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Executive Order

WHEREAS, PEANUTS ARE AN IMPORTANT ECONOMIC CROP FOR THIS NATION AND FOR MORE THAN SEVENTY OTHER COUNTRIES IN THE WORLD; AND

WHEREAS, PEANUTS ARE APPRECIATED BY YOUNG AND OLD IN THE FORMS OF SHELLED OR UNSHELLED, ROASTED OR RAW, HOME USE OR BALL PARK CONSUMPTION, SALTED, PLAIN, BLANCHED OR COATED, PEANUT CANDIES, PEANUT BUTTER AND OTHERS; AND

WHEREAS, NEW MEXICO GROWS MOST OF THE QUALITY VALENCIA PEANUTS IN THE UNITED STATES OF AMERICA, AN IMPORTANT SOURCE OF INCOME FOR THE GROWERS AND PROCESSORS AND AN ENJOYABLE AND NUTRITIOUS FOOD OR SNACK FOR THE CONSUMERS; AND

WHEREAS, AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY MEETS FOR THE FIRST TIME IN HISTORIC AND ENCHANTING ALBUQUERQUE, NEW MEXICO;

NOW, THEREFORE, I, HARRY E. KINNEY, MAYOR OF THE CITY OF ALBUQUERQUE, DO HEREBY PROCLAIM

JULY 12 THROUGH 18, 1982

"PEANUT RESEARCH AND EDUCATION WEEK"

IN ALBUQUERQUE, AND URGE ALL CITIZENS TO JOIN ME IN WELCOMING THE ESTABLISHMENT OF THIS NEW GROUP OF PEANUT ENTHUSIASTS AND GOOBER TROOPERS TO OUR CITY.



Harry E. Kinney
HARRY E. KINNEY, MAYOR

Janet E. Johnson
CITY CLERK/RECORDER

ORDER NO. 136

TABLE OF CONTENTS

| | <u>Page</u> |
|---|-------------|
| <u>Opening Session</u> | |
| Welcome and Proclamation ----- | 5 |
| H. E. Kinney, Mayor of Albuquerque | |
| U.S. Agriculture at the Crossroads ----- | 15 |
| L. S. Pope, Dean of Agriculture and Home Economics, New Mexico State University | |
| <u>PAPERS</u> | |
| Effect of Foliar and Soil Application of Urea on Yield and Biochemical Composition of Seed of Three Peanut (<u>Arachis hypogaea</u> L.) Cultivars ----- (1981 Paper) ----- | 17 |
| S. K. Pancholy, Shaik-M. M. Basha, A. L. Guy, and D. W. Gorbet | |
| Fatty Acid Composition of Peanut Genotypes in the Virginia-Carolina Production Area ----- | 29 |
| R. W. Mazingo and J. L. Steele | |
| Parent-Progeny Relationships for the Flat Seed Trait in the Florunner Cultivar ----- | 40 |
| A. J. Norden, J. I. Davidson, Jr., D. W. Gorbet, and D. A. Knauff | |
| Effect of Ground Spray Equipment on the Distribution of <u>Sclerotium rolfsii</u> in Peanut Fields ----- | 50 |
| F. M. Shokes and J. A. Arnold | |
| Pressing Peanuts: New Procedures for Removing Oil ----- | 60 |
| J. Pominski, H. M. Pearce, Jr. and J. J. Spadaro | |
| <u>ABSTRACTS</u> | |
| <u>Breeding and Genetics</u> | |
| Collection of <u>Arachis</u> Germplasm in South America ----- | 69 |
| C. E. Simpson, D. J. Banks, W. C. Gregory, A. Krapovickas, J. Pietrarelly, H. Zurita O., J. F. M. Valls, and A. Schinini | |
| Peanut Germplasm Development ----- | 69 |
| D. J. Banks, H. A. Melouk, and D. L. Ketrang | |
| Improvement of <u>A. hypogaea</u> by Combining Ancestral and Other Wild Species Genomes ----- | 70 |
| A. K. Singh and J. P. Moss | |
| Screening for Field Resistance to Peanut Leafspot in Virginia ----- | 70 |
| T. A. Coffelt and D. M. Porter | |
| Evaluation of Peanut Genotypes for Resistance to Leafspot and for Agronomic Performance ----- | 71 |
| D. W. Gorbet, A. J. Norden, and F. M. Shokes | |
| Genetic Study of a Miniature Phenotype in <u>Arachis hypogaea</u> L. ----- | 71 |
| W. D. Branch and R. O. Hammons | |
| Cytological Relationships Among Varieties of <u>Arachis hypogaea</u> L. ---- | 72 |
| H. T. Stalker | |
| Linkage Between Genes for Non-nodulation and Variegated Testa Color in Peanuts ----- | 72 |
| K. E. Dashiell and D. W. Gorbet | |
| Pedigreed Natural Crossing to Identify Peanut Testa Genotypes ----- | 73 |
| Ray O. Hammons and W. D. Branch | |

