickly sida. Weed control for Storm and bentazon tank mixtures was comparable with GC and 2 WGC applications. Poor control of all species resulted with the 4 WGC timing. Lactofen control of morningglory species and prickly sida was higher with the two earlier applications. Common lambsquarters control was highest with lactofen applied at GC. Weed control with paraquat was poor at all timings. No differences in peanut yield were observed with treatments applied at GC. Yields for all Storm treatments and bentazon tank mixtures were comparable at the GC and 2 WGC application timings. With lactofen and paraquat yields were lower for 2 WGC than for GC treatments. Highest net returns were obtained with all GC applications and with Storm treatments at 2 WGC. Wider and more effective windows of application were available with Storm and with bentazon tank mixtures. Lactofen provided effective common lambsquarters control, only as a GC application.

PRODUCTION TECHNOLOGY AND ECONOMICS

Industry Initiatives for Environmental Stewardship with Pesticides.

L. B. LYNN. Monsanto Agricultural Company, Marietta, GA 30062

Communities around the world are making it plain, in both word and deed, that chemical companies must make products that are both safe and environmentally friendly. Companies are experiencing an external as well as internal employee driven revolution in environmental stewardship. The public is demanding a clean environment as requisite to our "right to operate". Similar demands of environmental responsibility are being made on customers who use our products. Basic pesticide manufacturers like MONSANTO have initiated a variety of novel concepts to encourage and reward customers for adopting certain environmental stewardship practices. Pesticide use issues for Alachlor and Glyphosate herbicides like user safety, container disposal, food safety, and water quality are handled through a series of PRO-ACTIVE environmental projects. Monsanto has a corporate-wide environmental pledge with specific initiatives for its agricultural business.

The Effect of Cultivars, Planting Dates and Fungicide Treatment on Peanut Yields.

R. W. MOZINGO* and D. M. PORTER. VPI & SU and USDA-ARS, Tidewater Agricultural Experiment Station,Suffolk, VA 23437.

Peanut (*Arachis hypogaea* L.) cultivars differ in the number of days to maturity and susceptibility to diseases. The objective of this field study, conducted at the Tidewater Agricultural Experiment Station in Suffolk, Virginia from 1986 through 1988, was to determine the effect of four planting dates on the yield of four peanut cultivars which were either treated or untreated with fungicides. A split-plot design was used with three replications with fungicide treatment the whole plot and the 16 combinations of cultivars and planting dates the sub-plots. The four planting dates were at 10-day intervals beginning on 24 April. Florigiant, NC 7, NC 9, and Virginia 81 Bunch (VA 81B) were the cultivars studied. Each cultivar was harvested at a predetermined number of days after planting. Significant differences in yields were obtained between fungicide treatments and among planting dates each year, and among cultivars two of the three years. The planting date X treatment interaction was highly significant each year. Yield differences between fungicide treated and untreated were much greater at later planting dates than at earlier planting dates. This resulted from the earlier plantings being harvested earlier and escaping some disease pressure. The cultivar X planting date interaction was significant two of the three years indicating cultivars responded differently to planting date. These results show that without fungicide treatment earlier planting dates are advantageous.

Water Distribution in Soil Under Peanut Irrigated With a Subsurface Micro-irrigation System. S. BUDISANTOSO, N. L. POWELL*, and F. S. WRIGHT. SSIMP SUL-SEL, Sulawesi Selatan, Indonesia; VPI & SU, Tidewater Agricultural Experiment Station, Suffolk, VA 23437; and USDA-ARS, Tidewater Agricultural Experiment Suffolk, VA 23437.

Water distribution in soil resulting from application through a line source subsurface micro-irrigation system (buried under a peanut crop) was monitored on a stratified soil (Uchee loamy sand) in the peanut growing region of Virginia. The Continuous System Modeling Program (CSMP) model for simulating water distribution from irrigation sources was modified and developed in the FORTRAN programming language for this application. The modifications included the effects of layered soil, water source position, number of water sources, plant transpiration and water evaporation from the soil surface. Field experiments were conducted to determine the soil water retention curve, the hydraulic conductivity, and soil water distribution from the line source. This data was used for model verification with the lateral lines buried 0.38 m below the soil surface and spaced 0.91 (under the row) and 1.83 m (between alternate rows) apart. Comparisons of water distribution in soil with no crop cover and soil with a peanut crop cover in the pod development stage were made. Simulated water distribution indicated that the wetting front expansion is more a function of irrigation volume than irrigation rate. Irrigation rate affects the soil water distribution in a stratified soil with a restricting layer located below the water source. A higher rate will result in greater horizontal water movement. Simulated and measured soil water distributions were in good agreement.

Cultivar and Harvest Date Effects on Peanut Yield and Sclerotinia Blight Incidence. J. R. SHOLAR* and K. E. JACKSON. Dept. of Agronomy and Dept. of Plant Pathology, Oklahoma State University, Stillwater, OK, 74078.

Experiments were conducted during 1987-89 at Fort Cobb, OK to investigate effects of Sclerotinia blight (*Sclerotinia minor*), two cultivars, 'Okrun' and 'Spanco', and five harvest dates on peanut yield. The study was conducted on two sites with one having a history of Sclerotinia blight and the other free of Sclerotinia blight. The experimental design was a split-split plot with disease history as whole plot, cultivar as split plot, and harvest date as split-split plot. Plots were 3.65 x 9.1 m with row spacing of 0.91 m and the treatments were replicated four times. Spanco was harvested at an average of 115, 125, 135, 145, and 155 days after planting (DAP) and Okrun was harvested at an average of 135, 145, 155, 165, and 175 DAP. Over three years and five harvest dates, Spanco yields were 534 kg/ha greater in the Sclerotinia free location than in the diseased location. Okrun yields were 2216 kg/ha greater in the Sclerotinia free location than in the diseased location. The greatest Spanco yield in the Sclerotinia blight infested location was obtained when the crop was harvested at 125-135 DAP while the highest yield in the disease free location was obtained at 145-155 DAP. In the diseased location, Sclerotinia blight increased in Spanco from 4% at 115 DAP to 39% at 155 DAP. Okrun yields were highest in all years at 135 DAP in the Sclerotinia blight infested location, while in the disease free location, the highest yield in 1987 and 1988 was obtained at 165 DAP. In 1989, an early freeze limited further maturity and highest yield was obtained at 145 DAP. In the diseased location, Sclerotinia blight increased in Okrun from 51% at 135 DAP to 97% at 175 DAP. As incidence of Sclerotinia blight increased, greater yield loss resulted when harvest was delayed for Okrun than for Spanco. In the absence of Sclerotinia blight, pod yields for both cultivars increased by delaying harvest.

Timing and Rate of Gypsum Applications for Peanuts Grown on Sand. G. J. GASCHO*, A. K. ALVA, and A. S. CSINOS, Dept. of Agronomy and Dept. of Plant Pathology, Coastal Plain Experiment Station, University of Georgia, P. O. Box 748, Tifton, GA 31793.

Peanuts grown on deep sands with low nutrient retention are sometimes limited in yield, grade, and value by low soil calcium (Ca) concentrations in the pegging zone and pod rot (induced by low Ca). In these soils, rain and irrigation may move Ca, residual or applied as gypsum, from the pegging zone prior to pod absorption. Three irrigated field experiments were conducted during two years to determine the best timing and rate of gypsum application for both runner cv. Florunner and Virginia cv. GK3 types. Experiments were conducted at both recommended and high levels of potassium (K) and magnesium (Mg). The high K and Mg levels were residual in one experiment and were induced by preplant incorporation of 246 and 123 kg/ha of K and Mg, respectively in the other two experiments. Rates of gypsum were 0, 224, and 448 kg/ha Ca equivalent. The 224 kg rate (recommended broadcast rate for runners) was applied; 1. Spring-incorporated, 2. At bloom, or 3. Split between bloom and three weeks following bloom. The 448 kg rate (recommended broadcast rate for Virginias) was applied either at bloom or split as above. Significant responses to gypsum application were recorded in two and all three experiments for runner and Virginia types, respectively. Spring-incorporated gypsum was inferior to bloom and split applications. High levels of K and Mg increased pod rot, decreased yield and grade, and accentuated responses to gypsum. Splitting gypsum applications resulted in increased yield and grade only when K and Mg were applied at excessive rates. Responses above those attained for the recommended rate for runners were not recorded for the higher rate. Therefore neither splitting nor above-recommended rates appear justified, even on deep sands.

Effect of Fungicide Spray Schedule and Digging Date on Florunner and Southern Runner Peanuts. J. P. BEASLEY, JR* and S.S. THOMPSON, Extension Agronomy Dept., University of Georgia, P. O. Box 1209, Tifton, GA 31793 and Extension Plant Pathology Dept., University of Georgia, P. O. Box 1209, Tifton, GA 31793.

Peanut cultivars 'Florunner' and 'Southern Runner' were evaluated for response to fungicide spray schedule and optimum digging date. Southern Runner has resistance to late leafspot (*Cercosporidium personatum*) and requires fewer fungicide applications than Florunner for optimum leafspot control and higher yields. Southern Runner was also released as 7 to 10 days later in maturity than Florunner. Field tests were conducted in crop years 1987, 1988 and 1989 at the Southwest Georgia Branch Experiment Station in Plains comparing two fungicide spray schedules and three digging dates. The fungicide spray schedules were: (1) applying first application of foliar fungicide at 30 days after planting with subsequent applications at two week intervals, for a total of 8 applications, and (2) applying first application of foliar fungicide at 60 days after planting with subsequent applications at three week intervals, for a total of 4 applications. Fungicide used was chlorothalonil at 1.125 lbs., a.i./acre. There were three digging dates for each cultivar, with digging date 1 (DD1) being the optimum digging date for Florunner, based on the Hull-Scrape Maturity method. Subsequent digging dates (DD2, DD3, DD4) were at one week intervals. Florunner was dug at digging dates DD1, DD2 and DD3. Southern Runner was dug at digging dates DD2, DD3 and DD4. Experimental design was a randomized complete block split-split plot with fungicide schedule the whole plot, cultivars the split plot and digging date the split-split plots. Florunner yields were significantly less where only 4 applications of foliar fungicide were applied, whereas Southern Runner yields were essentially the same for 4 applications compared to 8 applications, 4933 and 4992 lbs. per acre, respectively. Florunner yields dropped, although not significantly, as digging date was delayed in one week intervals from the optimum digging date (DD1). Southern Runner yields increased from DD2 to DD3 (4909 to 5163), indicating that it is 2 to 3 weeks later in maturity, instead of 7 to 10 days later.

Effect of Seed Size on Peanut Yield. J. A. BALDWIN*, R.D. LEE, J. P. BEASLEY, JR., and E.B. WHITTY. Dept. of Extension Agronomy, University of Georgia, Athens, GA. and Dept. of Agronomy, University of Florida, Gainesville.

A single lot of Florunner peanuts were planted during 1989 to demonstrate the effect of seed size on yield and quality. Treatments were 3 seed sizes: 14-16/64, 16-18/64, and 18-21/64 in a randomized complete block design replicated 4 times. The peanuts were grown at 3 locations in Georgia and 1 in Florida. The peanuts were planted at 6 seed/foot of row in 36" rows. Seed/pound were determined to be 1540, 1080, and 790 seed per pound for the 14-16, 1-18, and 18-21 seed sizes respectively. This seed count per pound resulted in a planting of 56, 81, and 110 pounds of seed/acre. All management and production practices were according to Extension Service recommendations. Two of the four locations showed an increased yield response to the medium seed size (18-21). Yield increases ranged from 480 to 870 pounds/acre. Yield ranges from smallest to largest seed sizes were the following for locations 1, 2, 3, and 4: 4570-5050, 4460-4660, 2160-3030, and 2290-2370 pounds/acre.

Seed Treatment with Chemicals for Breaking Dormancy of Peanut Seed. A. K. SINHA* and B. K. RAI. Caribbean Agricultural Research and Development Institute, Belmopan, Belize (Central America).

Larger seeded cultivars like M-13 and NC-343 exhibit seed dormancy and take a longer time to germinate than the smaller ones. This investigation deals with treatments of seeds to break seed dormancy and also to protect the seed in soil from pests and pathogens. Etherex and Flordimex, commercial liquid formulations with etherel as active ingredient, at two percent v/v concentrations in Teepol, a non-ionic detergent, freshly and 102 days earlier were applied to dry seed. Both the formulations broke seed dormancy, prepared fresh or 102 days earlier. A dosage effect was observed. Both the commercial formulations at 0.11 percent concentration significantly increased germination of both the varieties of peanut. Solid formulations of insecticide and fungicide adhered well to the seed treated with dormancy breaking chemical diluted with Teepol and increased the germination of seed. Thus, Teepol assisted in dilution of commercial liquid formulations of dormancy breaking chemical, as well as adhesion of solid formulations of pesticides to seed.

The Influence of Irrigation Water Quality and Irrigation Method on the Mineral Composition of Peanut Tissue. F. J. ADAMSEN, USDA-ARS, Suffolk, VA 23437.

Peanut (*Arachis hypogaea* L.) is produced in an area of the Virginia and North Carolina coastal plain where sodic deep well water sources are more readily available than high quality shallow well sources. The objective of this work was to determine the effect of irrigation water quality and irrigation method on the mineral composition of peanut tissue. Virginia-type peanuts were grown on a Kenansville loamy sand (loamy, siliceous, thermic Arenic Hapludult) in Suffolk, VA from 1985 to 1987. Irrigation methods were overhead sprinklers and deep buried trickle lines using deep-well (142 m) and shallow well (10 m) water. Trickle lines were buried 350 to 410 mm below each row. Deep-well water had 220 mg Na L^{-1}, a pH of 8.5, and a sodium adsorption ratio (SAR) of 103. Shallow-well water had 4.8 mg Na L^{-1}, a pH of 4.8, and an SAR of 3.1. Sodic water did not affect soil levels of Ca, K, and Mg. Sodium and pH were both higher in soil irrigated with deep well water to a depth of 900 mm. Sodic water appeared to reduce the concentration of Mg and increase the concentration of K in plant tissue. Plants from plots irrigated with sodic water concentrated Na in the stems and roots. The concentration of Na in seeds from plants irrigated with sodic water was different from those from nonirrigated plants and plants irrigated with good quality water only in 1987, which was the driest year of the study. Trickle irrigation reduced the amount of Na in the plants and may be the best way to use sodic irrigation water for peanut production.

Zinc Toxicity Symptoms in Peanut. J. G. DAVIS-CARTER*, M. B. PARKER, and T. P. GAINES. Agronomy Dept., University of Georgia, Coastal Plain Experiment Station, Tifton, GA 31793.

The purpose of this study was to describe Zn toxicity symptoms in peanuts, determine the onset of each symptom, and to relate the existence of the symptoms to leaf Zn levels and/or Zn ratios with other cations in the leaves. Florunner peanuts were grown in the greenhouse on four soils (Lakeland sand, Tifton loamy sand, Greenville sandy clay loam, and Greenville sandy clay). Factorial treatments were pH levels of 5.0, 5.5, 6.0, 6.5 and 0, 10, 20, and 40 ppm of Zn. Leaf samples were taken every two weeks for ten weeks, and detailed observations were made on the same schedule. Zinc toxicity symptoms of plants grown on clayey soils required lower soil pH and higher soil Zn levels than the plants growing on sandy soils. Stunting of peanut plants, including leaves, was the first symptom to develop. This occurred by the four week stage. Six weeks after planting, leaves of toxic plants grew horizontally. A concurrent symptom, in some cases, was leaf closure similar to that stimulated by darkness. The characteristic zinc toxicity symptom of stem splitting did not occur until the eight week stage, and did not occur in plants where stunting was severe. Plants died in the most severe cases of zinc toxicity. Toxicity symptoms were most highly correlated with leaf Zn. Leaf Ca, Mg, and K levels were all related to Zn toxicity; however, the Ca/Zn, Mg/Zn, and K/Zn ratios in the leaves were not as well correlated with Zn toxicity as leaf Zn was. On the clayey soils, leaf Zn >470 ppm was related to toxicity. However, on the sandy soils, plants with leaf Zn >350 ppm exhibited zinc toxicity symptoms. Stem purpling, previously attributed to Zn toxicity, was poorly correlated to leaf Zn levels. Leaf chlorosis, also thought to be related to Zn toxicity, was not well correlated with leaf Zn levels.

Potential Impact of the Uruguay Round of GATT Negotiations of U.S. Peanut Farmers. S. M. FLETCHER* and D. H. CARLEY. Dept. of Agricultural Economics, Georgia Experiment Station, The University of Georgia, Griffin, Georgia 30223-1797

Individual country policies can influence the international peanut market. Government intervention in the domestic agriculture of a country has an important role. Intervention that limits world trade opportunities can create world supply and demand imbalances that may disrupt commodity prices. The increasing level of government intervention throughout the world has led many countries to call for international agreements that limit or reduce the adverse effects of government intervention on international trade. This led to the Uruguay Round of international trade negotiations under the General Agreement on Tariffs and Trade (GATT). The U.S. has submitted a proposal to GATT that addresses the elimination of all production-stimulating and trade-distorting policies over a 10 year period. This implies the elimination of the peanut support price and domestic quotas. In addition, all non-tariff import barriers would be converted to tariffs and be reduced over a 10 year period. Preliminary research by the authors indicate that compared with income under the current program a typical Georgia peanut farm would have an estimated 45% to 75% less income depending on the policy the U.S. may use for the transition. The tariffication issue implies the elimination of the import quota (Section 22). The tariff rate for imports would be based on the differences in average world prices for 1986-1988. Assuming the U.S. domestic price was $615/ton FSP which would translate into approximately $1025/MT shelled cif Rotterdam, the average per unit tariff rate would be $327/MT shelled. The question is whether this tariff rate will provide a protection to the U.S. peanut farmer from cheaper overseas peanuts when Section 22 is removed? Economic analysis will address this issue.

Soil-Test Calcium Calibration for Sunrunner, GK 7, and Southern Runner. D. L

HARTZOG* and J. F. ADAMS. Dept. of Agronomy and Soils Auburn University, Auburn, Alabama 36849.

Calcium is the most important soil fertility factor in peanut production. Varieties other than Florunner are being adopted by growers in the Southeast. Some of these have increased resistance to many soil-borne diseases that has resulted in higher yields. While the minimum soil Ca requirement has been determined for 'Florunner', there is no soil fertility calibration data for GK 7, Sunrunner, or Southern Runner. Minimum soil Ca amounts have not been determined for these varieties nor has it been established that their Ca requirements differ from 'Florunner'. On-farm experiments were conducted from 1984-1989 on soils that ranged from "very low" to "high" in soil-test Ca to determine if these new varieties had different soil Ca requirements. Yield and SMK data shows that these varieties do not differ in their Ca requirement. Also, soil-test data used for 'Florunner' can be used for these varieties to adequately predict yield response.

Impact of Peanut Demand Factors on Peanut Farmers' Income. D. H. CARLEY* and

S. M. FLETCHER. Dept. of Agricultural Economics, University of Georgia, Griffin, GA 30223-1797.

Two policy proposals for peanuts have incorporated plans that would substantially reduce the price that peanut farmers would receive for farmers' stock peanuts. The 1990 Farm Bill Proposal put forth by the Secretary of Agriculture would decrease farm prices for quota peanuts by more than $100 per ton. Proposals submitted by the United States under the GATT negotiations would decrease farm prices even more. Lower farm prices for peanuts would be expected to result in reduced prices for peanut products at the retail level. Lower prices may result in increased consumption of peanut products, thus increasing the demand for farmer's stock peanuts. Estimated relationships explaining per capita demand for peanut food products at the manufacturers level indicated a 10 percent decrease in the shelled price for peanuts may result in a 1.6 percent increase in the demand for shelled peanuts. A 10 percent change in per capita disposable income would result in a change in the same direction in peanut demand of 6.4%. Translating this into the impact on peanut farmers shows that for each 10 percent decrease in farm prices for peanuts, total food use for peanuts would increase 35 million pounds, assuming no change in population or income. Even though peanut consumption would increase, gross income to peanut farmers was estimated to decrease $70 million for each 10 percent decrease in prices. Several policy scenarios affecting peanut prices, along with changes in expected per capita disposal income and population, indicated that in most cases increases in income and population would not offset the impact of decreasing peanut prices on income to peanut farmers. A worst case scenario, peanut prices decreasing to world levels, showed an increase in domestic consumption of 200 million pounds of peanuts but a decease in gross farm income of more than $300 million from current levels.

Peanut Market in the European Community. K. L. JENSEN and T. L. RANEY*. Department of Agricultural Economics, University of Tennessee, Knoxville, TN 37901; USDA-ERS-ATAD, Washington, D.C. 20005-4788.

Import demand for peanuts by the European Community was estimated. Sources of supply included the United States, Argentina, China, and Africa. Peanut demand was hypothesized to occur as the result of a two-stage decision making process. In the first stage, demand was hypothesized to be allocated among broad commodity groups. The EC's expenditure shares on peanuts imported from the various sources were then estimated in the second stage. Therefore, the model implied that peanuts from different sources form a weakly separable commodity group. A translog cost function was used to model the first and second stages. The own-price elasticity of demand for lower quality African peanuts increased over time. Own-price elasticites for peanuts from all other sources of supply decreased. These results indicate an increasing preference for higher quality peanuts. This may have occurred because of increased demand for peanuts as a food item, rather than for crushing.

EXTENSION TECHNIQUES AND TECHNOLOGY

Systems Research to Solve Industry Problems and Implement Solutions. JAMES I. DAVIDSON, JR.* USDA, ARS, National Peanut Research Laboratory, 1011 Forrester Drive, S. E., Dawson, GA 31742.

Industry problems, such as aflatoxin, foreign material, off-flavor and chemical residues, are difficult to solve because of the many variables and their complex relationship to supply, quality, economic return, and environmental and food safety concerns. Even when a potential solution is found (e.g. screening prior to marketing), it is very difficult to implement the solution because of political and economic issues. Systems research offers the best approach to solve the problems and implement the solutions. A conceptional model to help meet this objective is presented and discussed. The model consists of certain inputs such as political, legislative, regulatory, financial, research, extension and environment and certain outputs such as quality, economic returns and environmental enhancement. By utilizing this model and systems research, the inputs may be optimized to provide maximum outputs. As an example, the model and systems research approach is used to show how screening prior to marketing solves industry problems and how this method could be implemented.

Effects of Herbicide/Insecticide/Fungicide Tank Mixes on Peanut. J. R. WEEKS*. Dept. of Entomology, Auburn University, Wiregrass Experiment Station, Headland, AL 36345.

In 1989, chlorimuron herbicide was labeled for Florida Beggarweed control in peanuts. Since its use is restricted to a mid-season post-emergence application, peanut growers wanted information on the effects of tank mixing it with other commonly applied pesticides. Tank mix combinations of chlorimuron with each of the following insecticides acephate, methomyl, esfenvalerate and thiodicarb with and without the fungicide chlorothalonil were applied to Florunner cv. peanuts to evaluate possible interactions. Visual ratings of peanuts treated with the combinations made one week after application indicated low levels of foliar and stem discoloration compared to peanuts not treated with chlorimuron. Normal peanut color and foliar growth resumed in all plots by three weeks after application. Although there was visually more damage with the tank mixes of chlorimuron + esfenvalerate and chlorimuron + esfenvalerate + chlorothalonil, peanut yields were not adversely affected by any of the mixtures.

BELTCOST: A Computer Spreadsheet for Assessing the Costs of Belt Screens. F. D. MILLS, JR.* Department of Agriculture, Abilene Christian University, Abilene, TX 79699.