| | <u>Page</u> |
|--|-------------|
| Classification of White Testa Peanuts by Flavonoid Analysis ----- D. J. Daigle, E. J. Conkerton, and R. O. Hammons | 73 |
| Response of Resistant and Susceptible Genotypes to Chemical Soil-Borne Disease Controls ----- O. D. Smith, T. E. Boswell, and W. J. Grichar | 73 |
| Field Performance of Two Peanut Cultivars Relative to Resistance to Invasion by <u>Aspergillus flavus</u> and Subsequent Aflatoxin Contamination ----- J. I. Davidson, Jr., R. A. Hill, R. J. Cole, A. C. Mixon, and R. J. Henning | 74 |
| <u>Entomology</u> | |
| Evaluation of Peanut Pest Management in Georgia - 1981 ----- H. Womack, G. K. Douce, C. Sivasailam, and D. Linder | 75 |
| Absolute and Relative Density Studies on the Tobacco Wireworm and Southern Corn Rootworm ----- P. F. Lummus and J. C. Smith | 75 |
| Pecunidity of the Lesser Cornstalk Borer, <u>Elasmopalpus lignosellus</u> , from "Florunner" and "Spanhoma" Peanut Varieties ----- R. C. Berberet and D. A. Sander | 75 |
| Oviposition of the Potato Leafhopper, <u>Empoasca fabae</u> (Harris) in Peanut Plants ----- Edwin T. Hibbs, Loy W. Morgan, and H. Joel Hutcheson | 76 |
| Control of Peanut Insects in Research/Demonstration Tests in Virginia J. C. Smith | 76 |
| Influence of Systemic Insecticides on Thrips Damage, Plant Growth, and Yield of Florunner Peanuts ----- R. E. Lynch, J. W. Garner, and L. W. Morgan | 77 |
| Application of Insecticides to Plants through Irrigation Systems ---- Loy W. Morgan | 77 |
| Modified Atmospheres: Effectiveness in Control of the Red Flour Beetle and the Almond Moth in Stored Peanuts ----- E. G. Jay | 77 |
| Monitoring Low-level Populations of the Twospotted Spider Mite on Peanut Field Borders ----- L. S. Boykin and W. V. Campbell | 78 |
| Spider Fauna of Peanuts in the West Cross-Timbers Area of Texas ---- C. W. Agnew, D. A. Dean, and J. W. Smith, Jr. | 78 |
| Resistance of Wild Species of Peanuts to an Insect Complex ----- W. V. Campbell and H. T. Stalker | 79 |
| <u>Extension and Industry</u> | |
| New Developments in Controlled Droplet Application ----- M. G. Wiltse | 80 |
| 1981 CDA Versus Hydraulic Leafspot Spray ----- Thomas A. Lee, Jr. | 81 |
| Use of Controlled Droplet Application Technique to Apply Fungicides for Suppression of Peanut Foliar Diseases ----- Robert H. Littrell | 82 |

| | <u>Page</u> |
|--|-------------|
| A Comparison of CDA and Conventional Spray Coverage with a Fluorescent Dye ----- F. M. Shokes | 83 |
| Chlorothalonil Deposition with CDA ----- W. C. Odle | 84 |
| Electrostatic Application ----- J. R. Bone | 85 |
| Peanut Disease Loss Estimates for Major Peanut Producing States in the United States for 1981 ----- R. V. Sturgeon | 86 |
| Rhizoctonia Limb Rot Disease ----- Samuel S. Thompson | 88 |
| Comparison of In-Furrow Applications and Banded Treatments for Control of <i>Meloidogyne arenaria</i> in Peanut ----- R. Rodriguez-Kabana, P. S. King, and M. H. Pope | 89 |
| A Consultant's Responsibility to the Grower ----- Roger Musick | 90 |
| Should Product Formulations Complement Delivery Systems or Vice Versa R. K. Lankow | 91 |
| Should Product Formulations Complement Delivery Systems or Vice Versa Reid Faulkner | 91 |
| Ridomil - Section 18 ----- Aithel McMahon | 91 |
| A Positive-Flow Pump for Application of Soil Fumigants ----- David A. Rickard | 92 |
| Ronilan and BAS 436 00 F for Sclerotinia Control on Peanuts ----- Jess Davis | 92 |
| <u>Nitrogen Fixation</u> | |
| Nitrogen and Other Peanut Shoot Nutrients as Influenced by Cultivar and Strain of Nitrogen Fixing Rhizobium ----- R. K. Howell and T. A. Coffelt | 93 |
| Nitrogen Fixation and Translocation in the Peanut ----- C. S. Kvien, J. E. Pallas, D. W. Maxey, and J. Evans | 93 |
| Biological Nitrogen Fixation in Peanuts: Relative Importance of Genetic Components of Symbiotic Variability ----- J. C. Wynne, T. G. Isleib, G. H. Elkan, and T. J. Schneeweis | 94 |
| Interactions Between Rhizobium Strains and Peanut Cultivars ----- G. H. Elkan, J. C. Wynne, and T. J. Schneeweis | 94 |
| Studies on Peanut Bacteroids ----- Dipankar Sen and R. W. Weaver | 95 |
| <u>Nutrition and Physiology</u> | |
| Effects of Salinity on Nodulation in Peanuts (<i>Arachis hypogaea</i> L.) -- J. S. Calahan, Jr. | 96 |
| Response of Nodulating and Non-nodulating Peanut Lines to N Application ----- S. K. Pancholy and S. M. M. Basha | 96 |