The Peanut Quality Enhancement Project (PQEP) analyzed the effects of belt screening farmers' stock peanuts. One component of the PQEP was to estimate the costs of installing and operating belt screens at United States peanut buying points. A computer spreadsheet, BELTCOST, was developed as a budgeting tool to estimate these costs. BELTCOST calculates, by location, the number of belt screens required to handle peanuts at peak delivery, annual operating costs and installation costs of the belt screens. Using the projected installation costs, the program estimates annual fixed costs and annual cash costs inclusive of debt payment. Subsequently, screening charges required to break-even relative to all costs and to cash costs are computed. The program's flexibility allows computation of installation costs at a single (multiple) peanut buying point(s). An example was included to illustrate the capabilities of BELTCOST.

PROCESSING AND UTILIZATION

The Birth and Growth of the Commercial Peanut Butter Industry.

Clyde T. Young. Department of Food Science, North Carolina State University, Raleigh, NC 27695-7624.

The peanut has often been referred to as the unpredictable legume because of the many mysteries associated with its development and growth. The peanut butter story has its own mysteries both in the birth and growth of America's favorite spread; it is a fascinating story. Was it born in 1890? Was it invented by a doctor? What is peanut chocolate? Why do most people have a favorite brand? Will the peanut butter flavor become the next universally accepted flavor? These interesting facts are presented within the following abridged chronological listing of published information. In 1871 (Report of the Commissioner of Agriculture) peanuts were "being roasted and ground, are used as chocolate, and are said to make an excellent substitute for that beverage". US patent 306,727 (1884) describes the preparation of peanut paste which "will set into a consistency of butter" and is used in the manufacture of peanut-candy. In 1891 (a Univ of Tenn Bulletin) "the well roasted nut is considerably used to adulterate chocolate." Patent 580,787 (1897) by Kellogg used boiled peanuts to make a "nut-butter" and his patent 604,493 (1898) states that "instead of boiling the kernels they may be roasted" but he again adds water to the product. A Connecticut report (1899) is the first time the "peanut butter" term appears in print. In 1909, the manufacture of peanut butter is described in Farmers' Bulletin 356. The Peanut Promoter in 1920 states that "It was in the year 1896 that the peanut butter industry had its origin when Joseph Lambert...". In the 1942 at the National Peanut Council meeting, L.H. Sessions states that "peanut butter was first manufactured in St. Louis in the 1890's by a physician as a food for invalids". In 1985 an article on factors affecting peanut butter preference was published. Since peanut flavor has the basic flavor compounds as chocolate, with the proper marketing techniques, it can become the next universally accepted flavor.

Effect of Maturity on Roasting Characteristics of Florunner Peanuts. J. A. LANSDEN*, T. H. SANDERS, J. R. VERCELLOTTI and K. L. CRIPPEN. USDA, ARS, National Peanut Research Laboratory, 1011 Forrester Drive, S. E., Dawson, GA 31742; USDA, ARS, Southern Regional Research Center, P. O. Box 19687, New Orleans, LA 70179.

Florunner peanuts classified into 5 maturity classes were roasted to Hunter L value of 49.68 ± 0.13. Analysis of the free amino acids before and after roasting revealed the largest decrease in the least mature class. Protein content decreased to a larger extent in the more mature peanuts during roasting. Gas chromatographic analysis of roasted peanut volatiles by purge and trap methods indicated that of the 50 peaks monitored, the least mature class was significantly different from all other classes on 24 peaks. Descriptive flavor intensity scores on the roasted peanut pastes indicated higher intensity for the "roasted peanutty" descriptor and less intensity for the "dark roasted" descriptor for the most mature class. The least mature class had slightly elevated intensities for "fruity fermented" and "painty" descriptors. Correlation of the "roasted peanutty" flavor intensity and roasted volatiles revealed several negative correlations including 2-methylpyrazine and 2-ethylpyrazine.

<u>Functional Properties of Peanut Flour and Peanut-fortified Sorghum Flour</u>. U. SINGH* and B. SINGH.

Department of Department of Food Science & Animal Industries, Alabama A & M University, AL, 35762.

Raw and heat-processed samples of peanut flour (cv. Florunner) and peanut-fortified sorghum flour (cv. Malisor 7) were studied for water and oil absorption, viscosity, gelation, emulsion capacity and nitrogen solubility index (NSI). Heat-processed samples were prepared by boiling the flour sample for 40 min. in distilled water, drying the whole broth in the oven at 50°C and grinding to a fine powder. There were remarkable differences in the functional properties of peanut flour, sorghum flour and their composite flour (80% sorghum flour and 20% peanut flour). Water and oil absorption increased due to heat processing and effect was more pronounced in peanut than in sorghum flour. The data from the viscoamylographic studies indicated no viscosity peak for peanut flour. On the contrary, sorghum flour attained a viscosity peak of 630 B.U. for raw sample and 438 B.U. for the heat-processed sample. Peanut fortification reduced the viscosity peak in both raw and heat-processed samples of sorghum flour. Nitrogen solubility index and emulsion capacity of peanut flour were noticeably higher than the sorghum flour. However, heat processing reduced NSI values and emulsion capacity of peanut flour and peanut-fortified sorghum flour. Further, NSI and emulsion capacity of sorghum flour were considerably improved as a result of fortification with peanut flour. The implication of these results will be realized in designing protein-enriched products based on sorghum flour especially for sorghum-growing regions of the world.

<u>Utilization of Peanut Flour for Preparation of Sorghum-based 'Toe'</u>. T. KOLEOSHO*, U. SINGH, and B. SINGH.

Department of Food Science & Animal Industries, Alabama A&M University, Normal, AL, 35762.

Various concentrations of defatted peanut flour ranging from 10 to 35% were used to fortify sorghum flour for preparation of 'Toe', a thick porridge, commonly utilized for food in Burkina Faso, Mali and Niger. A sensory panel consisting of African students familiar with the product rated color, texture and taste the highest for the 10% fortification level. These parameters generally declined with increases above 10%. General acceptability rating increased through 15% fortification then decreased. The viscosity and gel temperature of the peanut-fortified sorghum flour were studied by using viscoamylograph. Flour viscosity decreased as the fortification level increased. However a slight increase in gel temperature was observed as a result of fortification. As expected, protein level significantly increased in the Toe prepared from the peanut-fortified sorghum flour.

Comparison of Peanut Butter Color Determination by CIELAB L*a*b* and Hunter Color-Difference Methods and theRelationshipof Roasted Peanut Color to Roasted Peanut Flavor Attribute Response. H. E. PATTEE*, F. G. GIESBRECHT and C. T. YOUNG. USDA-ARS, Box 7625; Dept. of Statistics, Box 8203; Dept. of Food Science, Box 7624, North Carolina State University, Raleigh, NC 27695.

Descriptive flavor analysis in roasted peanut evaluation is increasing. However, there is a lack of information concerning an optimum roasted peanut color to which peanut samples should be roasted for the optimum roasted peanut attribute response. This lack of information and need for standard conditions to compare peanut germplasm sources for their roasted peanut attribute prompted this study. Comparison of Minolta Chroma Meter II CR-100 system to the Model 96 Spectrogard Color System for color analysis of roasted peanut paste samples indicates that the Minolta Chroma Meter II CR-100 system can be used for the rapid measurements needed. A three-year, four data-set study of the relationship between optimum roasted peanut attribute response and CIELAB L* values has shown that a nearly constant optimum CIELAB L* value exists. Across these data sets the optimum CIELAB L* varied from 58.2 to 59.5 suggesting that peanut samples should be roasted to a CIELAB L* of 58 to 59. Within these data possible differences due to germplasm and growing locations have not yet been determined. The Minolta Chroma Meter II CR-100 system only gives CIELAB color values directly and mathematical calculations are necessary to convert CIELAB color values to Hunter color values. We have shown that a simple equation:

$$\text{Hunter L} = \text{CIELAB L}^* - 7$$

can be used to approximate Hunter L values from CIELAB L* values in the CIELAB L* range 52 to 65. Thus the optimum Hunter L values would be 51 to 52 for obtaining optimum roasted peanut flavor attribute response.

HARVESTING, CURING, SHELLING, STORING AND HANDLING

The Role of Maturation in Quality of Stackpole Cured Peanuts. T. H. SANDERS*, J. A. LANSDEN, J. R. VERCELLOTTI and K. L. CRIPPEN. USDA, ARS, National Peanut Research Laboratory, 1011 Forrester, Drive, S. E., Dawson, GA 31742; USDA, ARS, Southern Regional Research Center, P. O. Box 19687, New Orleans, LA 70179.

As part of studies directed toward defining biochemical changes occurring during curing, Florunner peanuts were dug at 120 days after planting and cured in conventional stackpoles. Four stackpoles were constructed and one stack was harvested at ca. 10-day intervals beginning 10 days after stacking. Temperature in the stacks approximated ambient and relative humidity was generally higher in the stacks through 21 days. Hull scrape maturity profiles changed dramatically with yellow 2, orange, and brown classes decreasing and percentage of the black class increasing from 19 to 65% in 21 days. Size distribution within yellow 2 and orange maturity classes were variable with lowest percentages of medium grade sizes occurring after 21 days. Percentage of mediums generally decreased and No. 1 size increased in brown and black classes over the entire test period. Maturation was reflected in calculated maturity distributions in grade sizes from each stack and biochemical and sensory analyses supported the increase in quality.

Weighing Platforms For Automated Peanut Curing Control. G. VELLIDIS*, C. D. PERRY, C. S. KVIEN and J. K. SHARPE. Agricultural Engineering Department; Agricultural Engineering Department; Agronomy Department and Agronomy Department, all at the Coastal Plain Experiment Station, The University of Georgia, Tifton, GA 31793-0748.

The first stage of a microcomputer-based automated peanut curing controller was designed, developed, and tested. Current peanut curing practices require frequent manual sampling of the peanuts for moisture control. However, moisture loss can also be measured by continuously monitoring the weight of the peanut/trailer system during curing. Using the initial peanut moisture content, the desired final moisture content, and the initial net wet weight of the peanuts, the amount of moisture that must be lost by a load of peanuts can be determined mathematically. The predicted cutoff weight can then be calculated and the dryers cut off when this weight is reached. The predicted cutoff weight technique has been suggested by other researchers, but the technology to cheaply and accurately weigh the peanut/trailer system had not been adequately developed. A new approach to the problem that requires very little modification to existing curing facilities was developed in this study. A weighing platform using strain gage technology was designed. The rear wheels of a full drying trailer are driven onto the platform. The strain gages, which are mounted on the platform in a full Wheatstone bridge circuit and continuously monitored by a computer-operated data acquisition system, measure the load on the platform. As the peanuts lose moisture during curing, the load on the platform decreases. When the predicted cutoff weight is reached, the controlling software automatically cuts off the dryer. One year of development has been completed and 9 weighing platforms are being evaluated at a commercial shelling operation. Data indicate that the weighing platforms' accuracy is better than 20 kg and that moisture contents can be monitored to within 1%.

A Method for Setting the Plenum Thermostat for High Quality Peanut Curing.

J.M. TROEGER. USDA-ARS, Crop Systems Research Unit, Georgia Coastal Plain Experiment Station, Tifton, Georgia 31793.

Curing of high quality peanuts requires that temperature and relative humidity (RH) of the air be controlled to prevent the peanuts from losing moisture too rapidly. A rapid drying rate will increase splitting of kernels and may adversely affect flavor. Conversely, moisture must be removed rapidly enough to prevent mold growth and possible aflatoxin contamination. Using the Georgia extension recommendations for proper plenum temperature/RH limits and a simulation model for hourly ambient dry bulb and wet bulb temperatures, a method was developed for setting the plenum temperature thermostat once daily based on the expected minimum temperature for the next day. Experimental tests in 1989 showed that setting the plenum thermostat by this method reduced the percentage of split kernels compared with dryers with thermostats set at 35C (95F). Time for curing the peanuts, however, was extended.

Drying Peanuts in the Caribbean in a Batch Dryer Using an Inexpensive Kerosene Burner.

M. S. CHINNAN* and T. OZ-ARI. Department of Food Science and Technology, Georgia Agricultural Experiment Station, Griffin, GA 30223-1797.

An existing 500 cu. ft. batch dryer in Belize (Central America) was selected in this pilot study. The dryer was found to be inadequate with respect to the blower, power drive and the heat source, all of which are key components. A bigger, more efficient blower and an independent power drive were added. An inexpensive liquid fuel burner commonly used in citrus orchards during freezing weather was modified and adapted to serve as a heat source, replacing the existing wood burning system. To increase drying duration and to eliminate shutting down the system for refueling, an auxiliary fuel system for the heating unit was designed, fabricated locally and attached to the system. Samples were drawn from two independent loads, each from a different crop of peanuts (c.v. Tennessee-Red). The initial average moisture content of each load was 37% (dry basis). Peanut samples, two pounds each, were put in mesh bags and placed at different locations within the dryer. A bag was drawn from each location after predetermined drying times for moisture content test. Measurements of static pressure and temperature from the plenum were taken along with the air flow rate (inlet and outlet), air relative humidity (inlet and outlet) and blower speed. The effect of the various design parameters (blower speed, burner damper position and load depth) on the fuel consumption were evaluated. Engineering drawings and specifications were prepared for future use in other countries of the Caribbean basin.

Single Kernel Moisture Content Determination in Farmers Stock Peanuts. FLOYD E. DOWELL* and J. H. POWELL. USDA, ARS, National Peanut Research Laboratory, 1011 Forrester Drive, S. E., Dawson, GA 31742.

The U.S. peanut industry is currently evaluating and recommending improvements be made to increase accuracy and decrease the cost and labor involved in grading peanut samples. Determining single kernel moisture can impact these areas. The current moisture meter gives one moisture content value for the sample and therefore cannot necessarily detect if a load of peanuts has been improperly dried or if wet peanuts and dry peanuts have been mixed together. In addition, the inability of the current meter to detect single kernel moisture necessitates that individual trailers of peanuts be sampled and the moisture content determined for each trailer. However, one combined sample from two or more trailers coming from the same field could be graded, decreasing labor requirements and labor costs, if the moisture distribution of the single kernels were known. Thus, a commercially available single kernel moisture meter (SKM) was tested against the current DICKEY-john moisture meter and also compared to oven dried samples. The single kernel moisture meter produced results that compared favorably with both the DICKEY-john moisture meter and oven dried samples. Tests also showed that the SKM can effectively determine if samples contain a wide range of moistures. Tests showed an average standard deviation of 0.63% when comparing oven to the DICKEY-john readings, and an average standard deviation of 0.76% when comparing oven and SKM readings. Thus the SKM and DICKEY-john meters predicted oven moisture contents with similar accuracy. Design improvements in the SKM are needed to reduce residue buildup on the components and to increase the range and linearity needed to accurately determine extremely high and low kernel moisture contents. With minor design changes, the SKM can provide a commercially feasible method of detecting loads of improperly dried or mixed peanuts and to reduce grading labor requirements by allowing one grade sample to represent two or more trailers of farmers stock peanuts.

Comparative Grade and Shelling Studies on Florunner, Sunrunner, and Southern Runner. D. W. GORBET*, A. J. OSWALD, AND D. A. KNAUFT. Agri. Research and Education Center, Marianna, FL 32446; Florida Foundation Seed Producers, Inc., Greenwood, FL 32443; and Agronomy Dept., U. of Florida, Gainesville, FL 32611.

Grading and shelling data are important in the value and utility of peanut cultivars. Since its release in 1969, 'Florunner' has set standards for runner market-type cultivars, especially for grade and shelling traits, that have been difficult to equal or exceed by peanut breeders. Studies were conducted on samples from field plots and on Foundation and Breeder Seed increases of Florunner, 'Sunrunner', and 'Southern Runner' during 1985-89 to evaluate various grade and shelling variables. Plot data indicated that Southern Runner was significantly lower in total sound mature kernels (TSMK) than Florunner and Sunrunner (79.8 vs. 81.7 and 81.6%, respectively) and also significantly lower in 100-seed weights than Sunrunner (65.4 vs. 70.9 g). Grading data from seed increases indicated that the three cultivars differed significantly in loose-shell kernels (LSK) and splits but not for SMK, other kernels, and damaged kernels. Southern Runner had significantly lower LSKs than Florunner and Sunrunner (1.4 vs. 3.2 and 2.9%, respectively) and lower splits than Florunner but not Sunrunner (1.8 vs. 2.6, 2.0%, respectively). Southern Runner had significantly higher whole seed shellout than Florunner and Sunrunner (63.7 vs. 60.1 and 60.8%, respectively) for 1986-88 crops but not when 1989 crop was included. These results indicate that Florunner and Sunrunner are very similar in grade and shelling data comparison. Southern Runner compares more favorably to Florunner and Sunrunner in large scale shelling studies than plot data would indicate.

Effects on Quality of Screening Farmers Stock Peanuts with Greater than Four Percent Loose Shelled Kernels. P. D. BLANKENSHIP. USDA, ARS, National Peanut Research Laboratory, 1011 Forrester Drive, S. E., Dawson, GA 31742.

The Peanut Quality Enhancement Project (PQEP) demonstrated that belt screening farmers' stock (FS) peanuts will effectively improve peanut quality. However, the USA peanut industry declined immediate implementation of screening all lots of FS peanuts prior to farmer marketing because of economic ramifications. To encourage reconsideration of FS peanut screening, the PQEP data base was reanalyzed to determine the effects on quality parameters and costs of an alternative screening scheme requiring lots with greater than 4% loose shelled kernels (LSK) only be screened. Of the 1614 test lots of PQEP, only 703 had LSK greater than 4% before screening, a 56.4% reduction in lots requiring screening. Before and after screening LSK for all 1614 PQEP lots averaged 4.52 and 0.43%, respectively. Considering after screening LSK values for lots with greater than 4% LSK initially averaged with before screening LSK, values for all other lots yielded an LSK average of 1.87%. Similar before and after screening foreign material values for these lots yielded averages of 4.29%, 2.18%, and 3.31%, respectively. Minor changes in other quality parameters including aflatoxin levels indicated quality improvement with screening under this scheme.

Energy Losses From Air Leakage in Peanut Drying Trailers. D.H. VAUGHAN*, J.S. CUNDIFF, W.F. WILCKE and F.S. WRIGHT. Agricultural Engineering Dept., Virginia Polytechnic Institute and State University, Blacksburg, VA 24061-0303; USDA-ARS, Suffolk, VA 23437, and Agricultural Engineering Department, University of Minnesota, St. Paul, MN 55108.

To determine energy lost during peanut curing, a procedure was developed and used to measure air leakage from 6 peanut drying trailers. The top of each trailer was sealed with a polyethylene sheet clamped tightly with plywood, lumber and c-clamps; the trailer was then pressurized to 3 levels of airflow using a 3-speed fan; airflow was measured with pitot tube and micromanometer or with a hot-wire anenometer for very low flows; static pressure was measured with a pressure gage attached to a tube inserted in the plenum; and wet- and dry-bulb temperatures, barometric pressure and other air properties were recorded to correct data to standard conditions. For typical drying conditions of about 5000 cfm per trailerload of peanuts, air leakages were 700, 300, and 100 cfm per trailer, respectively, for poor, average, and excellent maintenance conditions. Trailers described as poorly maintained included rust holes in the plenum and lower sidewalls, broken welds or loose bolts on tailgates and front plates leaving up to ½-inch gaps, and plenum bottom plates broken loose from the angle iron frame. Trailers categorized as average had leaks mostly from small holes or cracks. Trailers rated in excellent condition were like new, although many were several years old, and had been stored under shelter, cleaned properly, kept painted, and subjected to a thorough maintenance program. Airflow losses ranged from 14 percent for poorly maintained trailers to 2 percent for trailers in excellent condition. Energy costs for these leakage losses, calculated based on current LP gas and electric rates and typical harvest moisture levels and drying conditions, were $5.55, 2.38, and 0.80 per trailerload for poor, average and excellent maintenance conditions. Seasonal use of a poorly maintained trailer costs approximately $40-50 more than a well-maintained trailer.

Environmental Monitoring of Peanut Curing to Maximize Energy Efficiency and Peanut Quality. J. K. SHARPE*, C. K. KVIEN, W. H. YOKOYAMA, and K. CALHOUN. Dept. of Agronomy; Dept. of Agronomy, Coastal Plain Experiment Station/Univ. of Georgia, Tifton, Georgia 31793; Beatrice/Hunt-Wesson, Fullerton, California 92633; Farmer's Fertilizer and Milling, Colquitt, Georgia 31737.

One of the most critical and most overlooked areas in peanut quality is the artificial curing operation. A study was conducted to monitor temperature, relative humidity, and energy use during peanut curing at a buying point during 1988. Peanut moisture content, organic volatile content, and hull scrape profiles were also collected to relate drying conditions to peanut quality. Horizontal temperature and relative humidity gradients in loaded wagons were significant with variations up to 16°F detected. When air flow rates were high, trailers dried more uniformly, but decreased energy efficiency over 50%. Peanut loads dried at high temperatures showed the greatest load to load variability in organic volatiles. Our results suggest that a weight based control system rather than moisture based would be the most efficient method for controlling the drying process.

ENTOMOLOGY

Interaction of Tobacco Thrips (Frankliniella fusca), Paraquat and mechanical Defoliation on peanut (Arachis hypogaea) growth, quality, and yield.

E. S. BLENK, H. M. LINKER*, and H. D. COBLE. Crop Science Department, N. C. State University, Raleigh, NC 27695-7620

Field studies were conducted in 1988 and 1989 at the Upper Coastal Plain Experiment Station near Rocky Mount, N. C., to determine the effects of multiple stresses on the yield and quality of peanuts cv. 'NC7'. The stresses included a foliage feeding insect, tobacco thrips, a phytotoxic herbicide (paraquat), and early and late season mechanical defoliation. Thrips population levels, plant growth, flowering and bud number were measured weekly. Treatments included aldicarb plus paraquat at 2 weeks after cracking (WAC), aldicarb plus paraquat at 4 WAC, aldicarb alone, paraquat at 2 WAC, paraquat at 4 WAC and no chemical applications. One meter microplots were established in all plots for mechanical defoliation tests. Plants were defoliated 50% and 100% at 4 WAC and 25% 12 WAC. Overall treatment effects were determined by yield and quality. In both years suppression of thrips increased yields. In 1988, thrips populations were low and paraquat applications resulted in a suppression of thrips levels for two weeks. Paraquat phytotoxicity did not affect final yields. Mechanical defoliation at 4 WAC did not affect yield or quality. In 1989, thrips populations were 4 times higher than 1988 at both adult and larval peaks. Paraquat applications did not suppress thrips numbers and the resulting phytotoxicity, in combination with thrips injury, decreased yields. Mechanical defoliation at 12 WAC alone or in combination with thrips injury did not affect yield or quality. In 1989, 100% defoliation at 4 WAC reduced yields. Yield and quality were not affected by 50% defoliation 4 WAC.

Lesser Cornstalk Borer (Lepidoptera: Pyralidae) Larval Feeding on 20 Host Plants.

T. P. MACK* and X. P. HUANG, Department of Entomology, 301 Funchess Hall, Auburn University, Ala., 36849-5413.

Feeding of the lesser cornstalk borer (*Elasmopalpus lignosellus* [Zeller]) on 20 species of host plants was compared by bioassaying larvae with agar plugs containing plant materials. Nineteen out of the 20 species of plants tested were fed upon significantly more than the control. Turnips (Cruciferae); corn, sugarcane, and sorghum (Graminaceae); and peanuts (Fabaceae) were fed upon the most compared with the others. Turnip is the only one of these five which has not been reported to be extensively damaged by lesser cornstalk borer larvae, and a greenhouse test verified that larvae attacked turnip plants. Color and odor were not the major cause of the feeding differences in the bioassay.

Effect of Timing on Prophylactic Treatments for Southern Corn Rootworm (*Diabrotica undecimpunctata howardi* Barber). R. L. BRANDENBURG*. Dept. of Entomology, Box 7613, N. C. State University, Raleigh, NC, 27695-7613
Granular insecticides were applied at various timing schedules for prophylactic treatments against southern corn rootworm damage to pods of peanuts grown in North Carolina and Virginia. The early application date using insecticides with low water solubility did not result in a reduction of the level of control. Yield and quality data were quite variable and few significant differences could be detected. The advantages to such early application, if done without sacrificing late season rootworm control, are less vine damage in application, earlier season control of other pests and fewer problems with secondary pests. Disadvantages are the exposure of more granular material to birds and potentially increased avian risk and increased ultraviolet degradation and, therefore, the need to incorporate the insecticide.

Effect of Tobacco Thrips and Herbicide Treatment on Growth and Yield of Virginia Peanut. D. A. HERBERT, Jr.*, J. W. WILCUT and C. W. SWANN. Dept. of Entomology, Dept. of Plant Pathology, Physiology and Weed Science, and Dept. of Crop and Soil Environmental Sciences, Virginia Polytechnic Institute and State University, Tidewater Agricultural Experiment Station, Suffolk, VA 23437.

NC 7 peanut was treated with combinations of insecticides and postemergence herbicides to determine the effects of herbicide treatment and tobacco thrips damage on yield. A RCB experimental design with 3 replicates was used with treatments being combinations of insecticides and herbicides including, single applications of Temik 15G in-furrow at 1 lb AI/acre, Sevin XLR PLUS foliar-applied on 13 Jun at 1 lb AI/acre, Temik plus Sevin XLR PLUS, Gramoxone 1.5EC at 0.125 lb AI/acre plus Induce at 0.25 % (v/v), Blazer 2.0EC at 0.25 lb AI/acre plus Induce, Tough 3.75EC at 1.05 lb AI/acre, and an untreated control. All herbicide treatments were applied postemergence on 5 Jun, when plants were ca. 6 inches in diameter. All weeds were manually removed from the test. Peanut plant growth response was assessed by measuring height and width of 5 randomly selected plants per plot, 44 and 64 days after treatment (DAT). Thrips damage was rated on 19, 27 Jun, and 5 Aug using a 0-10 subjective scale, where 0=0% damaged leaves and 10=100% damaged leaves. Yield was determined by digging, combining, drying, and weighing peanuts from 80 row-feet per plot (7% moisture). Results indicated that Tobacco thrips damaged ca. 50% and 40% of all leaves in untreated and Sevin XLR treated plots, respectively. Temik significantly reduced thrips damage to less than 1%. Gramoxone and Blazer significantly reduced plant height, by ca. 1 inch, and width, by ca. 2 inches, 44 DAT compared to Tough. Plant growth was not different among herbicide treatments at 64 DAT. Gramoxone and Blazer treatments that received Temik had larger plant canopies than non-Temik treatment combinations, but canopies were still ca. 1 inch shorter and 4 inches narrower than Tough-Temik treatments by 64 DAT. Yield of herbicide treated plots, without Temik, averaged ca. 2300 lb/acre and was not different among treatments. Temik-herbicide treatments resulted in significantly higher yields of ca. 3,400-3,800 lb/acre, with the highest yield from the Temik-Tough combination.

Enhanced Aflatoxin Contamination of Peanut as a Result of Insect Damage to Pods.

R. E. LYNCH*, D. M. WILSON, JR., and B. W. MAW. Insect Biology and Population Management Research Laboratory, USDA-ARS, Tifton, GA 31793; Mycotoxin and Tobacco Laboratory, Department of Plant Pathology, University of Georgia, Coastal Plain Experiment Station, Tifton, GA 31793; Department of Agricultural Engineering, University of Georgia, Coastal Plain Experiment Station, Tifton, GA 31793.

The interactions of drought, damage to peanut pods by the lesser cornstalk borer (LCB), infection with *Aspergillus flavus*, and contamination with aflatoxin were studied in drought-stress plots under a rain-out shelter. Plots were planted to 'Florunner' peanut, infested with LCB larvae at 75, 90, or 105 days after planting, and subjected to drought at 90 days after planting. At harvest, the percentage of externally damaged pods was significantly greater for the Drought-LCB-90 and Drought-LCB-105 treatments than the percentage for the irrigated control. The percentage of pods that was penetrated by LCB feeding was significantly greater for all drought treatments than the percentage for the irrigated control. Contamination of peanut hulls with *A. flavus* was also significantly greater for all drought treatments than contamination of hulls for the irrigated control. Total aflatoxin in kernels was significantly greater for peanut from the Drought-LCB-90 and -105 treatments than in kernels from the irrigated control. Orthogonal comparisons showed that pods with external damage had a significantly higher kernel infection with *A. flavus* and aflatoxin content than did kernels from undamaged pods. Thus, external damage without pod penetration enhanced invasion of pods with *A. flavus* and formation of aflatoxin during drought.

Effects of Aldicarb and Peanut Maturity on Survival, Feeding and Reproduction of Tobacco Thrips (*Frankliniella fusca*).

J. R. CHAMBERLIN* and J. W. TODD. Dept. of Entomology, CPES, University of Georgia, Tifton, GA, 31793

Survival, feeding, and reproduction of tobacco thrips on greenhouse and field grown peanut foliage was measured in several laboratory tests. Treatments were combinations of 5 plant ages (ca. 2, 4, 6, 8, and 10 wks after planting) and 2 levels of insecticide (none or aldicarb at 1 lb AI/acre in furrow). A female tobacco thrips was placed in a modified Munger cage containing an excised Florunner peanut terminal. Survival of the female parent, severity of feeding injury, and production of immatures were recorded every 3-4 days until all immatures died or reached adulthood. Aldicarb significantly reduced parental survival, feeding injury, and reproduction on terminals from two week old plants, but results varied for other plant ages. Effects of plant age varied among tests.

INDUSTRY SESSION

Control of Sclerotium rolfsii in Peanut with Broadcast Applications of Flutolanil plus Chlorothalonil. J. R. FRENCH*, R. S. RAYTHATHA, G. W. HARRISON AND W. C. ODLE. Fermenta ASC Corp., 5966 Heisley Rd., Mentor, OH 44061.

The control of white mold (southern blight) in peanuts was studied over a two year period with tank mixes and a co-formulation of flutolanil with chlorothalonil. A total of twenty-two field studies were conducted throughout two peanut growing regions of the U.S. Multiple applications of flutolanil in broadcast pattern over the canopy were as effective as single or double applications of flutolanil in over-the-row band treatments. The minimum effective application rate of flutolanil was established at 1.5 lbs a.i. through the growing season, when applied either in banded application pattern, or in multiple application broadcast pattern. An effective, stable co-formulation of flutolanil with chlorothalonil was developed, which gave combined protection of peanuts against white mold, early and late leafspots and rust. Aggregate control of these diseases provided significant protection of peanut crop yield potential to a level greater than that given by the presently registered standard fungicide. This research confirms that combined applications of flutolanil with chlorothalonil would be an effective, practical means of optimizing the utility of both fungicides for disease management in peanut.

Comparison of Tebuconazole Sensitivity in *Cercosporidium personatum* Populations from DMI-Treated and Non-Treated Peanuts. M. R. SCHWARZ*, D. V. MARINE, S. TAYLOR, and [1] W. D. ROGERS. Mobay Corporation, Vero Beach Laboratories, P. O. Box 1508, Vero Beach, FL 32961-1508 and [1] Mobay Research Farm, Ferry Lake Rd., Rt. 4, Box 2870, Tifton, GA 31794-9804.

Peanut leaves (var. Florunner) infected with *Cercosporidium personatum* were periodically collected from two locations in Georgia and one in Florida respectively representing: 1) test plots treated with chlorothalonil (1.26 kg ai/ha), chlorothalonil (1.26 kg ai/ha) followed by tebuconazole (0.25 kg ai/ha), tebuconazole (0.25 kg ai/ha), or nontreated in seasonal programs; 2) a site having no previous history of DMI fungicide use; and 3) a site having extensive prior and current DMI fungicide use. Conidia from fifty actively sporulating lesions per sample were tested separately. Conidia were removed from individual lesions and placed on water agar (WA) amended with 0, 0.001, 0.1, and 10 ug/ml tebuconazole. After 72 hours at room temperature, germ tube growth was stopped by adding 3% formaldehyde to each WA plate. Germ tube lengths for 15 conidia/concentration/lesion were measured and compared to those growing on nonamended WA. The log ED50 values for all lesion isolates were calculated using regression analysis. Mean baseline sensitivities were determined from log ED50 distributions for each sample. The ED50 distributions from DMI-treated sites (mean=0.0083, 0.0105 and 0.0252 ug/ml) were not significantly different (p=0.05) from ones found in non-DMI exposed populations (0.0091, 0.0371 ug/ml). This suggests prior DMI use did not result in detectable sensitivity shifts to tebuconazole. ED50 distributions for tebuconazole-treated vs non-treated test plots at the same location and sampling date were generally not significantly different. However, when baseline sensitivities for non-treated plots from different sampling dates at the same location were compared, a shift from less sensitive on 7/31 (0.0252) and 8/21 (0.008), to more sensitive on 9/8 (0.00002 ug/ml) was observed at one site. This shift may have been an actual seasonal sensitivity shift or caused by procedural or environmental factors which changed the viability of this sample versus the others.

Biological and Regulatory Update of Tilt on Peanuts. J. R. JAMES*, J. M. HAMMOND, A. MCMAHON, AND H. R. SMITH. CIBA-GEIGY Corp., Greensboro, N.C. 27409.

Tilt 3.6E (propiconazole) has been extensively evaluated as a peanut fungicide for control of peanut leaf spots and soilborne diseases. A label is pending at the EPA which allows foliar applications of 2.5 fl. oz./A (78 g ai/ha) for control of early leaf spot (*Cercospora arachidicola*) and 4 fl. oz./A (125 g ai/ha) for control of late leaf spot (*Cercosporidium personatum*). For early leaf spot control, Tilt will be recommended for both standard and advisory schedules while for late leaf spot control, emphasis will be directed toward early season applications. Tilt applied at 125 g ai/ha by chemigation has also provided control of white mold (*Sclerotium rolfsii*) and limb rot (*Rhizoctonia solani*). For white mold control 3-4 applications on a 7-14 day interval starting at pegging are recommended.

SYMPOSIUM: TOMATO SPOTTED WILT VIRUS

Thrips as Vectors of TSWV. J. W. Todd, A. K. Culbreath, J. W. Demski and Ramona Beshear. University of Georgia, Departments of Entomology and Plant Pathology, Coastal Plain Experiment Station, Tifton, GA 31793 and the Georgia Station, Experiment, GA 30212.

Spotted wilt disease of peanut caused by tomato spotted wilt virus (TSWV) has become a serious threat to peanut production in many areas of the southeastern U. S. as well as other regions of the world. Thrips are the only proven vectors of TSWV. Seven thrips species have been verified as TSWV vectors; Frankliniella fusca (Hinds), F. occidentalis (Pergande), F. schultzei (Trybom), Scirtothrips dorsalis Hood, Thrips tabaci Lindeman, Thrips palmi Karny, Thrips setosus. Many other thrips species as well as several members of the Hemiptera and Homoptera have been tested as vectors but only certain thrips listed above have been verified. All vector species have demonstrated an inability to acquire the virus as an adult but all adults vectored the virus after acquiring it as an immature. Larvae may acquire the virus by feeding on an infective plant for ca. 30 min. A latent period of ca. 10 days after acquisition seems to be necessary before transmission to another plant is possible. A feeding period of ca. 15 min. is apparently sufficient for infection by larvae or adult thrips. The virus has been shown to be circulative in thrips and infected individuals may remain infective for a few days to life and transmission may be continuous or sporadic. Epiphytotics are associated with an abundance of the virus and thrips vector species. Primary infection is due to immigrant or overwintering thrips in the subject area but secondary infection is due exclusively to within field and interplant movement of infective individuals reared there.

Epidemiology of TSWV on Peanut. A. K. Culbreath, J. W. Todd and J. W. Demski. University of Georgia, Departments of Plant Pathology and Entomology, Coastal Plain Experiment Station, Tifton, GA 31793, and Department of Plant Pathology, Georgia Experiment Station. Experiment, GA 30212.

Since 1986, Tomato spotted wilt virus (TSWV) has increased dramatically in incidence and distribution in peanut and several other crops in the peanut growing region of Georgia. To characterize spotted wilt epidemics, disease progress of spotted wilt was monitored in one field (72 ft by 500 ft) each of Florunner and Southern Runner peanut cultivars in 1989 at the Attapulgus Research Station, Attapulgus, GA. Disease incidence was determined at 2 wk intervals beginning 12 June. Position of each symptomatic plant was marked with a colored surveyors flag. Disease progress curves were constructed for both genotypes for comparsion of the cultivars over time, and maps of incidence in the field were made. Degree of within row clustering was evaluated using ordinary runs analysis. A grid was imposed upon each field dividing it into 240 contiguous quadrats (6 ft by 25 ft). Variance to mean ratios were calculated for each field as an index of dispersion, based upon incidence in individual quadrats. Final incidence in Southern Runner and Florunner was 2.93% and 6.25% respectively based upon the number of row feet containing at least one symptomatic plant. Ordinary runs analysis indicated that significant clustering did occur within rows in both Southern Runner and Florunner. Variance to mean ratios were 4.15 and 7.29 for Southern Runner and Florunner, respectively, indicating that across the field, symptomatic plants occurred in a non-random or clustered pattern.

Methods for Detection of Tomato Spotted Wilt Virus. J. L. SHERWOOD.

Department of Plant Pathology, Oklahoma State University, Stillwater, OK 74078.

The methods for detection and identification of tomato spotted wilt virus (TSWV) range from the reasonably effortless technique of observation of characteristic symptoms of infection, to the involved approach of utilizing assays with molecular probes. TSWV has an extensive host range and is the type member of the tomato spotted wilt virus group. Virions have a lipid envelope containing at least two glycoproteins which surrounds the three RNAs that are each encapsidated. The symptoms of TSWV in peanut are rather characteristic, although varied, which aids preliminary identification. There are several hosts which can be used for biological assay for TSWV, although the virus is sometimes difficult to recover from infected tissue. TSWV does induce unique intracellular inclusions in peanut which can be seen with the light microscope. Inclusions and virions can also be seen by electron microscopy. Several approaches have been taken to detect components of the virus. TSWV can be difficult to purify to homogeneity which makes the production of high quality polyclonal antiserum to TSWV difficult. Monoclonal antibodies have been produced to several proteins of the more common strain of TSWV. However, the nucleocapsid of an isolate of TSWV that has recently been characterized does not seem to share common epitopes with the nucleocapsid of the common strain of TSWV. The presence of double stranded RNA (dsRNA) in plants is generally taken as an indication of virus infection in plants. There does not seem to be any reports on the utility of this technique for the detection of TSWV. Nucleic acid hybridization has been used to detect TSWV in plants and thrips, but this technique does not seem to have been utilized with TSWV in peanut. There are many approaches that can be used for detection and identification of TSWV. Which technique is useful will depend on the time and availability of equipment to the investigator.

TSWV on Vegetable Crops. R.D. Gitaitis*, Department of Plant Pathology,

University of Georgia, Coastal Plain Experiment Station, Tifton, GA 31793

The spatial distribution of plants displaying symptoms caused by the tomato spotted wilt virus (TSWV) were plotted over time for both tomatoes (Lycopersicon esculentum Mill.) and peppers (Capsicum annuum L.) grown either for production or as field-grown transplants. Disease progress curves were constructed and infection rates (r_i) ranged from $r_i = 0.10$ in tomatoes to $r_i = 0.17$ in peppers. Both doublet analysis and ordinary runs evaluations demonstrated a random distribution of diseased plants, thus it was concluded that secondary dissemination was inconsequential to the epidemic. Graphs of disease incidence vs. distance from field perimeters were used to compare plant-disease dispersal gradients within and between fields. The observed dispersal gradients were interpreted as evidence of a local source of inoculum and of local movement of thrips from outside areas immediately adjacent to the fields. In addition, the dispersal gradients were correlated ($r = 0.91$) with differences in disease levels between pepper cultivars, whereas infection rates among cultivars were similar despite significant differences in disease incidence.

Predicting Spotted Wilt in South Texas Peanuts. M. C. BLACK.
Dept. of Plant Pathology and Microbiology, Texas A&M Univ., Agricultural Research and Extension Center, Uvalde, TX 78802.

Incidence of spotted wilt, caused by tomato spotted wilt virus (TSWV), was empirically compared to conditions in 1984-1988. Assumptions included: broad virus/vector host ranges, perennial TSWV reservoirs, TSWV buildup in winter annuals, host seed germination after fall rains, local vector migrations, low vector efficiency, and interference of frequent spring rains with thrips migrations. The greatest risk weight was for above average rainfall in September and October (+). Frequent spring rains had intermediate weight (-). Low weights included high disease incidence the previous summer (+), winter rainfall (+), and lack of rain after planting (+). For consideration by an individual grower, low weights were assigned according to cultivar selection, level of broadleaf weed control, and field selection. Predictions agreed well with low incidence in 1989 and low to moderate incidence in early 1990. Incomplete control is expected from single control measures, so growers are encouraged to use as many of the following as possible when risk is high. 1) Reduce sources of TSWV-carrying thrips in and near peanut fields, especially through control of *Verbesina encelioides*, a summer broadleaf weed. Plant remote and upwind from previous season diseased fields and current early planted peanuts, tomatoes, and peppers. 2) Use high seeding rates when risk is high. 3) Consider thrips management suggestions by entomologists. It may be adequate when risk is not high to treat only southern and southeastern portions of late planted fields due to the onset of prevailing winds. 4) Choose a resistant cultivar. Southern Runner and GK-7 have partial resistance to TSWV. Florunner and Langley are intermediate and Tamrun 88 is highly susceptible.

The Infection of Groundnut by Tomato Spotted Wilt in India and its Control. J. W. Demski* and D.V.R. Reddy, Department of Plant Pathology, University of Georgia, Georgia Experiment Station, Griffin, GA 30223 and Legumes Virology, ICRISAT, Patancheru 502 324, Andhra Pradesh, India.

In the late 1960's and early 1970's numerous diseases of groundnut, described as bud blight, bud necrosis, bunchy top, chlorosis, ring mosaic and ring mottle, were reported from India. In the late 1970's, accurate identification of tomato spotted wilt virus (TSWV) was made which may be the causal agent of many of the above diseases. TSWV is found in all groundnut growing areas of India with incidence up to 80%. Field mapping and survey data supported the thought that infected groundnut plants were the result of a continual source of primary infection; however, this is currently being re-exaimined to determine if some secondary spread also occurs. Two species of thrips vectors, *Thrips palmi* and *Frankliniella schultzei* were often found in groundnut fields. The best method of control would be the use of groundnut lines with immunity to the virus; however, none have been identified (over 7000 tested). Therefore a package approach of disease management to limit disease loss has been developed. Some groundnut lines such as ICGV 86029 and 86031 have consistent lower TSWV incidence compared to susceptible lines. Both these genotypes were shown to be resistant to TSWV in laboratory tests. In India high and frequent doses of dimethoate were needed to reduce TSWV incidence. Early sowing of groundnut so the plants are well established before the mass migration of thrips has resulted in less TSWV incidence. High density stands of groundnut with closed canopies sustain less losses. The elimination of weeds that are primary sources of TSWV from the vicinity of groundnut fields will reduce TSWV incidence. Nevertheless this is not a practical measure in India. Biological control using various predators on thrips requires further study.

Trends In TSWV On Peanut In The Southeast. J.C. FRENCH, Alabama Cooperative Extension Service, Department of Entomology, Auburn University, Auburn University, AL 36849-5629.

Tomato spotted wilt virus (TSWV) was first found infecting peanuts in the United States in Texas in 1971. It was not a major economic problem until 1984. It continued to cause major economic problems in Texas in 1985 and 1986 and has been a sporadic problem since that time.

TSWV was first found infecting peanuts in the Southeastern Peanut Belt in 1986. It was found rather generally in Alabama and Florida that year. It was considered to be of economic importance in only a few isolated fields. Georgia reported only one infected plant located on the Coastal Plain Experiment Station in 1986. Mississippi only grows a few thousand acres of peanuts but reported as high as 80 percent yield reduction due to TSWV in 1986. Annual surveys since 1986 revealed that the incidence of TSWV on peanuts continues to be more widespread in the Southeast. Georgia reported that several fields were economically damaged in 1989 and 100% of the fields surveyed were infected. South Carolina conducted a survey in 1989 that revealed 52% of the fields infected at very low levels.

This potentially devastating disease is widespread throughout the Southeastern Peanut Belt and is beginning to infect peanuts in the Virginia-Carolina area. It has been confirmed as a pest of numerous ornamental and vegetable crops throughout both areas.

Tomato Spotted Wilt Virus in Louisiana. L. L. Black, Plant Pathology and Crop Physiology, Louisiana State University, Baton Rouge, LA 70803.

Tomato spotted wilt virus (TSWV) in recent years has caused severe economic losses to producers of tomato, pepper, and tobacco in Louisiana. The virus was first identified in the state during 1972. The disease was found to be widespread in the state during the early 1970's, but incidence of TSWV-infected plants in fields surveyed did not exceed 3%. From 1975 to 1981, incidence of the disease increased, and it was not uncommon to find crop fields with 15% of the plants infected. In 1982, TSWV incidence in solanaceous crops was higher than any previous year, with fields in some production areas averaging 30% and individual fields as high as 60%. TSWV-incidence fluctuated at lower levels from 1983 to 1987 before it peaked at an all time high in 1988, with fields in some production areas averaging 50% and individual fields as high as 75%. Disease incidence declined statewide during 1989 and 1990 with the highest levels detected being 55% and 37%, respectively. Weed species growing in the vacinity of solanaceous crops that were found to be infected with TSWV include: sow-thistle, wild lettuce, wild verbena, black-eyed susan, buttercup, black seeded plantain, dandelion, thorny pigweed, wild poinsettia, wild quinine, horsenettle, morning glory, and black nightshade. The winter weeds, sow-thistle, wild lettuce, and buttercup are thought to be the most likely hosts in which TSWV overwinters in Louisiana. These weeds are abundant in April and May at the time spring solanaceous crops are transplanted to the fields. Thrips species caught in water pan traps located in crop fields over a 3-yr period listed in order from the most to least abundant are: *Frankliniella tritici*, *Thrips tabaci*, *F. fusca*, *Sericothrips variabilis*, *Microcephalothrips abdominalis*, and *F. occidentalis*. Of these only *T. tabaci*, *F. fusca*, and *F. occidentalis* have been reported to be TSWV vectors. The abundance of only *F. fusca* was significantly correlated with TSWV incidence in fields throughout the state, suggesting this thrips to be the main vector in Louisiana. Thrips begin to appear in the traps in April; their numbers peak in May and then decline to very low levels by early June. TSWV symptoms begin to appear in crop plants about mid-April and additional plants develop symptoms until about mid-June.

SYMPOSIUM: CHALLENGES OF THE 1990's

What Shellers are Doing to Prepare for the 1990's. M. STIMPERT. Golden Peanut Company, Atlanta, GA 30342.

Clear honest communications between all industry segments are needed. During the eighties shellers improved their product "in house" by using new equipment, new eyes, etc. In the nineties the pressure to improve is increasing. Changes in the shelling plant alone will not solve all the problems facing shellers. We must work at entire peanut production process. We must achieve the goals which consumers have given to us - to achieve a tasty nutritious, economic, safe, convenient product. We need to fully and effectively communicate to our research and extension people what the industry goals are and how they can most effectively help meet those goals. Our objectives should include reducing the incidence of aflatoxin and make its appearance more predictable, and lower the PAC limits, from 20 to 15, 10 and 5. Methodology: HPLC and sample size. Second we need to eliminate foreign material, improve flavor and nutritional characteristics and shelf life and improve appearance (size, color, damage and split content). Reduce subjectivity in grading farmer stock. Improve economics of peanut production and consumption. Reduce pesticide residues. Develop better detection methodology for aflatoxin, find the causes and prevention methods for aflatoxin. Work to quantify aflatoxin growth in storage and determine shelling plant capabilities to handle various levels of incoming aflatoxin. Develop new systems for foreign material separation. Dangerous items like glass and nutsedge tubers have to be removed entirely 100% of this time. Current systems are not capable of this level of accuracy and dependability. Formulate new methods for shellers. New packaging and handling techniques. Ways to store shelled stock at ambient temperatures are needed. What are the health issues? Improve farm harvesting and handling equipment. A typical ton of farmer stock has 70,000 pieces of foreign material. Now we get it down to 10-12 pieces. Study economic and environmental impact of systems changes such as increasing use of irrigation. New uses for hulls - this would increase margins. Reduce chemical residues. We need to involve consumer activities in finding cost effective methods to reduce food safety risks. The goal of society is a clean environment and a reasonably priced, safe food supply. The consumer is requiring us to accomplish more in the nineties than we have in the past four decades combined.

What Growers are Doing to Prepare for the 1990's. J. BLITCH. Blitch Place Partners, Statesboro, GA 30458.

The number one priority growers now have is to convince Congress that a supply management system is the best program for the entire peanut industry and consumers. Georgia growers know that to grow peanuts profitably they must be sold and therefore Georgia peanut growers invest over $800,000 per year promoting peanut sales through numerous channels. Quality is the only thing we have to sell and feel good applied research gives them one of the few competitive advantage they have today in the market. They work at increasing Federal, State and other resources for research dollars. We see a great need for a systems research approach. We need to gear our research in a whole farm situation. We need to know what we are doing to the microflora of our soil. We need a good growth regulator, a better peanut shell, more disease resistance, better weed control schemes, a longer harvest season, controls for flower and fruiting, biocompetative agents. Every avenue must be explored to eliminate aflatoxin.

Ecological Effects Assessment of Pesticides. R. C. PETRIE. U.S. EPA, Environmental Fate and Effects Division, Washington, DC 20460

Under the 1988 FIFRA amendment, Congress mandated that EPA would reregister all pesticides on an accountable time-table and that pesticide registrants would be charged a yearly pesticide maintenance fee. Of the 45,000 products formerly registered (representing about 600 active ingredients), about 20,000 have been dropped due to failure to pay. EPA is reviewing the remaining 25,000 products (approximately 400 active ingredients) for data gaps and expect this process to be completed by 1992. In addition to reregistration activities we will be reviewing new chemicals and biologicals, experimental use permits, emergency exemptions, state registrations, and special review actions amounting to over 700 actions per year. In the Environmental Fate and Effects Division we review data submitted mostly by registrants to EPA and use the information to conduct ecological risk assessments. Studies are validated and an assessment of likely hazard is made. In our assessment of likely hazard to non-target plants and animals we consider the ecotoxicological hazard of the pesticide to selected test species and the potential fate and transport of the pesticide in the environment be it by aerial drift, surface runoff, or downward movement. We then determine if the pesticide label and conditions of use are adequate or if restrictions on sites of application, soil type, equipment methods, maximum rates per acre, maximum number of treatments per year, etc. are necessary. We then determine if any endangered/threatened species are at risk and if we should limit pesticide use at the county level to avoid exposure. Other regulatory actions can include suspension, cancellation, and restricted use classification. When the laboratory studies indicate a significant hazard we then turn to field effects data such as mesocosms and monitoring. We may also require pesticide deposition and groundwater sampling. We also use incident reports from field contacts, EPA Regional Offices, and the Fish and Wildlife Service. Ways to minimize pesticide environmental effects: Have a complete environmental fate data base from which we can all make informed decisions prior to registration or reregistration. IPM programs may want to consider effects beyond the treated field.

We encourage the use of IPM and biological controls and increased efforts in the area of pesticide field effects monitoring.

Non-Target Impacts of Agriculture. R. LOWRANCE. USDA-ARS, Southeast Watershed Research Unit, Tifton, GA 31793.

Non-target impacts of agriculture can be due to pesticides, nutrients, sediment, gaseous emissions, or other sources. These non-target impacts can be classified as either environmental quality effects or non-target organism effects. Environmental quality effects receive considerable attention, primarily because of concerns about water quality. Effects on non-target organisms are also important and include both soil organisms and organisms which co-exist in agricultural landscapes and which may move in and out of production areas. The pesticides used in peanuts and other crops can have significant effects on both types of non-target organisms. The effects of insecticides on soil organisms vary depending on the class of compound. Pyrethroids have some antimicrobial activity in soil, but soils generally recover within four weeks. In general, pyrethroids have almost no effect on larger soil fauna such as earthworms. In contrast, the organophosphates kill many soil animals, especially predatory mites and collembola. Some organophosphates, such as parathion, dyfonate, and thimet are toxic to earthworms. All the carbamate insecticides are toxic to nematodes and many, such as carbofuran, are toxic to earthworms. In general, soils must be reinvaded by many non-target groups after application of carbamates. Fungicides also affect soil microbial populations, although many are relatively non-toxic to soil bacteria. The dithiocarbamate and dicarboximide fungicides tend to inhibit nitrification in soils. Studies of forest ecosystems have shown that small mammal populations can be substantially reduced after spraying with certain organophosphates and carbamates. Among the organophosphates, malathion is probably the safest compound for birds. In a study on quail habitat in southwest Georgia, a heavy mortality of birds in 1987 closely paralleled 7 applications of organophosphates and carbamates to peanut and cotton fields. Land use changes which lead to less forest in agricultural landscapes and more discontinuities along forest corridors may lead to more mortality among mobile vertebrates. In many southeastern agricultural areas, riparian (streamside) forests become the only vertebrate habitat available. Understanding how landscape structure controls movements of vertebrates into fields can help minimize non-target impacts of pesticides.

Attitudes and Outlook of the U.S. Market and What Manufacturers are Doing to Prepare for the 1990's. A. RACZYNSKI. The Procter & Gamble Company, Cincinnati, OH 45224.

The two major issues facing peanuts throughout the decade are chemical residues and aflatoxin. The EPA groundwater, the EPA drinking water and the National Academy of Science study on pesticides in the diets of infants and children are likely to focus more attention on agriculture use of pesticides. The NAS study is focusing on the risks associated with the use of alachlor, aldicarb, benlate, captan, daminozide, manzate, etu, atrazine and the combined risks of atrazine and nitrates, organophosphates and carbamates, captan and benomyl, and pyrethroids and organophosphates. "Inerts" are also of concern, particularly compounds like benzene, hydrazine, etu, aniline and toluene. The science of toxicology is changing. Developmental toxicology and delayed new neurotoxicity questions need addressing. Stricter pesticide legislation on the Federal (the Bush Pesticide Initiative) and State (Proposition 65 and the Environmental Protection Act of 1990) continues to be introduced. The peanut industry will probably lose some pesticides. We will have pesticide reform and negligible risk.

Attitudes and Outlook of the European Market. J. B. JOHNSON. Birdsong Peanuts, Suffolk, VA 23434.

World markets are undergoing dramatic and fundamental changes. The potential for U.S. peanuts in the world market is great, but is depends on quality. In 1987 the U.S. exported 127,267 MT of kernel. During the first six months of the 1989 crop, 154,128 MT were exported. Our T.E.A. program is working. One of the key reasons for this growth is the emergence of the European Community - a single unified market of 12 countries and 346 million people. Per capita consumption of peanuts in the UK is 3.78 pounds per person, France consumes 1.78 pounds per person and Italy 0.82 pounds. Another emerging market is Eastern Europe and the Soviet Union. These eight countries have 426 million people, and their per capita consumption of peanuts is only 0.5 pounds per person. To sell to the major buyers, these markets we must have a competitive price, quality and supply continuity, and we must eliminate aflatoxin.

Future Changes in State Regulation and Certification. L. L. SCHROEDER. Entomology & Pesticides Division, Georgia Department of Agriculture, Atlanta, GA 30334.

Groundwater, endangered species, worker protection and cancellation of pesticides are some of the issues we deal with at the State Department of Agriculture. In our latest groundwater survey of 50 shallow wells for six pesticides no detectable residues were found. Another study is now being conducted. Groundwater management plans are likely for certain pesticides to protect highly vulnerable areas of the state. One important regulatory tool the state has is a section 18 or emergency exemption. Over the past five we have dealt with at least 1 emergency exemption request for peanuts each year. An important area regulators need is information on pesticide use in peanuts, how many acres are treated. Certification programs such a organic certification and low input certification are being looked at. Workers safety and endangered species regulations are about a year away. A national task force, to address pesticide labeling issues has been formed and will be dealing with special generic labeling issues.

SOCIETY BUSINESS

Opening Remarks by the President at the 1990 Business Meeting of APRES

J. C. WYNNE

Good morning ladies and gentlemen. Welcome to the awards presentation and annual business meeting of APRES.

Thank you for making this meeting a big success. On behalf of the society, I would like to extend my sincere appreciation and thanks to those who organized and worked to make this meeting and its related events possible. First, I would like to recognize the program committee chaired by Dr. Ron Henning, the local arrangement committee chaired by Alex Csinos, the technical program committee chaired by Corley Holbrook, and the spouses program committee chaired by Ms. Lucia Csinos. On behalf of the society, I want to thank and recognize those who contributed so generously to make this meeting so enjoyable. The contributors to the 1990 meeting were listed on page 32 of the program.

I want to give special recognition and thanks to the organizations who sponsored our social events:

Rhone-Poulenc - Ice Cream Social on Tuesday Night
Fermenta ASC Corp. - Social on Wednesday Night
Monsanto Agric. Co. - Breakfast on Thursday Morning
Uniroyal Chemical and Dow Elanco - Barbecue on Thursday Night
Valent USA - Breakfast Friday Morning

Before we present the awards and complete the business of APRES, I would like to make a few brief comments about the society. Last year, our now past-president, Hassan Melouk, said that APRES was a young but solid professional society. The society is relatively young but it already has many significant achievements to its credit. The goal of this society is to exchange information that will ultimately result in the increased use of peanuts. The society has had 22 outstanding meetings and has published the proceedings of each meeting. APRES has published two books which have become the standard reference for peanuts. The society publishes a quality refereed journal (Peanut Science) which is envied by many other groups. The society publishes a newsletter (Peanut Research) which provides up-to-date news and research accomplishments. The society has published a methods to measure quality manual--26 methods. The society has achieved much and you as a member have much to be proud of.

As the society has matured, it is now recognizing those members who have made significant contributions to the society and the peanut industry. The society is involved with selecting the National Peanut Council Research and Education Award, selecting fellows of the society each year, selecting a Bailey Award winner each year for the best paper from the annual meeting, and last year added the Joe Sugg Graduate Student Award which recognizes the best graduate student paper. Seventeen papers were submitted this year. We will also initiate the Coyt Wilson Distinguished Service Award this year. These awards recognize contributions to the society and industry and help promote peanuts.

This is a unique society composed of representatives from industry, growers, researchers, and the extension service.

As we heard in our opening session, this is a time to work together to promote agriculture and the peanut industry. I encourage you as members to suggest creative and innovative ways that we can enhance cooperation through information exchange at this meeting.

It has been an honor to serve as your president during the past year. After having worked with our Executive Officer Ron Sholar, his assistant Brenda Louderback, and the Board of Directors, I can say with confidence that the affairs of the society are in good hands. Thank you for your support and cooperation during the past year. I look forward to continuing to work with you to see APRES continue to meet its goal of promoting the peanut.

Thank you.

AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY
BOARD OF DIRECTORS MEETING
EVERGREEN CONFERENCE CENTER
Stone Mountain, GA
July 10, 1990

1. **Meeting was called to order by President Johnny Wynne at 7:30 p.m.**
   Those present were: Ron Sholar, David Dougherty, C. Edward Ashdown, Floyd Adamsen, Gale Buchanan, John Beasley, Craig Kvien, Charles Simpson, William Branch, John Haney, Tom Whitaker, Freddie McIntosh, Benny Rogerson, Ronald Henning, Hassan Melouk, and Johnny Wynne.

2. **Old Business**

   a. **Minutes of Past Board Meeting** - Ron Sholar, Executive Officer.
   Minutes of 1989 meeting were published in 1989 Proceedings.

   b. **Executive Officer Report** - Ron Sholar.
   The Executive Officer's report was presented on finances and membership of the society. The Executive Officer reported that APRES has had a slight decline in institutional and foreign membership. Current membership is approximately 600. Approximately 250 people have registered for the 1990 meeting with a total registration of 350 expected before the end of the meeting.

   c. **American Society of Agronomy Liaison Report** - W. D. Branch
   The 81st meeting of the ASA was held October 15-20, 1989 in Las Vegas, NV. Twenty three hundred papers were presented with about half being poster papers. Five poster papers were presented on peanuts with APRES members being authors on 14 papers. The 1990 meeting will be October 21-26, 1990 in San Antonio, TX.

   d. **Southern Agricultural Experiment Station Directors Report** - G. A. Buchanan.
   Dr. Buchanan reported that Southern Agricultural Experiment Station Directors are attempting to get peanut quota restored for experimentation and research. SRIEG 23 on insects in peanuts is very active and increased effort will be put on soil fertility for peanuts. A separate SRIEG has not been established but this will be a subgroup of another effort on soil-plant analysis. Dr. Buchanan reported that Experiment Station Directors nationwide are working on getting increased funding for a national research initiative. This is a $500 million effort and would be in a competitive mode. Dr. Buchanan also made comments on the importance and activities of CAST (Council for Agricultural Science and Technology).

3. **New Business**

   a. **Nominating Committee Report** - Hassan Melouk
   Officer nominations for the 1990-91 year are:
   President-elect - Charles Simpson, Texas
   State Employees Representative - Gene Sullivan, North Carolina
   USDA Representative - Tim Sanders, Georgia
   Industry (Production) Representative - Dwayne Bishop, Georgia

   b. **Finance Committee Report** - David Doughtery
   The APRES Proposed budget for 1990-91 was distributed. The budget showed that the Finance Committee budgeted $51,650 for the next year. Of this amount, $20,825 is budgeted for Peanut Science. The budget includes a line item amount

of $2000 for an "on-line computer search" of data bases and periodic literature for peanut references. The Publications Committee requested this amount at the request of Dr. Craig Kvien who would perform the on-line computer search. The report was accepted and then a general discussion on the budget was held.

Concern was expressed by several Board members that all checks should have the signatures of both the President and the Executive Officer; however, almost one-half of the budget is expended by the Peanut Science editor with only one signature.

Ron Sholar explained some of the items in the budget.

Concern was expressed that for the 1990 meeting, funds raised for supporting the meeting were collected by the host state, deposited in a local bank account, and were then expended by the Local Arrangements Committee. The Board indicated they desired that for future meetings, funds collected by the Local Arrangements Committee be forwarded to the Executive Officer and all invoices/bills be paid by that officer.

Tom Whitaker questioned whether spending for Quality Methods would be restricted to only the $100 budgeted in 1990-91. President Wynne and Finance Committee Chair David Dougherty, indicated that this only reflects the amount that has been spent recently and more could be spent if a need develops (i.e., new methods are written).

A question was raised about why the APRES fiscal year ends on June 30. There appear to be advantages and disadvantages to this fiscal year. At one time, the society's fiscal year was on a calendar year basis but the change was made as it appeared to more advantageous.

The budget was accepted as presented.

c. **Peanut Quality Committee Report** - Tom Whitaker

Paul Blankenship met with the Peanut Quality Committee and reported on a pilot project which is a feasibility study to determine if farmer stock peanuts can be tested chemically for aflatoxin at the buying point. This project is being funded in the amount of $100,000 by the Research Foundation of the National Peanut Council. The Peanut Quality Committee voted to go on record as supportive of this effort and suggested that the APRES Board do the same.

Dr. Whitaker reported that Dr. Sam Ahmed has resigned as Editor of "Quality Methods". Dr. Tim Sanders has been selected as the new editor. The Peanut Quality Committee is very concerned that Quality Methods not be allowed to die. The report was accepted.

Discussion was held on the appropriateness of the APRES Board voting to express support for the pilot aflatoxin testing project funded by the NPC. It was agreed that an expression of support for an individual research project would not be a good idea and no vote was taken on this proposal.

d. **Public Relations Committee Report** - John Beasley

The Committee looked into necrology and unusual cases of service to APRES. Necrology resolutions will be offered at the business meeting for Mr. J. B. Roddenberry, Sr. of Georgia and Mr. Harvard R. Birdsong of Virginia.

The committee reported that they are editing and updating the "old" APRES brochure. Chairman Beasley questioned who would handle printing of a new brochure. President Wynne indicated the Publications Committee should handle printing and it would be distributed by the Executive Officer. The Board indicated they wanted to approve any changes to and updating of the brochure.

e. **National Peanut Council Research and Education Award Report** - Walton Mozingo

Walton Mozingo gave the report in the absence of Chairman Dick Cole. The winner for 1990 was Dr. Gene Sullivan of North Carolina State University.

Dr. Wynne indicated that he was looking into some problems with the composition of the NPC award selection committee. The southwest is under-represented due to only one APRES member being a previous winner.

f. **Fellows Committee Report** - Don Smith
Three APRES members were nominated and were approved by the Fellows Committee. The report was accepted but the actual selectees will require approval by the Board of Directors in executive session.

g. **Bailey Award Committee Report** - Craig Kvien
Nine papers were nominated for this award with manuscripts submitted for six papers. A full report is included in the Proceedings.

h. **Site Selection Committee Report** - Alex Csinos
Dr. Csinos discussed the future locations for APRES annual meetings and meeting dates:

1991 - Hilton Palacio del Rio, San Antonio, TX,
July 9-12, 1991 (contract has been signed)

1992 - Omni International Hotel, Norfolk, VA
July 7-10, 1992 (contract has been signed)

1993 - Hilton, Huntsville, AL
July 13-16, 1993 (contract has not been signed)

Copies of all contracts are available from the committee.

Committee report was accepted.

i. **Publications and Editorial Committee** - Don Smith
1) Dr. Smith discussed the budget line item request for the "on line computer search" of data bases. Craig Kvien described the need to obtain some financial assistance with this project. He is currently doing this out of his Experiment Station Budget. The peanut citations are published in Peanut Research. The request is for up to $2000 per year.

2) The Committee recommended appointment of Tim Sanders as Editor of the Quality Methods manual.

3) The Committee recommended appointment of Jay Williams, Georgia and Joe Funderburk, Florida as new associate editors of Peanut Science (3 year terms).

4) The committee recommended appointment of Floyd Adamsen, Craig Kvien, Fred Shokes, and Charles Simpson for additional 3 year terms as Associate Editors of Peanut Science.

Recommendations 1 through 4 were approved by the Board of Directors.

5) The committee recommended publication of a new book similar to Peanut Science and Technology with a publication date of 1994 and that Harold Pattee be appointed as editor. A question was raised as to whether 1994 is a realistic date for publication of a new book. The Board of Directors voted down the motion to publish a new book in 1994, however, the President will request that the Publications and Editorial Committee study the desirability and need for publishing a new book. The committee will determine if a new book is needed, who should

publish, determine time frame for publication, cost, and study capability of publisher.

j. **Program Committee Report** - Ron Henning

Corley Holbrook reported that 135 abstracts are included in the program. Dr. Holbrook stated a problem developed because there are no guidelines for preparation of abstracts (i.e. scientific names and units of measure). He recommended that guidelines for abstract preparation be developed.

Dr. Holbrook also indicated that there were problems with scheduling the Graduate Student Competition to avoid conflict with other sessions and to find judges who would be willing to devote a full day to judging the graduate student competition. He also indicated there were problems with scheduling four concurrent sessions which were necessitated by the large number of papers for the 1990 meeting.

Dr. Csinos reported on meeting registration. Previous record registration is 330 at Mobile, AL in 1984 and 330 at Virginia Beach, VA in 1985.

k. **Other Business**

Ad Hoc Committee Study on Board of Directors Composition -

President Wynne initiated discussion on the ad hoc committee report on the composition of the Board of Directors. The ad hoc committee chaired by Dr. Dan Gorbet had recommended at the 1989 annual meeting that the APRES Board of Directors be increased by two members in the area of "state employee representative." This will result in three Board representatives in this category and will better reflect the composition of the society membership. President Wynne indicated a vote on this change could not take place until 1990 and that this proposal will be voted on at the business meeting on July 13, 1990.

Coyt T. Wilson Distinguished Service Award - Walt Mozingo

Five nominations were made for the award. Announcement of the winner of this award will be made at the business meeting.

Mr. Mozingo indicated that no length of term has been established for committee members and President Wynne responded that length of term should be three years. Mr. Mozingo recommended the following time frame be adopted for selecting the Coyt T. Wilson award winner.

February 15 - Nominations due to committee chair
April 1 - Committee selects winner to permit plaque to be made by May 1

The Board of Directors discussed making the Coyt T. Wilson Distinguished Service Award selection committee a standing committee and a part of the By-Laws. This will require a change to the By-Laws and will be voted on by the membership at the annual meeting in 1991. The Board voted to ask the President to designate a committee to develop additional guidelines for selecting the Coyt T. Wilson Distinguished Service Award winner. After development, these guidelines will be published in the Proceedings but will not be a part of the By-Laws. This action will permit the guidelines to be changed without changing the By-Laws.

President Wynne indicated that the society has a problem with the composition of the National Peanut Council Research and Education Award Committee. The Southwest production area has insufficient former winners to be properly represented on the committee. President Wynne also proposed that an ad hoc committee is needed to study how the graduate student competition should fit into the overall meeting. President Wynne indicated that an ad hoc committee should study the length of the annual meeting. President Wynne indicated that an ad hoc committee should be appointed to study the By-laws and recommend changes.

The Board discussed the desirability of having all checks issued by the society being signed by both the President and Executive Officer. The Board voted to make this a requirement for all future expenditures. The Board directed the Executive Officer to work with the Editor of Peanut Science to establish a workable solution to accomplish this change.

The Board of Directors approved appointment of the following ad hoc committees:

a. Ad Hoc Committee to Develop Guidelines for the Technical Program Committee - This committee will establish guidelines to be used in preparation of the abstracts for paper presentation at the annual meeting. The committee will address units of measure, scientific names, etc. Report to the President with recommendations by February 1, 1991.

b. Ad Hoc Committee to Study Annual Meeting Length, Meeting Reorganization, and Graduate Student Competition - This committee will study whether the annual meeting should be extended, paper presentation should start earlier in the meeting, and the appropriate time for holding the graduate student competition. The committee will study whether the graduate student competition should be integrated into the overall meeting or will remain a separate activity. Report to the President with recommendations by January 15, 1991.

c. Ad Hoc Committee of Four Past Presidents to Study the By-Laws and Recommend Changes - This committee will recommend changes to the By-Laws. This committee will include in their study whether the Coyt T. Wilson Distinguished Service Award Committee should be a standing committee as part of the By-Laws (same as Bailey Award Committee and Fellows Committee). Guidelines for selection could be included in Proceedings without being part of the By-Laws. This committee will also study the composition of the National Peanut Council Research and Education Award Committee and recommend changes as appropriate. At this time, the southwest production area has insufficient former winners to be adequately represented on this committee. Report to the President with recommendations by February 1, 1991.

d. Editorial and Publications Committee to Study Desirability and Need to Publish New Book - This committee will determine if a new book is needed, who should publish, time frame for publication, cost, and study capability of publishers. Report to the President with recommendations by February 1, 1991.

The Board went into executive session and voted to approve the following:

Fellows: Ruth Ann Taber - Texas A&M University
Jim Kirby - Oklahoma State University
Walton Mozingo - Virginia Tech University

Bailey Award: J. M. Bennett, University of Florida

Coyt T. Wilson Distinguished Service Award:
Don Smith - Texas A&M University

The Board of Directors adjourned at 10:17 p.m.

MINUTES OF THE REGULAR BUSINESS MEETING OF THE AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY

July 13, 1990

The meeting was called to order at 8:45 a.m. by President Johnny Wynne. The following items of business were transacted:

Executive Officer Report - Ron Sholar
Old Business:

President Wynne called for any old business to be brought to the attention of the society. Dan Gorbet of Florida moved that the recommendation of the ad hoc committee to study the composition of the Board of Directors be implemented. This report presented to the Board in 1989 had recommended that two members from the "state employee representative" category be added to the Board resulting in three members from this category. This change would better reflect the composition of the APRES membership. A vote on this report could not be taken until 1990. The motion passes without opposition and two state employee representatives will be added at the 1991 meeting.

The following committee reports were made. Reports are printed in the Proceedings.

Finance Committee - David Dougherty
Nominating Committee - Hassan Melouk
  President-elect - Charles Simpson
  State Employee Representative - Gene Sullivan
  USDA Representative - Tim Sanders
  Industry Representative (Production) - Dwayne Bishop
  National Peanut Council - Ed Ashdown
Peanut Quality Committee - Tom Whitaker
Public Relations Committee - John Beasley
Coyt T. Wilson Committee - Walton Mozingo
Fellows Committee -Johnny Wynne
  Three were selected: James Kirby
    Ruth Ann Taber
    Walton Mozingo
Joe Sugg Graduate Student Outstanding Paper Award - Floyd Adamsen - 17 papers presented.
  Winner - Ramon Cu, VPI
Bailey Award Committee - Craig Kvien
Site Selection Committee - Alex Csinos
  1991 - San Antonio, TX, July 9-12
  1992 - Norfolk, VA, July 7-10
  1993 - Huntsville, AL, July 13-16
Publications and Editorial Committee - Don Smith
  Corley Holbrook - Peanut Research
  Harold Pattee - Peanut Science
Program Committee - Ron Henning

FINANCE COMMITTEE REPORT

The Finance Committee met at 3 PM on July 10th, 1990 at the Evergreen Conference Center, Stone Mountain, GA, with members David Dougherty, Terry Coffelt, and O.D. Smith present.

Ron Sholar, Executive Officer of APRES, submitted the financial statement for the 1989-90 fiscal year. The committee reviewed the statement and used it, the budget from Harold Pattee, Peanut Science Editor, and advice from the Executive Officer as a basis for setting the 1990-91 proposed budget.

Harold Pattee submitted a financial summary of the past year for Peanut Science along with the budget for the coming year.

The committee made a recommendation to the Board of Directors that the major expenses of Peanut Science, primarily publication costs, be paid directly from the APRES account by the Executive Officer. In the past, the Peanut Science Editor had a separate account which spent a significant portion of the overall APRES budget.

Respectfully submitted

D. E. Dougherty, Chairman
T. Coffelt
O. D. Smith

PEANUT SCIENCE BUDGET
1990-91

Number of Issues 2 (July-December, 1990; January-June, 1991)

Estimates:
Pages - 120
Cost per page - $85.00

<u>Expenditures</u>

Printing and Reprint Costs	$12,000.00
Editorial Assistance	6,000.00
Miscellaneous Expenses	1,000.00
Office Supplies	750.00
Postage - Domestic	750.00
- International	1,200.00
Total	$21,700.00

<u>Income</u>

Page and Reprint Charges	$11,750.00
International Mailings	1,200.00
APRES Member Subscriptions (485 x $13.00)	6,305.00
Library Subscriptions (85 x $15.00)	1,275.00
Total	$20,530.00

AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY
BUDGET 1990-91

RECEIPTS	1990-91
Registration	$12,000
Membership	16,500
Special Contributions (host state)	3,000
Differential Postage Assessment	2,000
Peanut Science & Technology	1,200
Quality Methods Book	100
Proceedings and Reprint Sales	100
Peanut Science Page Charges & Reprints	11,750
Interest	5,000
TOTAL RECEIPTS	$51,650

EXPENDITURES	
Annual Meeting	$ 4,500
Membership CAST	650
Office Supplies	1,100
Secretarial Services	10,200
Postage	3,500
Travel - Officers	1,200
Legal Fees	500
Proceedings - Printing & Reprints	2,800
Peanut Science	20,825
Peanut Science and Technology	250
Peanut Research	2,600
Quality Methods	100
Bank Charges	150
Miscellaneous	1,000
On-line Computer Search Capability	2,000
Reserve	275
TOTAL EXPENDITURES	$51,650

Excess Receipts over Expenditures	0

BALANCE SHEET FOR FY 1990-91

ASSETS	June 30, 1990	June 30, 1989
Petty Cash Fund	$ 55.56	$ 216.61
Cash in Checking Account	13,587.41	16,514.69
Certificate of Deposit #1	16,073.44	14,828.38
Certificate of Deposit #2	10,411.80	9,619.11
Certificate of Deposit #3	9,722.68	8,967.41
Certificate of Deposit #4	25,044.52	23,000.00
Money Market Account	6,218.38	5,811.62
Savings Account (Wallace Bailey)	1,195.41	1,199.43
Inventory of Books	28,929.60	31,501.12
TOTAL ASSETS	$ 111,238.80	$ 111,658.37
LIABILITIES		
None	$ 0.00	$ 0.00
FUND BALANCE	$ 111,238.80	$ 111,658.37
TOTAL LIABILITIES AND FUND BALANCE	$ 111,238.80	$ 111,658.37

AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY

Statement of Activity for Year Ending

RECEIPTS	June 30, 1990	June 30, 1989
Registration	$ 10,699.00	$ 8,549.00
Membership	15,917.00	16,458.00
Special Contributions	0.00	0.00
Differential Postage	1,889.00	1,823.00
Ladies Activities	751.95	1,765.40
Peanut Science and Technology	1,882.49	3,229.75
Quality Methods	85.00	149.25
Proceedings & Reprint Sales	130.01	86.00
Peanut Science Page Charges & Reprints	11,475.00	11,082.75
Checking Account Interest	876.71	1,141.15
Savings Account Interest (W. Bailey)	78.98	79.65
Money Market Account Interest	406.76	1,194.91
Certificate of Deposit #1 Interest	1,245.06	963.27
Certificate of Deposit #2 Interest	792.69	680.97
Certificate of Deposit #3 Interest	755.27	618.79
Certificate of Deposit #4 New and Interest	2,044.52	23,000.00
TOTAL RECEIPTS	$ 49,029.44	75,846.89

EXPENDITURES		
Annual Meeting	$ 5,275.41	6,452.26
Membership	613.60	0.00
Office Supplies	828.81	859.43
Secretarial Services	9,600.00	9,030.00
Postage	3,157.26	2,048.80
(minus petty cash fund balance)	(55.56)	(216.61)
Travel - Officers	687.00	709.94
Corporation Registration	55.00	55.00
Legal Fees	200.00	1,530.00
Sales Tax	44.30	50.50
Proceedings	2,322.62	1,868.52
Peanut Science	22,000.00	17,500.00
Peanut Science & Technology	81.84	57.15
Peanut Research	1,558.43	2,678.29
Quality Methods	0.00	0.00
Bank Charges	145.17	143.25
Money Market Account	0.00	15,000.00
Certificate(s) of Deposit	0.00	0.00
Miscellaneous	64.00	8,716.61
TOTAL EXPENDITURES	$ 46,577.88	$ 66,483.14
EXCESS RECEIPTS OVER EXPENDITURES	2,396.00	9,383.75

Cash in Checking Account:

July 1, 1988 - $18,897.64 June 30, 1989 - $16,514.69

July 1, 1989 - $16,514.69 June 30, 1990 - $13,587.41

PEANUT SCIENCE AND TECHNOLOGY

SALES REPORT AND INVENTORY ADJUSTMENT

1989-90

	# of books sold	Remaining inventory
Beginning inventory 1372		
1st Quarter	25	1347
2nd Quarter	37	1310
3rd Quarter	24	1286
4th Quarter	25	1261
TOTAL BOOKS SOLD	111	
BOOKS LOST IN SHIPPING	1	1260

112 books sold x $22.96 = $2,571.52 decrease in value of book inventory

1260 remaining books x $22.96 (book value) = $28,929.60 total value of remaining book inventory

Fiscal year	# of books sold
1985-86	102
1986-87	77
1987-88	204
1988-89	136
1989-90	112

NOMINATING COMMITTEE REPORT

The following individuals as active members of APRES have agreed to accept nominations and serve if elected as follows:

1) President-elect - Charles E. Simpson
2) Industry Representative (Production) - T. Duane Bishop
3) State Employee Representative - Gene Sullivan
4) USDA Representative - Timothy H. Sanders
5) National Peanut Council President - C. Edward Ashdown
6) Executive Officer - J. Ron Sholar

Respectfully submitted,

H. A. Melouk, Chair
D. Knauft
H. Hagwood

PUBLIC RELATIONS COMMITTEE REPORT

The Public Relations Committee of APRES met at 1:00 p.m. on July 10, 1990 in the Barberry Room of the Evergreen Conference Center at Stone Mountain, GA. Members present were Ed Colburn, Danny Colvin and John Beasley.

There were two primary orders of business the committee addressed.

In the area of necrology, we are sad to report the loss of two individuals whose faithful service contributed greatly to the peanut industry. We, therefore, have the two following resolutions:

Whereas, Harvard R. Birdsong was one of the founders and served as President and Chairman of the Board of Birdsong Peanuts until the time of his death, and

Whereas, Birdsong Peanuts is located in all three peanut producing regions of the United States, and

Whereas, Mr. Birdsong was very civic minded and served the city of Suffolk, Virginia in many capacities.

Be it resolved the American Peanut Research and Education Society remembers the life and contributions of Harvard R. Birdsong to the peanut industry.

The second resolution is as follows:

Whereas, Julian Bostich Roddenberry, Sr. was President of W. B. Roddenberry Company, which was founded by his father W. B. Roddenberry and celebrated its 100th anniversary in 1989, and

Whereas W. B. Roddenberry Company is known for its peanut butter and canned boiled peanuts, and

Whereas J. B. Roddenberry Sr., provided loyal and faithful service to the community of Cairo, Georgia, and to the peanut industry.

Be it resolved that the American Peanut Research and Education Society remembers the life and contributions of J. B. Roddenberry, Sr.

The committee also discussed the current APRES brochure. It was felt that the promotional brochure needed substantial updating and editing. Committee members reviewed the brochure and made initial changes and suggestions. Once completed, the revised brochure will be sent to the board of directors for approval. These brochures can be used by society members to promote APRES and recruit new members.

Respectfully submitted,

John Beasley, Chair
Ed Colburn
Danny Colvin

PUBLICATIONS AND EDITORIAL COMMITTEE REPORT

William D. Branch, Jerry M. Bennett, C. Corley Holbrook, Darold L. Ketring, Craig Kvien, Harold E. Pattee, James R. Sholar, Donald H. Smith, Peter Valenti, and Thomas B. Whitaker participated in this meeting.

The following reports were presented and approved: Peanut Research (Craig Kvien and C. Corley Holbrook); Peanut Science (Harold E. Pattee); APRES Proceedings (James R. Sholar).

The committee submitted the following recommendations for consideration by the Board of Directors:

1) Allocate funds to pay for the on-line literature search for the literature citations that are published in each issue of Peanut Research, with a maximum of $2,000 per fiscal year.

2) Appoint E. Jay Williams and Joe E. Funderburk as Associate Editors of Peanut Science. Appoint Floyd J. Adamsen, Craig Kvien, F. M. Shokes, and Charles E. Simpson to serve an additional three year term as Associate Editors of Peanut Science.

3) Publish a new APRES book with a format similar to Peanut Science and Technology with a tentative publication date of 1995. Appoint Harold E. Pattee as editor of the book.

4) Appoint Timothy H. Sanders as Editor of APRES Peanut Quality Methods.

Respectfully submitted,

Donald H. Smith, Chair
T. B. Whitaker
J. M. Bennett
D. L. Ketring
P. Valenti
W. Branch

PEANUT QUALITY COMMITTEE REPORT

The Peanut Quality Committee met July 10, 1990 at 3:00 p.m. Five committee members and about 25 visitors were present.

Paul Blankenship, USDA-ARS, described a pilot study to determine the feasibility of testing farmers stock peanuts for aflatoxin. The study will be implemented this crop year at five buying points. The study is being funded by the NPC Peanut Foundation, USDA, and various segments of the peanut industry. The Peanut Quality Committee unanimously indicated its support for the pilot study.

Harold Pattee, USDA-ARS, described the "Alcohol Meter" which can be used to detect peanuts that either have freeze damage or were subjected to elevated temperatures. The meter can be used as a grading tool or to provide information to shellers and other processors about the flavor quality of peanuts. Dr. Pattee was encouraged to describe the alcohol meter and its use in the Methods manual.

Esam Ahmed has notified APRES of his resignation as Editor of the Peanut Methods Manual. The Quality Committee fully supports the nomination, made by the Publications and Editorial Committee, of Timothy Sanders as the new Editor of the Methods Manual. The Quality Committee re-affirmed the need to continue publishing methods and to provide support to the new editor in his efforts to have additional methods published in the manual.

Respectfully submitted,

Thomas B. Whitaker, Chair
P. Blankenship
J. Grichar
J. Kirby
M. Grice
T. Sanders

PROGRAM COMMITTEE REPORT

A record 355 persons registered for the 1990 annual meeting of the American Peanut Research and Education Society held at the Evergreen Conference Center, Stone Mountain, Georgia, July 10-13, 1990. Working committees chaired by Dr. Alex Csinos (Local Arrangements Committee), Dr. Corley Holbrook (Technical Committee) and Mrs. Lucia Csinos (Spouses Program Committee) did an outstanding job in planning and executing the meeting. A big "thank you" to the members of these committees. Members are listed for your information.

A record total of 135 volunteer papers were presented including 17 graduate student papers and 2 symposia. In addition, a manufacturers symposium on Aflatoxin Control was presented.

Tremendous industry support was given to the meeting as evidenced by the prpoduct and cash donations. Peanut products were donated by the following U.S. manufacturers: Rodenberry, Best Foods, Tara Foods, Tom's Foods, M&M Mars, Hershey Chocolate USA, Peanut Factory and the Georgia Peanut Commission. In addition to product, cash contributions totaling $6000 were received. A special word of appreciation is due to these folks. Contributors are listed in the program.

Also, the following Allied Industries paid for the various meal functions: Rhone Poulenc (ice cream social), Fermenta (catfish dinner), Monsanto (breakfast), Uniroyal/Dow Elanco (bar-b-que) and Valent (business meeting breakfast). A total of 2,140 persons attended these meal functions.

Gratitude is expressed to these firms for their support. We value your help greatly.

The spouses program featured visits to Atlanta Botanical Gardens and a tour of Historic Atlanta as well as a stop at the newly reopened Underground Atlanta in addition to hosting the ladies hospitality suite.

Congratulations to the 1990 APRES committees for a job well done!

Respectively submitted,

Ronald J. Henning
Program Chair

<u>Local Arrangements</u>

Alex Csinos, Chair
John Baldwin
Dewane Bishop
Ford Eastin
Dennis Hale
Gearldean Harris
Emory Murphy
Forrest Nutter
Anne Rice
Richard Rudolph

<u>Technical Program</u>

Corley Holbrook, Chair
John Baldwin
John Beasley
Rodney Beaver
Tim Brenneman
Joe Chamberlin
Albert Culbreath
Carroll Johnson
Craig Kvien
Jim Noe
Danny Rodgers
Tim Sanders
John Troeger
Dave Wilson

<u>Spouse's Program</u>

Lucia Csinos, Chair
Edna Eastin
Sally Griffith
Cathy Andrews
Betty Henning
Anne Rice

1990 PROGRAM

BOARD OF DIRECTORS
1989 - 1990

President Johnny C. Wynne
President-Elect .... Ronald J. Henning
Executive Officer .... J. Ron Sholar
Past President .... Hassan A. Melouk
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USDA Representative .... Floyd J. Adamsen
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Shelling, Marketing, Storage .... Freddie McIntosh
Manufactured Products .... John Haney
National Peanut Council President .... C. Edward Ashdown

PROGRAM COMMITTEE .... **Ronald J. Henning, Chairman**

Local Arrangements

Alex Csinos, Chmn.
John Baldwin
Dewane Bishop
Ford Eastin
Dennis Hale
Gearldean Harris
Emory Murphy
Forrest Nutter
Anne Rice
Richard Rudolph

Technical Program

Corley Holbrook, Chmn.
John Baldwin
John Beasley
Rodney Beaver
Tim Brenneman
Joe Chamberlin
Albert Culbreath
Carroll Johnson
Craig Kvien
Jim Noe
Danny Rodgers
Tim Sanders
John Troeger
Dave Wilson

SPOUSE'S PROGRAM

Lucia Csinos, Chairperson
Edna Eastin
Sally Griffith
Cathy Andrews
Betty Henning
Anne Rice

PROGRAM HIGHLIGHTS

Monday, July 9

9:00-5:00 Peanut Descriptor Workshop and Peanut Crop Advisory Committee Meeting to be Held at the Regional Plant Introduction Station, Griffin, GA

1:00-4:00 National Peanut Council Seminar on Aflatoxin Control Technology—Salon D

Tuesday, July 10

8:30-12:00 NPC Seminar on Aflatoxin Control Technology .... Salon D

12:00-8:00 APRES Registration

12:00-8:00 Spouses Registration & Hospitality Committee, Board and Other Meetings

Committee, Board and Other Meetings

1:00-2:00 Associate Editors
(PEANUT SCIENCE) .... Magnolia
Public Relations .... Barberry
APRES-CAST .... Juniper

2:00-3:00 Publications & Editorials .... Rhododendron
Bailey Award .... Wintergreen
Site Selection .... Cranberry

3:00-4:00 Finance .... Rhododendron
Peanut Quality .... Wintergreen

4:00-5:00 Integrated Pest Management Roundtable Discussion .... Magnolia

5:00-7:00 Peanut Systems Working Group .... Wintergreen

7:00-8:30 Board of Directors .... Rhododendron

8:00-10:00 Rhone-Poulenc ICE CREAM SOCIAL .... Pool Area

Wednesday, July 11

8:00-12:00 APRES Registration
Spouses Registration

8:00-10:00 Spouses Hospitality

9:30-5:00 Industry Exhibits .... Prefunction, Area 2

8:00-10:00 General Session .... Salon ABC&D

8:00 Call to Order .... Johnny Wynne
Invocation .... Ron Henning

8:10 Welcome to State of Georgia .... Max Cleland, Secretary of State, Georgia

8:20 Welcome and Opening Remarks .... William P. Flatt, Dean
.... College of Agriculture, University of Georgia

8:35 "The Challenges of the Extension Service in the 90s" .... C. Wayne Jordan
.... Director, Georgia Cooperative Extension Service

8:50 "Research in Peanuts: A Necessity for Survival" .... Gale A. Buchanan
.... Resident Director, Coastal Plain Experiment Station, Tifton

9:05 "The Voice of the Consumer" Keynote Address .... Jim Kelly
.... Assoc Product Supply Manager, Procter and Gamble Co.

9:30	Announcements	
	A.S. Csinos	Local Arrangements
	C.C. Holbrook	Technical Program
10:30-12:00	Breeding and Genetics	Laurel Room
10:45-12:00	Processing & Utilization	Salon A&B
10:30-12:00	Plant Pathology	Salon E&F
10:30-12:00	Graduate Student Competition Papers	Salon G
1:15-4:30	SYMPOSIUM: Tomato Spotted Wilt Virus	Laurel Room
1:15-4:30	Breeding and Genetics	Salon E&F
1:00-4:00	Graduate Student Competition Papers	Salon G
8:00-10:00	Fermenta ASC Corporation SOCIAL	The Deck

Thursday, July 12

7:00-8:00	Monsanto Agr. Co. BREAKFAST	
8:00-11:45	Plant Pathology	Laurel Room
8:00-10:00	Entomology and Nematology	Salon A&B
8:30-10:30	Physiology and Seed Technology	Salon E&F
8:30-11:15	Harvest & Handling	Salon G
10:15-12:00	Mycotoxins	Salon A&B
10:45-11:45	Economics	Salon E&F
1:15-4:20	SYMPOSIUM: Challenges of 1990's	Laurel Room
1:30-3:45	Weed Science	Salon A&B
1:00-4:30	Production and Extension Technology	Salon E&F
6:30-8:30	Uniroyal Chemical and DowElanco BARBECUE	Lakeside Pavillion
8:30	River Boat Ride to LASERSHOW	Stone Mountain

Friday, July 13

7:30-8:30	Valent USA BREAKFAST	
	APRES Awards Ceremony	Ballroom ABC&D
8:30-10:00	Business Meeting	Ballroom ABC&C
10:30-12:00	Peanut Systems Working Group	Wintergreen
10:30-4:00	Peanut CRSP	Salon E

PAPER PRESENTATION SESSIONS

Wednesday, July 11

Breeding and Genetics .... **Laurel Room**

Moderator: D.A. Knauft, Univ. of Florida, Gainesville, FL

10:30 (1) Inheritance of Resistance to Sclerotinia minor in Selected Spanish Peanut Crosses. **L.G. Wildman, O.D. Smith*, R.A. Taber, and C.E. Simpson,** Dept. of Soil & Crop Sciences, and Dept. of Plant Pathology & Microbiology, Texas A&M Univ., College Station, TX 77843, and TAMU Res. & Ext. Center, Stephenville, TX 76401.

10:45 (2) Mechanical Inoculation to Study Resistance to Groundnut Rosette Virus in Groundnut (Peanut). **P.E. Olorunju, C.W. Kuhn, J.W. Demski*, O.A. Ansa, and S.M. Misari,** Institute for Agricultural Research, Ahmadu Bello University, Zaria, Nigeria; Division of Plant Pathology, University of Georgia, Athens, GA 30602.

11:00 (3) Field and Greenhouse Techniques for Evaluating Peanut Genotypes for Resistance to White Mold (Sclerotium rolfsii). **C.C. Holbrook*, A.S. Csinos and T.B. Brenneman,** USDA-ARS and Dept. of Plant Pathology, University of Georgia, Coastal Plain Experiment Station, Tifton, GA 31793.

11:15 (4) Response of Peanut Genotypes to Interference from Common Cocklebur. **W.W. Fiebig*, T.G. Shilling, and D.A. Knauft,** Dept. of Agronomy, University of Florida, Gainesville, FL 32611.

11:30 (5) Responses of Genotypes of Peanut to Meloidogyne arenaria and a Complex of Soil-borne Diseases. **D.W. Dickson*, D.J. Mitchell, D.W. Gorbet and D.A. Knauft,** Institute of Food and Agricultural Sciences, University of Florida, Gainesville, 32611.

11:45 (6) Characterization of the Resistance of TP-135 to Meloidogyne arenaria. **J.L. Starr*, and C.E. Simpson,** Dept. Plant Pathology and Microbiology, Texas A&M University, College Station, TX 77843; Texas Agricultural Experiment Station, Stephenville, TX 76401.

Processing and Utilization .... **Salon A&B**

Moderator: J.R. Vercellotti, USDA-ARS, New Orleans, LA

10:45 (7) Effect of Maturity on Roasting Characteristics of Florunner Peanuts. **J.A. Lansdsen*, T.H. Sanders, J.R. Vercellotti and K.L. Crippen,** USDA-ARS, National Peanut Research Laboratory, Dawson, GA 31742; USDA-ARS, Southern Regional Research Center, New Orleans, LA 70179.

11:00 (8) Functional Properties of Peanut Flour and Peanut-fortified Sorghum Flour. **U. Singh* and B. Singh,** Dept. of Food Science & Animal Industries, Alabama A&M University, Normal, AL 35762.

11:15 (9) Utilization of Peanut Flour for Preparation of Sorghum-based 'Toe'. **T. Koleosho*, U. Singh, and B. Singh,** Dept. of Food Science & Animal Industries, Alabama A&M University, Normal, AL 35762.

11:30 (10) Comparison of Peanut Butter Color Determination by CIELAB L*a*b* and Hunter Color-Difference Methods and the Relationship of Roasted Peanut Color to Roasted Peanut Flavor Attribute Response. **H.E. Pattee*, F.G. Giesbrecht and C.T. Young,** USDA-ARS; Dept. of Statistics; Dept. of Food Science, North Carolina State University, Raleigh, NC 27695.

11:45 (11) The Birth and Growth of the Commercial Peanut Butter Industry. **Clyde T. Young,** Dept. of Food Science, North Carolina State University, Raleigh, NC 27695.

Plant Pathology .... Salon E&F

Moderator: A.K. Culbreath, Univ. of Georgia, Tifton, GA

10:30 (12) Effect of the Herbicides Ethalfluralin and Vernolate on the Net-blotch Disease of Peanut Pods. **Y. Ben-Yephet*, S. Mhameed, Z.R. Frank, and J. Katan,** Dept. of Plant Pathology, A.R.D., The Volcani Center, Bet Dagon, Israel; Dept. of Plant Pathology and Microbiology, The Hebrew Univ. of Jerusalem, Faculty of Agriculture, Rehovot, Israel.

10:45 (13) Effects of Different Parts of Rye Plants on Yield and Populations of Rhizoctonia solani anastomosis Groups 4 and 2 Type 2 in Peanut Shells. **D.K. Bell*, D.R. Sumner and R.D. Hankinson, Jr.,** Dept. of Plant Pathology, University of Georgia, Coastal Plain Experiment Station, Tifton, GA 31793.

11:00 (14) Status of Sclerotinia minor in Commercial Peanut Seed Lots from Oklahoma. **H.A. Melouk*, C. Bowen and K.E. Jackson,** USDA-ARS and Dept. of Plant Pathology, Oklahoma State University, Stillwater, OK 74078.

11:15 (15) Prediction of Sclerotinia Blight of Peanut Outbreaks Based on Soil Temperature at 5 cm. **T.A. Lee, Jr.*, K.E. Woodard and C.E. Simpson,** Texas Agricultural Extension Service, Texas Agricultural Experiment Station, Stephenville, Texas 76401.

11:30 (16) Potential Benefit of Chemical Management of Sclerotinia Blight in Peanut. **K.E. Jackson*, and H.A. Melouk,** Dept. of Plant Pathology and USDA-ARS, Oklahoma State University, Stillwater, OK 74078.

11:45 (17) Pathogenicity of a Dicarboximide-Resistant Isolate of Sclerotinia minor to Peanut in Microplots Treated with Fungicides. **F.D. Smith*, P.M. Phipps and R.J. Stipes,** Virginia Polytechnic Institute and State University, Tidewater Agricultural Experiment Station, Suffolk, VA 23437.

Graduate Student Papers .... Salon G

10:30 (18) Nitrate Assimilation and Its Inhibitory Effect on Nodulation and Nitrogen Fixation in Peanut. **S.B. Stanfill*, R. Wells, D.W. Israel, and T.W. Rufty,** Crop Sci. Dept, Soil Sci. Dept., and USDA-ARS, N.C. State Univ., Raleigh NC 27695.

10:45 (19) Mechanical Inoculation of Tomato Spotted Wilt Virus on Peanut. **T.E. Clemente*, A.K. Weissinger and M.K. Beute.** Depts. of Plant Pathology and Crop Science, North Carolina State University, Raleigh, NC 27695.

11:00 (20) Evaluation of Tip Culture, Thermotherapy and Chemotherapy for Elimination of Peanut Mottle Virus. **W.Q. Chen* and J.L. Sherwood**, Dept. of Plant Pathology, Oklahoma State University, Stillwater, OK 74078.

11:15 (21) Comparison of Green Leaf Area Index, Dry Weight, Disease Intensity and Percent Reflectance Measurements as Inputs for Modeling Yield Losses in Peanuts. **A.A. Almihanna* and F.W. Nutter, Jr.**, Dept. of Plant Pathology, University of Georgia, Athens 30602.

11:30 (22) The Effect of Fungicide and Cultivar Selection on Performance of the Virginia Peanut Leafspot Advisory Program. **R.M. Cu*, P.M. Phipps, and R.J. Stipes**, Tidewater Agr. Exp. St., VPI & SU, Suffolk, VA 23437.

11:45 (23) Possible Role of Pods in Seasonal Fluctuations of Pythium Spp. Populations in Peanut Soil. **R.K. Soufi* and A.B. Filonow**, Dept. of Plant Pathology, Oklahoma State University, Stillwater, OK 74078.

SYMPOSIUM: Tomato Spotted Wilt Virus .... Laurel Room

1:15 Opening Remarks - J.W. Demski, Chairman

1:20 (24) Trends in TSWV on Peanut in the Southeast. **J.C. French**, Auburn University, AL 36849.

1:40 (25) Methods for Detection of TSWV. **J.L. Sherwood**, Oklahoma State University, Plant Pathology, Stillwater, OK 74078.

2:00 (26) TSWV on Vegetable Crops. **R.D. Gitaitis**, University of Georgia, Plant Pathology, Coastal Plain Experiment Station, Tifton, GA 31793.

2:20 (27) TSWV in Louisiana. **L.L. Black**, Louisiana State University, Plant Pathology and Crop Physiology, Baton Rouge, LA 70803.

2:40 Break

3:00 (28) Predicting TSWV in South Texas Peanuts. **M.C. Black**, Texas A&M University, AREC, P.O. Box 1849, Uvalde, TX 78802.

3:20 (29) TSWV Epidemics on Peanut. **J.W Demski and Rgahava Reddy**, University of Georgia, Plant Pathology, Griffin, GA 30223; and ICRISAT/AGINSPO - 11E, 809 United Nations Plaza, New York, NY 10017.

3:40 (30) Thrips as a Vector for TSWV. **J.W. Todd**, University of Georgia, Entomology, Coastal Plain Experiment Station, Tifton, GA 31793.

4:00 (31) Epidemiology of TSWV on Peanut. **A.K. Culbreath**, University of Georgia, Plant Pathology, Coastal Plain Experiment Station, Tifton, GA 31793.

4:20 Discussion

Breeding and Genetics .... **Salon E&F**

Moderator: W.D. Branch, Univ. of Georgia, Tifton, GA

1:15 (32) Quantifying Late Leafspot in Resistant Peanut Genotypes with Visual and Reflectance-based Assessments. **F.M. Shokes*, D.W. Gorbet, and F.W. Nutter,** No. Florida Research and Education Center, Quincy, FL 32351; Agric. Research and Education Center, Marianna, FL 32446; and Dept. of Plant Pathology, University of Georgia, Athens, GA 30601

1:30 (33) Peanut Genotype Effects on Occurrence of Cercospora arachidicola and Cercosporidium personatum in North Carolina. **B.B. Shew*, and M.K. Beute,** Depts. of Crop Science and Plant Pathology, North Carolina State University, Raleigh, NC 27695.

1:45 (34) Causes of Yield Stability in Peanut. **D.A. Knauft*, C.C. Holbrook, K.J. Boote, and D.W. Gorbet,** Dept. of Agronomy, Univ. of Florida, Gainesville, FL 32611; USDA-ARS, Coastal Plain Experiment Station, Tifton, GA 31793; Dept. of Agronomy, Univ. of Florida, Gainesville, FL 32611; and Agricultural Research and Education Center, Marianna, FL 32446.

2:00 (35) Stability of the Florigiant Peanut Cultivar and its Component Lines in Ten Environments. **T.A. Coffelt* and R.L. Wilson, Jr.,** USDA-ARS, Suffolk, VA 23437 and Athens, GA 30613.

2:15 (36) Combining Ability Estimates for Maturity and Agronomic Traits in Peanut. **Naazar Ali*, J.C. Wynne and J.P. Murphy,** Dept. of Crop Science, North Carolina State Univ., Raleigh, NC 27695.

2:30 (37) Genetic Occurrence of Cytoplasmic Albino Peanut Seedlings. **W.D. Branch* and C.S. Kvien,** University of Georgia, Dept. of Agronomy, Coastal Plain Experiment Station, Tifton, GA 31793.

2:45 Break

3:00 (38) Isozyme Variability Among Arachis Species. **H.T. Stalker*, T.M. Jones and J.P. Murphy,** Dept. of Crop Science, North Carolina State Univ., Raleigh, NC 27695.

3:15 (39) RFLP Analysis of Peanut Cultivars and Wild Species. **G. Kochert*, and W.D. Branch,** Dept. of Botany, University of Georgia; Dept. of Agronomy, Coastal Plain Experiment Station, University of Georgia.

3:30 (40) Incompatibility During Late Embryogeny in Some Crosses of Arahis hypogaea x A. stenosperma and the Utility of Three Tissue Culture Methods for Hybrid Rescue. **P. Ozias-Akins* and W.D. Branch,** Dept. of Horticulture and Dept. of Agronomy, University of Georgia, Coastal Plain Experiment Station, Tifton, GA 31793.

3:45 (41) Introgression of Early Maturity into Arachis hypogaea L. **C.E. Simpson,** Texas Agric. Exp. Stn., Texas A&M Univ. System, Stephenville, TX 76401.

4:00 (42) Yield, Grade, and Leafspot Reaction of Interspecific Derived Peanut Lines. **M. Ouedraogo*, O.D. Smith, D.H. Smith and C.E. Simpson,** Dept. of Soil & Crop Sciences, Texas A&M Univ., College Station, TX 77843; TAES Agric. Res. Stn., Yoakum, TX 77995; and TAMU Res. & Ext. Center, Stephenville, TX 76401.

4:15 (43) Hand-Tripping Flowers Results in Seed Production in Arachis lignosa. **D.J. Banks,** USDA-ARS, Plant Science Research Laboratory, Stillwater, OK 74075.

Graduate Student Papers .... Salon G

1:00 (44) Analysis of Seed Storage Proteins in Arachis Species Using SDS-PAGE Electrophoresis. **C.M. Bianchi-Hall*, R.D. Keys and H.T. Stalker,** Dept. of Crop Science, North Carolina State Univ., Raleigh, NC 27695.

1:15 (45) In vitro Culture of Prequiescent Arachis hypogaea Embryos. **Tallury P.S. Rau*, H.T. Stalker and H.E. Pattee,** Crop Science Dept. and USDA-ARS, Botany Dept., North Carolina State Univ., Raleigh, NC 27695.

1:30 (46) Estimates of Heritability and Correlation Among Three Mechanisms of Resistance to Aspergillus parasiticus in Peanut. **S.D. Utomo*, W.F. Anderson, J.C. Wynne, M.K. Beute, W.M. Hagler, Jr. and G.A. Payne,** Depts. of Crop Science, Plant Pathology and Poultry Science, North Carolina State Univ., Raleigh, NC 27695.

1:45 (47) Evaluation of Peanut Genotype for Resistance to Sclerotinia minor Using Two Detached Shoot Techniques. **G.F. Chappell*, J.C. Wynne, and M.K. Beute.** Dept. of Crop Science and Dept. of Plant Pathology, North Carolina State University, Raliegh, NC 27695.

2:00 (48) The Effects of Fungicides on Yield and Grade of Florunner and Southern Runner Peanuts. **J.C. Jacobi* and P.A. Backman,** Dept. of Plant Pathology, Alabama Agricultural Experiment Station, Auburn Univeristy, AL 36849.

2:15 (49) A Response Surface Approach to Optimize Quality of Muffins Containing Peanut and Other Nonwheat Flours. **S.D. Holt*, A.V.A. Resurreccion and K.H. McWatters,** Dept. of Food Science and Technology, University of Georgia, Agricultural Experiment Station, Griffin, Georgia 30223.

2:30 Break

2:45 (50) Peanut Butter Rheology: An Assessment of Homogenization and Sugar Type and Levels in Texture Modification. **M.O. Ogwal*, J.C. Anderson and B. Singh,** Dept. of Food Science & Animal Industries, Alabama A&M University, Normal, AL 35762.

3:00 (51) Effect of Processing Conditions on the Color, Headspace Volatiles and Sensory Characteristics of Peanut Paste. **K.F. Muego* and A.V.A. Resurreccion,** Dept. of Food Science & Technology, University of Georgia Agricultural Experiment Station, Griffin, GA 30223.

3:15 (52) Physical and Sensory Qualities of Muffins Supplemented with Dried Fermented Peanut Milk. **C. Lee* and L.R. Beuchat,** Dept. of Food Science and Technology, University of Georgia, Agricultural Experiment Station, GA 30223.

3:30 (53) Density Distributions of Aflatoxin Contaminated Peanuts. **V. Gnanasekharan*, M.S. Chinnan and J.W. Dorner**, Dept. of Food Science and Technology, Georgia Agricultural Experiment Station, Griffin, GA 30223 and USDA-ARS, National Peanut Research Laboratory, Dawson, GA 31742.

3:45 (54) Resistance to Grey Mould (Botrytis cinerea) in some Peanut (Arachis hypogaea) genotypes in Zimbabwe. **Z.A. Chiteka**, Crop Breeding Institute, Dept. of Research and Specialist Services, Causeway, Harare, Zimbabwe.

Thursday, July 12

Plant Pathology .... Laurel Room

Moderator: F.M. Shokes, Univ. of Florida, Quincy, FL

8:00 (55) Reduced Rate, Narrow Band Applications of PCNB for Southern Stem Rot Control on Peanut. **A.K. Hagan* and J.R. Weeks**, Dept. of Plant Pathology and Entomology, respectively, Auburn University, AL 36849.

8:15 (56) Improved Southern Blight Control with Peanut Canopy Opener and Banded Reduced Fungicide Rates. **R.V. Sturgeon, Jr***, Plant Health Services, Inc., Stillwater, Okla. 74075.

8:30 (57) Effects of Diniconazole on Soilborne Pathogens, Aflatoxin Formation, Plant Growth, and Pod Yields of Irrigated and Nonirrigated Peanuts. **T.B. Brenneman*, D.M. Wilson, R.W. Beaver, and A.P. Murphy**, Dept. of Plant Pathology, Coastal Plain Experiment Station, University of Georgia, Tifton, GA 31793.

8:45 (58) AU-Pnut Leafspot Advisory System: Validation of Recommended Sprays. **D.P. Davis*, J.C. Jacobi, P.A. Backman, R. Rodriguez-Kabana, and T.P. Mack**, Depts. of Plant Pathology and Entomology, Auburn University, Auburn, AL 36849.

9:00 (59) Evaluation of Predictive Systems for Timing of Peanut Leafspot Fungicide Applications. **P.A. Backman*, J.C. Jacobi, and D. Davis**, Dept. of Plant Pathology, Dept. of Plant Pathology and Dept. of Entomology, Auburn University, AL 36849.

9:15 (60) Disease Pro - A Computerized Disease Assessment Training and Evaluation Program. **F.W. Nutter, Jr.* and O. Worawitlikit**, Dept. of Plant Pathology, University of Georgia, Athens 30602.

9:30 (61) Relationship of Conventional and Conservational Tillage on Incidence of Peanut Leafspot. **D.M. Porter* and F.S. Wright**, USDA-ARS, Tidewater Agricultural Experiment Station, Suffolk, VA 23437.

9:45 (62) Impact of Chemical-Use Restrictions on Disease, Weed, and Insect Management in Peanuts. **P.M. Phipps*, D.A. Herbert, J.W. Wilcut, C.W. Swann, G.G. Gallimore, and D.B. Taylor**, Tidewater Agr. Exp. Sta, VPI & SU, Suffolk, VA 23437.

10:00 Break

10:15 (63) 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 Univ., Stillwater, OK 74078; Texas Agricultural Exp. Stn., Yoakum, TX 77993; and Texas Agricultural Ext. Serv., Pearsal, TX 78061.

10:30 (64) Comparison of Tebuconazole Sensitivity in Cercosporidium personatum Populations from DMI-Treated and Non-Treated Peanuts. **M.R. Schwarz*, D.V. Marine, S. Taylor, and W.D. Rogers,** Mobay Corporation, Vero Beach, FL 32961; Mobay Research Farm, Tifton, GA 31794.

10:45 (65) Comparison of the Number of Stem Lesions Caused by Cercosporidium personatum in Florunner and Southern Runner Cultivars. **A.K. Culbreath* and T.B. Brenneman,** Dept. of Plant Pathology, University of Georgia, Coastal Plain Experiment Station, Tifton, GA 31793.

11:00 (66) The Effects of the Fungicide Propiconazole on the Groundnut Shell Mycobiota. **R.E. Baird*, T.B. Brenneman, D.K. Bell, and A.P. Murphy,** Dept. of Plant Pathology, Coastal Plain Experiment Station, University of Georgia, Tifton, GA 31793.

11:15 (67) Single and Mixed Infections of Groundnut (Peanut) with Groundnut Rosette Virus (GRV) and Groundnut Rosette Assistor Virus (GRAV). **O.A. Ansa, C.W. Kuhn*, S.M. Misari, J.W. Demski, R. Casper, and E. Breyel,** Institute for Agricultural Research, Ahmadu Bello University, Zaria, Nigeria; Division of Plant Pathology, University of Georgia, Athens, GA 30602; Federal Biological Research Center, Braunschweig, West Germany.

11:30 (68) Production of Peanut Seed Free of Peanut Mottle - and Peanut Stripe Viruses in Florida. **F.W. Zettler*, M.S. Elliot, D.E. Pureifull, and G.I. Mink,** Dept. of Plant Pathology, Univ. of Florida, Gainesville, FL 32611 and Dept. of Plant Pathology, Washington State University, Prosser, WA 99350.

Entomology and Nematology .... Salon A&B

Moderator: J.R. Chamberlin, Univ. of Georgia, Tifton, GA

8:00 (69) Effects of Tillage and Double-cropping with Wheat on Pest Management in Peanut. **N.A. Minton*, A.S. Csinos, R.E. Lynch and T.B. Brenneman,** USDA-ARS and Dept. of Plant Pathology, Coastal Plain Experiment Station, University of Georgia, Tifton, GA 31793.

8:15 (70) Influence of the Nematode Antagonist Pasteuria penetrans on Peanut Yield. **M. Oostendorp*, D.W. Dickson and D.J. Mitchell,** Dept. of Entomology and Nematology, University of Florida, Gainesville, FL 32611, and Dept. of Plant Pathology, University of Florida, Gainesville, FL 32611.

8:30 (71) Interaction of Tobacco Thrips (Frankliniella fusca), Paraquat and Mechanical Defoliation on Peanut (Arachis hypogaea) growth Quality, and Yield. **E.S. Blenk, H.M. Linker*, and H.D. Coble,** Crop Science Dept., N.C. State University, Raleigh, NC 27695.

8:45 (72) Effect of Tobacco Thrips and Herbicide Treatment on Growth and Yield of Virginia Peanut. **D.A. Herbert, Jr.*, J.W. Wilcut and C.W. Swann,** Dept. of Entomology, Dept. of Plant Pathology, Physiology and Weed Science, and Dept. of Crop and Soil Environmental Sciences, Virginia Polytechnic Institute and State University, Tidewater Agricultural Experiment Station, Suffolk,VA 23437.

9:00 (73) Effects of Aldicarb and Peanut Maturity on Survival, Feeding and Reproduction of Tobacco Thrips (Frankliniella fusca). **J.R. Chamberlin* and J.W. Todd,** Dept. of Entomology, Coastal Plain Exp. Sta., Univ. of Georgia, Tifton, GA 31793.

9:15 (74) Lesser Cornstalk Borer (Lepidoptera: Pyralidae) Larval Feeding on 20 Host Plants. **T.P. Mack*, and X.P. Huang,** Dept. of Entomology, 301 Funchess Hall, Auburn University, Ala. 36849.

9:30 (75) Effect of Timing on Prophylactic Treatments for Southern Corn Rootworm (Diabrotica undecimpunctata howardi Barber). **R.L. Brandenburg*,** Dept. of Entomology, N.C. State University, Raleigh, NC, 27695.

9:45 (76) Enhanced Aflatoxin Contamination of Peanut as a Result of Insect Damage to Pods. **R.E. Lynch*, D.M. Wilson, and B.W. Maw,** Insect Biology and Population Management Research Laboratory, USDA-ARS; Tifton, GA 31793; Mycotoxin and Tobacco Laboratory, Dept. of Plant Pathology, and Dept. of Agricultural Engineering, University of Georgia, Coastal Plain Experiment Station, Tifton, GA 31793.

Physiology and Seed Technology .... Salon E&F

Moderator: J.M. Bennett, Univ. of Florida, Gainesville, FL

8:30 (77) Peanut Roots. An Enigma? **D.L. Ketring*, and J.L. Reid,** USDA-ARS, Plant Science Research Laboratory, Cooperative with Department of Agronomy, Oklahoma State University, Stillwater, OK 74075.

8:45 (78) Changes in Seed Quality During Peanut Seed Development and Maturation. **J.M. Ferguson*,** Crop Science Dept., North Carolina State University, Raleigh, North Carolina 27695.

9:00 (79) A Comparison of Different Methods of Accelerated Aging of Peanut Seeds. **R.Z. Baalbaki* and R.D. Keys,** Dept. of Crop Science, North Carolina State University, Raleigh, NC 27695.

9:15 (80) Changes in Electrophoretic Profiles of Peanut Storage Proteins Under Different Storage Conditions and Durations. **R.D. Keys*, and R.Z. Baalbaki,** Dept. of Crop Science, North Carolina State University, Raleigh, NC 27695.

9:30 (81) Measurement of Pod Maturity Color with a Chroma Meter. **E. Jay Williams,** USDA-ARS, Coastal Plain Experiment Station, Tifton, GA 31793.

9:45 (82) On-Farm Testing of the PNUTGRO Crop Growth Model in North Florida. **K.J. Boote*, J.M. Bennett, J.W. Jones, and H.E. Jowers,** Depts. of Agronomy and Agric. Engineering, Univ. of Florida, Gainesville, FL 32611; and Florida Cooperative Extension Service, Univ. of Florida, Marianna, FL 32446.

10:00 (83) Effects of Soil Water Deficits on Physiological and Growth Responses of Peanut. **J.M. Bennett*, P.J. Sexton, and K.J. Boote**, Dept. of Agronomy, University of Florida, Gainesville, FL 32611.

10:15 (84) Sensitivity of Peanut to Temperature Change. **G. Hoogenboom*, K.J. Boote, and J.W. Jones**, Dept. of Agricultural Engineering, Georgia Station, University of Georgia, Griffin, GA 30223; and Dept. of Agronomy and Dept. of Agricultural Engineering, University of Florida, Gainesville, FL 32611.

10:30 Break

Harvesting, Curing, Shelling, Storing and Handling .... Salon G

Moderator: C.L. Butts, USDA-ARS, Dawson, GA

8:30 (85) Energy Losses From Air Leakage in Peanut Drying Trailers. **D.H. Vaughan*, J.S. Cundiff, W.F. Wilcke and F.S. Wright**, Agricultural Engineering Dept., Virginia Polytechnic Institute and State University, Blacksburg, VA 24061; USDA-ARS, Suffolk, VA 23437, and Agricultural Engineering Dept., University of Minnesota, St. Paul, MN 55108.

8:45 (86) Effects on Quality of Screening Farmers Stock Peanuts with Greater than Four Percent Loose Shelled Kernels. **P.D. Blankenship**, USDA-ARS, National Peanut Research Laboratory, Dawson, GA 31742.

9:00 (87) Systems Research to Solve Industry Problems and Implement Solutions. **James I. Davidson, Jr.***, USDA-ARS, National Peanut Research Laboratory, Dawson, GA 31742.

9:15 (88) Comparative Grade and Shelling Studies on Florunner, Sunrunner, and Southern Runner. **D.W. Gorbet*, A.J. Oswald, and D.A. Knauft**, Agri. Research and Education Center, Marianna, FL 32446; Florida Foundation Seed Producers, Inc., Greenwood, FL 32443; and Agronomy Dept., U. of Florida, Gainesville, FL 32611.

9:30 (89) Single Kernel Moisture Content Determination in Farmers Stock Peanuts. **Floyd E. Dowell*, and J.H. Powell**, USDA-ARS, National Peanut Research Laboratory, Dawson, GA 31742.

9:45 (90) The Role of Maturation in Quality of Stackpole Cured Peanuts. **T.H. Sanders*, J.A. Lansden, J.R. Vercellotti, and K.L. Crippen**, USDA-ARS, National Peanut Research Laboratory, Dawson, GA 31742; USDA-ARS, Southern Regional Research Center, New Orleans, LA 70179.

10:00 (91) Drying Peanuts in the Caribbean in a Batch Dryer Using an Inexpensive Kerosene Burner. **M.S. Chinnan* and T. Oz-Ari**, Dept. of Food Science and Technology, Georgia Agricultural Experiment Station, Griffin, GA 30223.

10:15 Break

10:30 (92) A Method for Setting the Plenum Thermostat for High Quality Peanut Curing. **J.M. Troeger**, USDA-ARS, Crop Systems Research Unit, Georgia Coastal Plain Experiment Station, Tifton, GA 31793.

10:45 (93) Environmental Monitoring of Peanut Curing to Maximize Energy Efficiency and Peanut Quality. **J.K. Sharpe*, C.S. Kvien, W.H. Yokoyama, and K. Calhoun,** Dept. of Agronomy, Univ. of Georgia, Coastal Plain Experiment Station, Tifton, GA 31793; Beatrice/Hunt-Wesson, Fullerton, CA 92633; Farmer's Fertilizer and Milling, Colquitt, GA 31737.

11:00 (94) Weighing Platforms for Automated Peanut Curing Control. **G. Vellidis*, C.D. Perry, C.S. Kvien, and J.K. Sharpe,** Agricultural Engineering Dept.; Agricultural Engineering Dept.; Agronomy Dept.; and Agronomy Dept., Coastal Plain Experiment Station, The University of Georgia, Tifton, GA 31793.

Mycotoxins .... Salon A&B

Moderator: R.W. Beaver, Univ. of Georgia, Tifton, GA

10:15 (95) Screening Peanut Genotypes for Resistance to Aflatoxin Accumulation. **D.M. Wilson*, W.D. Branch, R.W. Beaver and B. W. Maw,** Depts. of Plant Pathology, Agronomy and Agricultural Engineering; Coastal Plain Experiment Station, University of Georgia, Tifton, GA 31793.

10:30 (96) Degradation of Aflatoxins B1, B2, G1 and G2 in Solution. **R.W. Beaver* and D.M. Wilson,** Dept. of Plant Pathology, Coastal Plain Experiment Station, University of Georgia, Tifton, GA 31793.

10:45 (97) Changes in Isozyme Patterns of Aspergillus spp. Infected Peanut Cotyledons from Plants Grown Under Drought Stress. **J.B. Szerszen*, and R.E. Pettit,** Dept. of Plant Pathology and Microbiology, Texas A&M University, College Station, TX 77843.

11:00 (98) Fungicide Effectiveness for Control of Fungal Invasion and Aflatoxin Contamination in Peanut Kernels. **K.L. Bowen*, and P.A. Backman,** Dept. of Plant Pathology, Alabama Agricultural Experiment Station, Auburn, AL 36849.

11:15 (99) The Use of a Biocompetitive Agent to Control Preharvest Aflatoxin in Drought Stressed Peanuts. **J.W. Dorner*, R.J. Cole and P.D. Blankenship,** USDA-ARS, National Peanut Research Laboratory, Dawson, GA 31742.

11:30 (100) Testing Bacillus subtilis as a Possible Inhibitor in Stored Farmers Stock Peanuts. **J.S. Smith, Jr.*, J.W. Dorner and R.J. Cole,** USDA-ARS, National Peanut Research Laboratory, Dawson, GA 31742.

11:45 (101) Aspergillus flavus and A. niger Contamination of Groundnut in Niger. **F. Waliyar,** Groundnut Improvement Program, ICRISAT Sahelian Center, B.P. 12404, Niamey, Niger.

Economics .... Salon E&F

Moderator: F.D. Mills, Abilene Christian Univ., Abilene, TX

10:45 (102) Impact of Peanut Demand Factors on Peanut Farmers' Income. **D.H. Carley* and S.M. Fletcher,** Dept. of Agricultural Economics, University of Georgia, Griffin, GA 30223.

11:00 (103) Potential Impact of the Uruguay Round of GATT Negotiations on U.S. Peanut Farmers. **S.M. Fletcher* and D.H. Carley**, Dept. of Agricultural Economics, Georgia Experiment Station, The University of Georgia, Griffin, GA 30223.

11:15 (104) Peanut Market in the European Community. **K.L. Jensen and T.L. Raney***, Dept. of Agric. Economics, University of Tennessee, Knoxville, TN 37903 and USDA-ERS-ATAD, Washington, D.C. 20005.

11:30 (105) BELTCOST: A Computer Spreadsheet for Assessing the Costs of Belt Screens. **F.D. Mills, Jr.***, Dept. of Agriculture, Abilene Christian University, Abilene, TX 79699.

SYMPOSIUM:
Peanut as a Food Crop - Challenges of the 1990's .... Laurel Room

1:15 Opening Remarks .... C.K. Kvien, Chairman

1:20 (106) Public Policy and Crop Pest Management. **L. Gianessi**, Fellow, Resources for the Future, Washington, DC 20036.

1:40 (107) Non-target Impacts of Agriculture. **R. Lowrance**, USDA-ARS, Southeast Watershed Research Unit, Coastal Plain Exp. Stn. Tifton, GA 31793.

2:00 (108) Future Changes in State Regulation and Certification. **L.L. Schroeder**, Entomology and Pesticides Division, Georgia Department of Agriculture, Atlanta GA 30334.

2:20 (109) Ecological Effects Assessment of Pesticides. **R. Petrie**, U.S. EPA, Environmental Fate and Effects Division, Washington, DC 20460.

2:40 Break

3:00 (110) Attitudes and Outlook of the European Market. **J. Johnson**, Export Marketing, Birdsong Peanut, Suffolk, VA 23434.

3:20 (111) Attitudes and Outlook of the U.S. Market and What Manufacturers are Doing to Prepare for the 1990's. **A. Raczynski**, Procter and Gamble Food Safety and Nutrition, Cincinnati, OH 45224.

3:40 (112) What Shellers are Doing to Prepare for the 1990's. **M. Stimpert**, Vice President, Operations & Government Affairs, Golden Peanut Co., Atlanta, GA 30342.

4:00 (113) What Growers are Doing to Prepare for the 1990's. **J. Blitch**, Research Chairman, Georgia Peanut Commission, Statesboro, GA 30458.

4:20 Discussion

Weed Science .... **Salon A&B**

Moderator: W.C. Johnson, USDA-ARS, Tifton, GA

1:30 (114) Rate and Application Studies with Imazethapyr in Peanuts. **F.R. Walls, Jr.*, J.W. Wilcut and A.C. York,** American Cyanamid Co., Goldsboro, NC 27530; Dept. of Agronomy, Coastal Plain Exp. Stn, Tifton, GA 31793; and Crop Science Dept., North Carolina State University, Raleigh, NC 27695.

1:45 (115) Imazethapyr for Weed Control in Texas Peanuts. **W.J. Grichar*, J.H. Blalock, and A.E. Colburn,** Texas Agricultural Experiment Station, Yoakum, TX 77995, Texas Agricultural Extension Service, Dallas, TX 75252, and College Station, TX 77843.

2:00 (116) Peanut Genotypes as Affected by Paraquat Dosage and Timing. **D.L. Colvin*, D.A. Knauft, and D.W. Gorbet,** Dept. of Agronomy, University of Florida, Gainesville, FL 32611, and Agricultural Research and Education Center, University of Florida, Marianna, FL 32446.

2:15 (117) Florida Beggarweed: A Review. **S.M. Brown* and J. Cardina,** University of Georgia, Tifton, GA 31793; and Ohio Agricultural Research and Development Center, Wooster, OH 44691.

2:30 Break

2:45 (118) Timing of Postemergence Herbicides for Peanut Profitability. **C.W. Swann* and J.W. Wilcut,** Tidewater Agric. Exp. Stn., VPI & SU, Suffolk, VA 23437 and Dept. of Agronomy, Coastal Plain Exp. Stn., Tifton, GA 31793.

3:00 (119) Phytotoxicity and Peanut Recovery from Chlorimuron Tank Mixture Applications. **W.C. Johnson, III*, and S.M. Brown,** USDA-ARS, Coastal Plain Experiment Station, and University of Georgia, Tifton, GA 31793.

3:15 (120) Cracking and Postemergence Herbicide Combinations for Weed Control in Virginia Peanuts. **J.W. Wilcut* and F.R. Walls,** Dept. of Agronomy, Coastal Plain Exp. Stn., Tifton, GA 31793 and American Cyanamid Corp., Goldsboro, NC 27530.

3:30 (121) Weed Control in Peanut with Tycor (Ethiozin). **R.D. Rudolph, W.D. Rogers, D.M. Hunt*, and D.A. Komm,** Mobay Corp. Atlanta, GA 30349.

Production Technology/Extension Technology .... **Salon E&F**

Moderator: A.E. Colburn, Texas A&M Univ., College Sta, TX

1:00 (122) Biological and Regulatory Update of Tilt on Peanuts. **J.R. James*, J.M. Hammond, A. McMahon and H.R. Smith,** CIBA-GEIGY Corp., Greensboro, NC 27409.

1:15 (123) Control of Sclerotium rolfsii in Peanut with Broadcast Applications of Flutolanil plus Chlorothalonil. **J.R. French*, R.S. Raythatha, G.W. Harrison, and W.C. Odle,** Fermenta ASC Corp., Mentor OH 44061.

1:30 (124) Effect of Seed Size on Peanut Yield. **J.A. Baldwin*, R.D. Lee, J.P. Beasley, Jr., and E.B. Whitty,** Dept. of Extension Agronomy, University of Georgia, Tifton, GA 31793 and Dept. of Agronomy, University of Florida, Gainesville FL 32611.

1:45 (125) Water Distribution in Soil Under Peanut Irrigated With a Subsurface Micro-irrigation System. **S. Budisantoso, N.L. Powell*, and F.S. Wright,** SSIMP SUL-SEL, Sulawesi Selatan, Indonesia; VPI & SU, Tidewater Agricultural Experiment Station, Suffolk, VA 23437; and USDA-ARS, Tidewater Agricultural Experiment Station, Suffolk, VA 23437.

2:00 (126) The Influence of Irrigation Water Quality and Irrigation Method on the Mineral Composition of Peanut Tissue. **F.J. Adamsen,** USDA-ARS, Suffolk, VA 23437.

2:15 (127) The Effect of Cultivars, Planting Dates and Fungicide Treatment on Peanut Yields. **R.W. Mozingo* and D.M. Porter,** VPI & SU and USDA-ARS, Tidewater Agricultural Experiment Station, Suffolk, VA 23437.

2:30 (128) Effect of Fungicide Spray Schedule and Digging Date on Florunner and Southern Runner Peanuts. **J.P. Beasley, Jr.*, and S.S. Thompson,** Extension Agronomy and Extension Plant Pathology Depts., University of Georgia, Tifton, GA 31793.

2:45 Break

3:00 (129) Cultivar and Harvest Date Effects on Peanut Yield and Sclerotinia Blight Incidence. **J.R. Sholar* and K.E. Jackson,** Dept. of Agronomy and Dept. of Plant Pathology, Oklahoma State University, Stillwater, OK 74078.

3:15 (130) Seed Treatment with Chemicals for Breaking Dormancy of Peanut Seed. **A.K. Sinha*, and B.K. Rai,** Caribbean Agricultural Research and Development Institute, Belmopan, Belize (Central America).

3:30 (131) Effects of Herbicide/Insecticide/Fungicide Tank Mixes on Peanut. **J.R. Weeks*,** Dept. of Entomology, Auburn University, Wiregrass Experiment Station, Headland AL 36345.

3:45 (132) Zinc Toxicity Symptoms in Peanut. **J.G. Davis-Carter*, M.B. Parker, and T.P. Gaines,** Agronomy Dept., University of Georgia, Coastal Plain Experiment Station, Tifton, GA 31793.

4:00 (133) Timing and Rate of Gypsum Applications for Peanuts Grown on Sand. **G.J. Gascho*, A.K. Alva, and A.S. Csinos,** Dept. of Agronomy and Dept. of Plant Pathology, Coastal Plain Experiment Station, University of Georgia, Tifton, GA 31793.

4:15 (134) Soil-Test Calcium Calibration for Sunrunner, GK-7, and Southern Runner. **D.L. Hartzog*, and J.F. Adams,** Dept. of Agronomy and Soils, Auburn University, Auburn, AL 36849.

4:30 (135) Industry Initiatives for Environmental Stewardship with Pesticides. **L.B. Lynn,** Monsanto Agricultural Company, Marietta, GA 30062.

Contributors to the 1990 APRES Meetings

On behalf of APRES members and guests, the Program Committee thanks the following organizations for their generous contributions:

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BAILEY AWARD COMMITTEE REPORT

Nine papers were nominated for the Bailey Award at the 1989 APRES meeting held in Winston-Salem, NC. Each of the nine papers were presented by the senior author who was a member of APRES. On August 7, 1989, the senior author of the nominated paper was notified of the nomination and an original manuscript based on the presentation was requested by January 5, 1990. Six of the nine nominees responded with a manuscript. Submitted manuscripts were judged by five of the six Bailey Award Committee members (one committee member's paper was nominated and a manuscript was submitted). Papers were judged on appropriateness, originality, clarity and scientific excellence. April 9, 1990 the committee reached a consensus on the Bailey Award winner and the president, executive officer and president-elect were notified.

The 1990 recipient of the Bailey Award is "A Root-tube pegging pan technique for determining the effects of soil water in the pegging and rooting zone on peanut pod formation" by J. M. Bennett, P. J. Sexton and K. J. Boote of the Department of Agronomy, University of Florida.

Respectfully submitted,

C. S. Kvien, Chair
F. M. Shokes
F. Starr
T. Brenneman
P. Phipps
H. T. Stalker

NOMINEES FOR BAILEY AWARD 1990

1. Application of chlorothalonil via ground sprays, a center pivot irrigation system or an underslung boom for peanut disease control. T. B. Brenneman and D. R. Sumner.
2. A root tube - pegging pan technique for determining the effects of soil water in the pegging and rooting zone on peanut pod formation. J. M. Bennett, P. J. Sexton and K. J. Boote.
3. Disease assessment of peanut genotypes at commercial and breeding nursery intrarow spacings. D. A. Knauft and D. W. Gorbet.
4. Effect of planting and digging dates on yield, value and grade of four Virginia-type peanut cultivars. R. W. Mozingo and T. A. Coffelt.
5. Airflow distribution in multi-trailer peanut dryers. J. S. Cundiff, D. H. Vaughan, W. F. Wilcke, and F. S. Wright.
6. Comparison of dryer control strategies. C. L. Butts and W. D. Dykes.

Nominated but not submitted were:

1. A comparison of various quality factors between stack-cured and conventional windrowed/artificially dried peanuts. R. J. Cole.
2. Optimal timing of soil insecticide applications to peanuts. J. W. Chapin.
3. Imazethapyr for broadleaf weed control in Virginia peanuts. J. W. Wilcut.

FELLOWS COMMITTEE REPORT

Fellow award nominations were received for three respected APRES colleagues in our society: Mrs. Ruth Ann Taber, Dr. James S. Kirby, and Mr. R. Walton Mozingo.

Copies of the nominations and supporting letters were reviewed and scored for the categories specified in the printed instructions. The Fellows Commitee was unanimous in their recommendation and strongly encouraged the Board of Directors of APRES to honor these nominations.

Respectfully submitted,

J. W. Dickens, Chair
A. H. Allison
F. McGill
D. H. Smith
D. Banks

BIOGRAPHICAL SUMMARY OF FELLOWS RECIPIENTS

MRS. RUTH ANN TABER, Research Scientist, Department of Plant Pathology and Microbiology, Texas A&M University, Texas Agricultural Experiment Station, College Station, TX, has been actively engaged in research at Texas A&M since 1964. She has conducted research on identification and ecology of fungi associated with peanuts, and is a recognized authority on mycorrhizal fungi and fungal diseases of peanuts. Mrs. Taber is an expert on the anatomical details of peanut plants, especially those anatomical traits associated with disease resistance. She has authored or co-authored 133 scientific papers, book chapters, and abstracts.

Mrs. Taber has been actively involved in the activities of the American Peanut Research and Education Society, the Mycological Society of America, the Canadian Society of Phytopathology, the British Mycological Society, and the Texas Mycological Society. She has served as Associate Editor of Peanut Science, Assistant Editor of the APRES Quality Manual and on many APRES committees.

DR. JAMES S. KIRBY, Professor, Agronomy Department, Oklahoma State University, Stillwater, OK, has a research career of more than 20 years in peanut genetic, agronomic, and end-use investigations. He is widely recognized as a world authority in his area of expertise. He has collected and maintained an outstanding collection of peanut germplasm and breeding lines of cultivated peanuts. Dr. Kirby and his colleagues have developed two spanish peanut varieties that constitute over 80% of the spanish peanuts grown in Texas and Oklahoma. An improved variety of the runner type peanut for the southwestern peanut production area has recently been released. He is the author or co-author of more than 100 journal aritcles and research reports.

Dr. Kirby has been a member of APRES since it was organized and has served on numerous committees. He was President of APRES in 1979-80. Dr. Kirby is also a member of the American Society of Agronomy, the Crop Science Society of America, and the American Genetics Association. His efforts in research, education, and leadership have made outstanding contributions to the peanut industry, to Oklahoma State University, and to his community.

MR. R. WALTON MOZINGO, Associate Professor, Crop and Soil Environmental Sciences, Tidewater Agricultural Experimental Station, Virginia Polytechnic Institute and State University, Suffolk, VA, has conducted the Peanut Variety and Quality Evaluation Program for Virginia and North Carolina since 1968. Because of his outstanding leadership and research contributions the program has achieved national and international recognition. From a total of 250 varieties and advanced breeding lines tested by the program, 27 have been accepted. The peanut industry has greatly benefited from the increased yields and improved quality represented by the 19 new cultivars and 8 germplasm lines approved by the program. Mr. Mozingo is senior author of 90 and co-author of 70 publications including 34 journal articles and 42 abstracts.

Mr. Mozingo has been actively involved in APRES and has served on many committees and as Associate Editor of Peanut Science. In addition to APRES, he is a member of the American Society of Agronomy, the Crop Science Society of America, numerous other professional associations, and honorary societies. Mr. Mozingo was recipient of the 1989 National Peanut Council Research and Education Award for his contributions to peanut research.

SITE SELECTION COMMITTEE REPORT

The Site Selection Committee met on Tuesday, July 10, 1990 at 2:00 p.m. at the Evergreen Conference Center in Stone Mountain, Georgia. Members present were: William Birdsong, Thomas Lee, Charles Simpson, Scott Wright, Ron Weeks, W. W. Gregory, A. S. Csinos, and Ron Sholar (guest).

A. S. Csinos (chair for 1990) opened the meeting and asked each site search committee for each of the states, Texas, Virginia and Alabama to discuss respective locations, attractions and contracts associated with their meetings.

Future sites and committee members for APRES are:

1991 - Texas - Committee members: Chip Lee, Chair, and Charles Simpson. The date for the meeting will be July 9-12, 1991. The site will be San Antonio at the Hilton Palacio de Rio on the river walk. Confirmed room rates of $80 single/double. Children stay free.

1992 - Virginia - Committee members: William Birdsong, Scott Wright. The date for the meeting will be July 7-10, 1992. The site will be Norfolk at the Omni International Hotel. Confirmed room rates of $80 single, double, triple, quadruple.

1993 - Alabama - Committee members: G. Gregory and Ron Weeks.
Date is set tentatively for July 13-16, 1993. The tentative site is Huntsville at the Huntsville Hilton. There is no contract at this time.

Respectfully submitted,

A. S. Csinos, Chair	F. S. Wright
R. E. Lynch	B. Birdsong
T. A. Lee	J. R. Weeks
C. E. Simpson	G. Gregory

CAST LIAISON REPRESENTATIVE REPORT

The Board of Directors of the Council for Agricultural Science and Technology (CAST) met in Washington, D.C. on February 26-28. The board approved seven new topics for reports and named Stanley P. Wilson as executive vice president. CAST, a nonprofit consortium of 29 professional scientific societies in food and agriculture, compiles and publishes reports on public issues related to food and agricultural science, and provides educational material for high school science teachers.

Five topics were approved for CAST task force reports: They are:

"Public Perception of Agricultural Drugs and Chemicals." Regulatory actions pertaining to agricultural chemicals and drugs are affected by public perception and pressure applied to legislative bodies and regulatory agencies. The task force will study why the public perceives agricultural chemicals and drugs the way they do, and how realistic those perceptions are. Objectives for the task force are to determine the credibility of science with the public in the area of agricultural chemicals, to evaluate social reasons for public attitudes toward agricultural chemicals, and to compare the public perception and scientific fact.

"The Impact of Alternative Agricultural Practices on the Environment." This will be a follow-up to the CAST review of the National Research Council report, Alternative Agriculture. Key issues to be addressed are fertility practices and water quality (manure versus chemical), soil conservation and tillage practices (no-till versus conventional), pest control (biological versus chemical), genetic manipulation of plants for disease resistance, and the benefits and risks of new organisms.

"Relationship of Value-Added Activities on Agricultural Products and the U.S. Trade Balance." This report will include characterizations of U.S. exports related to the extent of processing, use of products by purchasers, defining opportunities to add value locally, economics, processed products and expansion of value-added products, pollution versus purity, research in this area, sociological factors, and who determines standards.

"Risk/Benefit Assessment of Agricultural Chemicals." Regulatory decisions concerning the use of agricultural chemicals and drugs are based on the documented benefits associated with the historical use compared to documented and perceived risks associated with continued use. This report will explain this process and its effects on the pest-management and animal-health disciplines. Objectives are to assess the status of the risk/benefit method of determining usefulness and the methods used to measure risks and benefits, and to discuss particular areas in relation to worker safety, food safety, and the environment.

"Integrated Animal Waste Management." Animal agriculture is under indictment for water pollution. Recycling of waste in integrated animal production systems approaches are needed. Objectives of the task force are to provide information on the best management practices for utilizing animal waste, to decrease the impact of undesirable runoff and residues from animal waste application, and to examine cost-effectiveness of waste disposal alternatives including value of nutrients.

Two topics were approved for the Comments from CAST series. Comments are shorter papers, designed for faster publication than task force reports.

"Pesticide Residues in Fruits and Vegetables." This publication investigates the use of pesticides for combating pests of fruits and vegetables, systems for regulating pesticide availability and legal residue tolerances, cancer risks, the enforcement system, and results of tests on fruits and vegetables.

"Contribution of Animal Products to Healthful Diets." This is designed to inform health professionals who advise consumers on dietary regimen. The objective is to provide information on the nutrient components of animal products, and to examine controversial issues as perceived by the consumer.

Keynote speakers for the meeting were Donald E. Davis, recipient of the Charles A. Black Award, and Nyle C. Brady, senior consultant for the United Nations Development Program.

CAST Releases Review of "Alternative Agriculture"

A new report from CAST provides reviews that both support and criticize the National Research Council (NRC) report, "Alternative Agriculture." These reviews were prepared by 44 leading scientists representing a broad range of disciplines. The reviewers agree that the NRC report raises several important issues that contribute to the establishment of a national dialogue and possibly a research agenda that would assure an economically viable, sustainable U.S. agricultural system. However, they caution that before major national policy shifts are instituted, further research on alternative agricultural practices is necessary.

The position of the CAST reviewers is not to defend the status quo but to support the common goal of undergirding U.S. agriculture with the technologies and infrastructure such that all resources are utilized with maximum efficiency and environmental compatibility while assuring economic competitiveness. Such an agricultural system should be sustainable. Federal farm programs should not discourage the adoption of alternative agricultural practices that meet the above criteria. The CAST review concludes that the NRC report should be viewed as a critique for adjusting, where necessary, an agricultural system that has served the United States and the world well.

The CAST review of the NRC report was written at the invitation of Representative Lee Hamilton (D-Indiana), chairman of the U.S. Congressional Joint Economic Committee. Dr. Lowell S. Jordan of the University of California, Riverside, recruited the scientists and chaired the effort. The authors represent the disciplines of agricultural engineering, food science, toxicology, animal sciences, crop and soil sciences, economics, sociology, weed science, entomology, and plant pathology.

Submitted by:

Ron Sholar
CAST Representative

AMERICAN SOCIETY OF AGRONOMY
LIAISON REPRESENTATIVE REPORT

The 81st annual meeting of the American Society of Agronomy, Crop Science Society of America, and the Soil Science Society of America was held October 15 to October 20, 1989 in Las Vegas, Nevada. Approximately 2,370 papers were presented in 272 divisional sessions, and nearly 50% of these were given as posters. Five peanut posters were presented in a breeding and genetics session. Members of APRES were authors or co-authors on some 14 total presentations involving various aspects of peanut research.

New officers of the Tri-Societies (ASA, CSSA, and SSSA) are as follows: A.A. Baltensperger, president and D.R. Nielsen, pres.-elect of ASA; S.A. Eberhart, president and V.L. Lechtenberg, pres.-elect of CSSA; and W.R. Garner, president and F.P. Miller, pres.-elect of SSSA. San Antonio, Texas will host the 1990 meetings of these three sister societies from October 21 thru 26.

Respectively submitted:

Wm. D. Branch
ASA/APRES Representative

NATIONAL PEANUT COUNCIL
RESEARCH AND EDUCATION AWARD ADVISORY COMMITTEE REPORT

The NPC Research and Education Award Advisory Commitee evaluated nominees for consideration for this year's award. Materials required for the evaluation were provided to the committee. After each member of the committee carefully reviewed all documents, input was summarized by the chairman.

The recipient for the 1990 NPC Research and Education Award was identified as Gene Sullivan of North Carolina State University.

The National Peanut Council was advised of the recommendation by the NPC Research and Education Award Advisory Committee.

Respectfully submitted,

R. Cole, Chair
T. B. Whitaker
H. E. Pattee
E. J. Williams
R. W. Mozingo

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

The Spring meeting of the Southern Association of Agricultural Experiment Station Directors was held at San Antonio, Texas, May 6-9, 1990. The Texas Agricultural Experiment Station served as host for this meeting.

Special efforts have continued to get appropriate wording in the current Farm Bill that provides for experimental quota for peanuts involved in research. It appears this is being accomplished such that reserved quota that is provided for each state can be used at the request of the director for research quota. This effort will continue to be monitored until the passage of the Farm Bill.

During the past year an effort was made to develop a soil fertility group to address peanut fertility. This was proposed as a Southern Research Information Exchange Group. Discussion within the Southern Agricultural Experiment Station Directors led to the approval of this effort as a part of the existing SRIEG-18, "Soil Test and Plant Analysis". SRIEG-23, "Peanut Insects", continues to be a very effective information exchange group dealing with many aspects of peanut entomology.

The Southern Association of Agricultural Experiment Station Directors has been highly involved in the national effort to develop support for the special funding initiative. This major initiative would provide, if fully funded, $500 million of new money for support of agricultural research.

The Southern Agricultural Experiment Station Directors continue to have a special interest in APRES and its role in supporting research in peanuts and enhancing the entire peanut industry.

Respectfully submitted,
Gale A. Buchanan

COYT T. WILSON DISTINGUISHED SERVICE AWARD IMPLEMENTATION COMMITTEE REPORT

At the 1989 meeting, the Board of Directors approved the establishment of the Coyt T. Wilson Distinguished Service Award and asked the President to appoint an implementation committee to set the guidelines and select a recipient for the first award to be presented at the 1990 meeting in Georgia.

The guidelines enclosed were established by the committee and approved by the Board of Directors by mail before distribution to the membership. Five nominations were received by the May 15 deadline and a winner chosen. Dr. Don Smith from Texas A&M University in Yoakum, Texas was selected to receive the first award. Dr. Smith served as secretary treasure of the Society for 10 years, was President and has been selected a Fellow.

Respectively submitted,

Walton Mozingo, Chairman
John Baldwin
Bill Birdsong
Gerald Harrison
Darold Ketring

JOE SUGG GRADUATE STUDENT AWARD

Seventeen papers were submitted for consideration for the Joe Sugg Graduate Student Award at the 1990 Annual Meetings. The papers were judged by a committee of five. The recipients of the 1990 Joe Sugg Graduate Student Awards were:

First Place: R. M. Cu, P. M. Phipps, and R. V. Stipes. The effect of fungicide and cultivar selection on performance of the Virginia Peanut Leafspot Advisory Program.

Second Place: T. E. Clemente, A. K. Weissinger, and M. K. Beute. Mechanical inoculation of tomato spotted wilt virus on peanut.

Respectfully submitted,

Floyd Adamsen, Chair
Johnny Wynne
Benny Rogerson
Freddie McIntosh
John Haney

Guidelines for

FELLOW ELECTIONS

AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY

Fellows

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

Eligibility of Nominators

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

Eligibility of Nominees

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

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

Nomination Procedures

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

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

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

Basis of Evaluation

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

Processing of Nominations

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

Recognition

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

Distribution of Guidelines

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

Format for

FELLOW NOMINATIONS

AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY

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

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

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

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

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

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

I. PERSONAL ACHIEVEMENTS AND RECOGNITION (10 points)

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

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

A. Research

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

B. Extension

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

C. Service to Industry

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

D. Administration or Business

Evidence of creativeness, relevance and effectiveness of administration of activities or business within or outside the U.S.A.

III. SERVICE TO THE PROFESSION (30 points)

A. Service to APRES

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

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

B. Service to the profession outside the society

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

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

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

SUPPORTING LETTERS: Three supporting letters should be included, at least two of which are from active members of the Society. The letters are solicited by, and are addressed to, the nominator, and should not be dated. Please urge those writing supporting letters not to repeat factual information that will obviously by given by the nominator, but rather to evaluate the significance of the nominee's achievements. Attach one copy of each of the three letters to each of the six copies of the nomination. Members of the Fellows Committee, the APRES Board of Directors, and the nominator are not eligible to write supporting letters.

Length of Articles Published in Peanut Science

Year	Number of Articles	Number of Pages		
		Mean	Maximum	Minimum
1974	25	3.92	8.00	2.00
1975	22	4.05	8.50	2.00
1976	23	3.98	6.50	2.00
1977	19	3.88	6.00	1.00
1978	28	3.62	9.00	2.00
1979	29	3.80	9.00	2.00
1980	29	3.96	6.75	2.00
1981	35	3.79	8.00	1.50
1982	30	3.29	5.00	2.00
1983	32	3.45	5.25	2.00
1984	32	3.38	6.00	1.50
1985	24	3.86	6.00	1.50
1986	27	3.49	6.50	2.00
1987	26	3.90	5.25	2.25
1988	26	4.02	6.25	1.25
1989	29	4.10	6.75	2.25

APRES MEMBERSHIP (1975 - 1990)

MEMBERSHIP CATEGORY	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Individual	419	363	386	383	406	386	478	470	419	421	513	455	475	455	415	416
Sustaining	21	30	29	32	32	33	39	36	30	31	29	27	26	27	24	21
Organizational	40	45	48	50	53	58	66	65	53	52	65	66	62	59	54	47
Student	–	–	14	21	27	27	31	24	30	33	40	27	34	35	28	29
Institutional	–	45	45	54	72	63	73	81	66	58	95	102	110	93	92	85
Total Members	480	483	522	540	590	567	687	676	598	595	742	677	707	669	613	598

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

ARTICLE I. NAME

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

ARTICLE II. PURPOSE

Section 1. The purpose of 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 presentation to the interested public and to promote scientific research on the properties, production, and use of the peanut by providing forums, treatises, magazines, and other forms of educational material for the publication of scientific information and research papers on the peanut and the dissemination of such information to the interested public.

ARTICLE III. MEMBERSHIP

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

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

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

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

d. Sustaining memberships: Industrial organizations and others that pay dues as fixed by the Board of Directors. Sustaining members are those who wish to support this Society financially to an extent beyond minimum requirements as set forth in Section 1c, Article III. Sustaining members may designate one representative who shall have individual member rights. Also, any organization may hold sustaining memberships for any or all of its division 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 or 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 memberships	:	$ 15.00
c. Organizational memberships	:	$ 35.00
d. Sustaining memberships	:	$ 125.00
e. Student memberships	:	$ 5.00

(Dues were set at 1987 Annual Meeting)

Section 2. Dues are receivable on or before July 1 of the year for which the membership is held. Members in arrears on July 31 for 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 discussion, and for the transaction of business. At least one general business session will be held during regular annual meetings at which reports from the executive officer and all standing committees will be given, and at which attention will be given to such other matters as the Board of Directors may designate. 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 that 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 education 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. Three State employees' representatives - these directors are those whose employment is state sponsored and whose relation to peanuts principally concerns research, and/or education, and/or regulatory pursuits. One director will be elected from each of the three main peanut producing areas.
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 of 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 appoints. 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.

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 recommendation 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 thorough 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 meting. 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 person 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 (P148-9 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 year, the award shall be made for research accomplishments and for odd-numbered years, the award will 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 two-thirds vote of the general membership. Likewise, in a similar manner, a Division may be dissolved.

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

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

ARTICLE XI. AMENDMENTS

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

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

Amended at the Annual Meeting
of the American Peanut Research
and Education Society,
July 13, 1990, Stone Mountain, GA

RESEARCH IN PEANUTS : A NECESSITY FOR SURVIVAL

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One of nature's truly great success stories is the peanut. Those of us who grew up with peanuts are quite familiar with the highly desirable qualities of this unique crop. Fortunately, the remainder of the country and most of the world are rapidly becoming aware of this rather remarkable plant.

There is probably no better model system in agriculture than the peanut to illustrate the success of science and technology. We only have to go back to the 195O's when yields of U.S. peanuts averaged less than 1,000 lbs/A. Yields climbed to over 2,000 lbs/A by 1970 and 3,000 lbs/A by 1980.

This phenomenal increase should be attributed to many factors, including creative developments from industry, innovative approaches to production, and generally favorable environmental conditions. However, the bottom line is that the peanut has been highly responsive to research and developments in technology. This has been well confirmed by the increased yields over the past 40 years.

The importance of research to the future of the peanut industry is contingent upon the fact that there are still many untapped opportunities for improvement in the peanut. The peanut is not called the "unpredictable legume" without good cause!

I'd like to digress for just a moment and talk about funding for agricultural research in general. In a recent report by the National Research Council entitled, "Investing in Research," it is stated:

> "Solving the problems of competitiveness, a high quality food supply, and natural resources and the environment will require much more new knowledge than was required to solve previous problems."

Furthermore:

> "The necessary new knowledge is unlikely to be acquired and expediently applied without substantial new funding."

Answers to such fundamental questions will neither be cheap nor within the resources currently available in the state agricultural experiment stations or USDA's Agricultural Research Service. The underfunding of agricultural research in the U.S. today is rapidly becoming a national tragedy.

Agriculture is the world's oldest and only truly essential industry. It continues to be one of the most successful industries in the U.S. Because of our extensive and abundant complement of soil, water, favorable climate, and other factors, early leaders in our country sought to develop agriculture through generous support of teaching, research and, later, extension.

Formalized agricultural research in this country began during the middle of the last century. Throughout the 18OO's there were many puzzling and unexplained phenomena occurring in American agriculture, particularly with regard to fertilizer materials, soil fertility, pests, and other problems associated with agricultural production. While no one knew the answers to many of the problems that faced farmers, there were few who failed to recognize the need to provide information to enable agriculture to be more successful. In light of these emerging problems, many states began developing agricultural research programs during the middle to the latter part of the 18OO's.

The great experiment in education of the common man provided in the Morrill Act of 1862 further illuminated the need for more information about agriculture. Such information could only be gained through a major research effort. All of these forces coalesced and resulted in the passage of the Hatch Act of 1887. This legislation provided support for an agricultural experiment station in each state. The monies provided by the Hatch Act required the states to match the federal appropriation. This requirement ensured joint ownership of experiment stations by each state, as well as providing overall coordination at the national level.

This creative, innovative, and clever approach provided for a highly successful agricultural research system that has served our farmers and all of the people of this nation well for over a hundred years. The investment in agricultural research by the U.S. government has paid great dividends over the years. Agriculture was the first major investment in research by the federal government. In fact, if we go back just 50 years, in 1940 the federal government invested 80 percent of its research and development dollars in agriculture. Today that percentage is less than two percent.

This digression serves to illustrate a brief history and the importance of the need for enhanced support of agricultural research. I'm sorry to report that the future is not bright. Doing the things that must be done is exceedingly expensive.

Individual scientists clearly know that we are only "scratching-the-surface" of what needs to be done. Those of us with broader responsibilities have even greater levels of frustration in being able to only partially satisfy the need for research in agriculture.

I'd like to further illustrate this point with a single example from the National Research Council publication mentioned previously. It's pointed out that, "Genetically engineered biocontrol agents for pest management are now being designed on the basis of current knowledge. But it will likely take a ten-fold increase in understanding of the biology of such agents and their survival and action in various ecosystems before such engineered biological control agents can be effectively developed and used. The knowledge needed must come from a number of disciplines, such as biochemistry, genetics, physiology, plant pathology, entomology, plant biology, ecosystem analysis, agronomy, and economics, among others. The specific disciplinary knowledge must then be integrated into effective production systems. The knowledge required far transcends that necessary for the current chemical based technologies."

A particularly relevant question is, "If research is so important for the future success of the peanut industry, just where are the opportunities for greatest impact?" This is a fair and particularly timely question for us to consider today. I'd like to mention just a few areas where I feel enhanced research in peanuts would pay big dividends.

Genetics and breeding

Traditional breeding efforts have already made many contributions and will continue to do so in the future. More effort is needed in employing biotechnology techniques to allow crossing peanut species which are usually not compatible. Using "embryo rescue" and various other procedures will lead to genetic improvements not possible through conventional breeding techniques. Breeding for resistance to disease, insects, and aflatoxins will undoubtedly be important areas of research. Think for a moment, what if we had a laboratory with 20 geneticists and breeders just researching the 7500 genetic lines in the peanut collection?

Fertility

Fertility research, especially calcium nutrition, is important in peanuts, particularly with regard to new peanut cultivars. We must have fully definitive answers with regard to optimum fertility for maximum yield and highest quality. We also need answers regarding toxicity of zinc and other plant nutrients.

Physiology of the Peanut Plant

Developing a better understanding of the peanut plant offers tremendous opportunities, especially as related to yield, quality, response to the environment, and various stress factors. Developments in this area will be particularly useful when research is in collaboration with the breeders and other scientists.

Irrigation

To ensure maximum production of the highest quality peanuts on a constant basis, irrigation of peanuts will continue to increase. Much research is needed to develop better computer models to predict water use and subsequent irrigation needs. Further research is needed on water table management in order to protect and preserve valuable sources of high quality ground water.

Quality and Safety

One of the most fruitful areas where research can make a difference in the success of peanuts as a crop is quality and food safety. We must do the research that eliminates all concern regarding the quality and safety of peanuts and peanut products. It makes no difference whether the concern is manmade, such as pesticides, or naturally occurring, such as aflatoxins. The market place demands and expects nutritious and wholesome food products free of all impurities. Developing more effective drying and processing systems will undoubtedly impact favorably on both reducing drying cost and improving crop quality.

Processing Technology

Developing more effective means of processing after peanuts leave the farm will of necessity require major research inputs in coming years. This effort is tied closely to quality and safety. Let me add most emphatically that to argue with the consumer is a lose/lose situation. We simply must produce what the consumer wants.

Growth Regulation

There are still opportunities for influencing peanuts through growth regulators. Of particular concern is vine growth, but there are many other ways that growth regulation could affect growth to enhance productivity.

Controlled Traffic and Tillage

Research designed to remove the incidence of traffic pan (compaction layer) could have a positive impact on plant growth. Such research, as well as conventional tillage research, could impact on infiltration rate and/or chemical movement. Environmental concerns require that we have a good understanding of such matters.

Systems Research

Systems research will be one of the most fruitful areas for peanut research in the next few years. Integrating new technologies and developing new production systems will undoubtedly lead to greater efficiency of production.

Pest Complexes

Probably the most important area of research with the greatest opportunity for enhancing peanuts as a crop is in developing more effective methods of dealing with the myriad pest complexes of peanuts. Peanuts have more than their share of pest problems. Weed scientists must learn more about the biology and ecology of weeds to develop effective means of control.

The pathologists have many challenges that must be addressed because disease problems will simply not go away. The longer these disease problems remain unsolved, the greater our quality problems will become. Only through a strong commitment to research on disease will we begin to solve our problem with quality. As the quality of the U.S. peanut increases, the future of the U.S. peanut industry will become even brighter.

Entomologists are focusing on how best to manage insect populations in peanuts. This research is not necessarily designed to maximize yields, although we're certainly not against that, but to maximize the farmer's profit and to minimize detrimental environmental impact. This will be done by combining various aspects of scientific agriculture into a system with an optimum mix of profit for the farmer and safety for the environment. Genetically engineered plants that resist disease and insect attack, combined with biologically altered insect pathogens and other plant protectants, will be added to the arsenal of integrated pest management.

One thing we must keep in mind is that our research effort dealing with pest complexes on peanuts must take into account the principles of environmentally sound agriculture. There was a time when we, who did research on pesticides, felt that pesticides could solve all of our problems. We've learned that is not necessarily true.

In the future, "IPM" will no longer be just a buzzword but will have real meaning as a delivery system for combining all aspects of pest management for the benefit of both the farmer and the consumer. The "new" IPM will embrace the concepts of cultural, chemical, and biological control, and will add the new science of biotechnology. In addition, the integration of these means will require the implementation of a new concept of an interdisciplinary systems approach and will do all this with an up-front conscious concern for both the farmer's profit and the nation's environment.

Economics and Market Development

There is little doubt that the world will continue to shrink as transportation and communication improve and nations become less hostile. Such rapidly changing environments and market places offer tremendous potential, but only for those who are able to capitalize on such opportunities.

We must have reliable and dependable production and market models if we are to be a successful competitor in the international market place. Research in economics and marketing clearly represents specific opportunities for the U.S. producer. This is another of those areas in which far greater research effort could effectively be expended if resources were available.

Summary

Few would argue that the peanut is, indeed, a very important crop for much of the southeastern United States. While there are already literally thousands of uses for peanuts, there are still many opportunities: new candy bars finding their way to the market place, a recent patent using a medium chain fatty acid for preparing a low calorie peanut butter, new uses in paints, insecticidal baits, and even breast implants. There are numerous other uses such as peanut lectins for use in detection of some cancers, peanut hulls as an energy source, pet litter, and mushroom media. However, we must not lose sight of the fact that there are many commodities that can, with varying degrees of success, replace peanuts.

Probably no crop in this country better reflects the importance of research than does the peanut. Over the past several years, peanut research has produced dividends. I remain firmly convinced that peanuts can and will remain an important and successful crop for the United States, provided we continue to maintain a strong and creative research program.

THE CHALLENGES OF THE EXTENSION SERVICE IN THE 90'S

I could speak about changing demographics; new technological advancements; funding problems; use of electronic technology to deliver information i.e, technology transfer and the pressure for Extension to assume a greater role in generating its own research – all of these are challenges.

But I submit to you that the challenges for Extension in the decade ahead are not dissimilar to the challenges of society in general. While Extension's primary roots are firmly planted in the agricultural, community, family and youth composite base, our branches are extending into the contemporary societal issues of today. Yet, some critics argue *that* Extension is not keeping pace with this change. The following quote appeared in the Futures Task Force report to the Extension Committee on Organization and Policy[1]:

> "Extension currently is failing to keep up with societal changes. The primary problem of Extension appears to be, in my opinion, its present, functioning mindset, a mindset that seems to be one of survival rather than one of potential ...Extension appears to be more concerned with management than with leadership; ...with doing things right, rather than doing the right things. As a result Extension seems to be missing much of the big picture and is beginning to slip in its role as a societal leader. To be successful in the future, Extension must decide to lead and then to do so with a vision and a boldness."

For those of us who grew up knowing the "Agricultural" Extension Service, the transition to the "Cooperative" Extension Service was tough enough, but to hear that Extension is dealing with "societal issues" can be even more disturbing. Let's take a closer look at today's issues of society. Such topics as food wholesomeness, water availability, groundwater protection, solid waste management, land use decisions, diet/health relationships, low input farming, and animal rights frequent the front pages of newspapers and add spice to our conversations.

The intertwining of certain agricultural concerns with those of society in general has become such that they are difficult--if not impossible--to untangle. More specifically, the concerns of the American Peanut Industry and its supporting research and education base can ill afford to ignore society's issues.

Just a few weeks ago the Southeastern Peanut Association sponsored a tri-state meeting with the Cooperative Extension Service around the theme of "Striving for Quality". The consensus is that the peanut industry's concept of quality must be different today because of the new dimensions of peanut quality. The keynote speaker that day stated that peanut shellers had to confess to have reached the point of maximum quality output. Yet, consumer groups and government regulations say that is not enough. So, not unlike Extension, the peanut industry and perhaps agriculture in general is finding it difficult to keep up with societal issues.

This brings me to the point about Extension's new challenge and how to deal effectively with the public's preoccupation about environment and health. Not that environment and health are unimportant, but that fear and perception make communications and understanding of facts and truth difficult.

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[1]"Extension In Transition: Bridging the Gap Between Vision and Reality: Report of the Futures Task Force to the Extension Committee on Organization and Policy, Pg. 1, November, 1987.

The Cooperative Extension Service prides itself as a source of unbiased, factual information with accompanying educational programs that are research based. But, when it comes to questions about the impact of agriculture on food safety and the environment, facts and perception often conflict. Unfortunately, in a contest between fact and perception, perception rules. That is one of Extension's greatest challenges today. Our creditability is being questioned; our objectivity is under scrutiny - in particular as it relates to a balanced agricultural production system that includes use of fertilizer and pesticides.

There is a common ground for agriculture, consumer, and environmentalist. It extends all the way from the farm to the dining table. One way to find that common ground is through improved education and communication -- that's where Extension fits in.

But communication includes listening. You and I must listen to consumer and environmental advocates and admit to them our genuine concern relative to a profitable agriculture that presents minimal threat to health and environment. Here is a sub-challenge for Extension -- developing credibility with a new and powerful consumer clientele. Their voices are being heard at the state house as well as the courthouse. We must recognize that consumers without agricultural backgrounds have problems accepting manmade risks in contrast to risks imposed by nature. Their view of risks versus benefits is heavily weighted toward the risk's side.

We must also understand that in this country, with our abundant supply of low cost food, the public concern is not with more production. In fact, there is a growing perception that the world's food supply is more than adequate and that our productive capacity should be throttled down. In light of this misconception will the public continue support for Extension to work with agriucltural production programs?

For many years, I as a practicing Agronomist sat where some of you still sit -- cloaked in the self-righteousness of knowing the scientific facts and working to help farmers find a profit through better soil, water and crop management. It is now incumbent on all of us to expand our concept of agriculture and of our responsibilities. We must combine science with common sense, science with communication and science with compromise so that farmers can have the opportunity to make a living in a socially and environmentally acceptable manner. That is the ultimate challenge to all of us.

Presented to the American Peanut Research and Education Society (APRES)
Stone Mountain, Georgia
July 11, 1990
C. Wayne Jordan, Director
The University of Georgia Cooperative Extension Service

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