| | <u>Page</u> |
|---|-------------|
| Potato Leafhopper Inhibits Peanut Leaf Photosynthesis ----- | 97 |
| J. E. Pallas, Jr. and Edwin T. Hibbs | |
| Effect of Drought and Soil Temperature on Peanut Canopy, Stem, and Pod Temperatures ----- | 97 |
| T. H. Sanders, P. D. Blankenship, R. J. Cole, and R. A. Hill | |
| Effects of Trickle Irrigation Rate and Interval and of Fertilization Level on Rhizobium-Inoculated Peanuts ----- | 98 |
| I. S. Wallerstein, B. Bar-Yoseph, B. Sagiv, Rina Lobel, and J. Schiffman | |
| Skip-Row Culture of Peanuts in South Central Texas ----- | 98 |
| A. M. Schubert, C. L. Pohler, and D. H. Smith | |
| Influence of Humus-Containing Fertilizers and Sludge on Peanut Plant Growth ----- | 99 |
| R. E. Pettit, B. L. Jones, and C. L. Martin | |
| Evaluation of Peanut Genotypes for Root and Shoot Growth ----- | 99 |
| D. L. Ketrung | |
| Physiological Basis for Yield Differences Among Peanut Cultivars ---- | 100 |
| S. T. Ball, J. C. Wynne, and L. A. Nelson | |
| Investigation of Protein-Bound Lipids from Stored Raw Peanuts and Peanut Flours ----- | 100 |
| A. J. St. Angelo | |
| <u>Pathology</u> | |
| Feasibility of Peanut Leafspot Forecasting in North Carolina ----- | 101 |
| Jack E. Bailey and Suzanne Spencer | |
| Resistance in Peanut Germplasm to <u>Cercospora arachidicola</u> ----- | 101 |
| H. A. Melouk and D. J. Banks | |
| Additional Studies on Biological Control of Late Leafspot with <u>Dicyma</u> ----- | 102 |
| Donald H. Smith, Ruth A. Taber, James K. Mitchell, and Susan H. Woodhead | |
| Effects of Irrigation on Peanut Diseases in Virginia ----- | 102 |
| D. M. Porter, F. S. Wright, and N. L. Powell | |
| A Field Selection Procedure for Resistance in Peanuts to Verticillium Wilt ----- | 103 |
| D. F. Wadsworth, H. A. Melouk, and J. L. Sherwood | |
| The Severity of Peanut Blackhull in South Africa and Studies on the Survival of the Pathogen ----- | 103 |
| Christa Laubscher, S. W. Baard, and G. D. C. Pauer | |
| Thermal Inactivation of Fungi Associated with Pod Rot of Peanuts ---- | 104 |
| J. L. Sherwood, H. A. Melouk, and D. F. Wadsworth | |
| Comparative Resistance to <u>Pythium myriotylum</u> in Juvenile and Mature Peanuts ----- | 104 |
| B. L. Jones | |
| Influence of Calcium Source on Peanut Peg and Pod Rot Complex ----- | 105 |
| A. S. Csinos, T. P. Gaines, and M. E. Walker | |
| Vesicular-Arbuscular Endomycorrhizal Fungi in Weed Seeds in Peanut Soils ----- | 105 |
| Ruth Ann Taber | |

| | <u>Page</u> |
|--|-------------|
| Yield and Vigor Improvements in Florunner Peanut Following Seed Bacterization with <u>Bacillus subtilis</u> ----- | 105 |
| R. P. Clay, P. A. Backman, and M. A. Crawford | |
| Application Time and Effectiveness of Four Systemic Nematicides Against <u>Meloidogyne arenaria</u> on Florunner Peanuts ----- | 106 |
| R. Rodriguez-Kabana, R. A. Shelby, P. S. King, and M. H. Pope | |
| Comparison of In-Furrow, Banded, and Combination Banded + In-Furrow Treatments for Control of the Peanut Root-Knot Nematode ----- | 106 |
| R. Rodriguez-Kabana, R. A. Shelby, P. S. King, and M. H. Pope | |
| Use of CGA-64250 in Managing Fungal Pathogens of Peanuts ----- | 106 |
| J. M. Hammond, John D. Weete, and H. G. Hancock | |
| Effect of Certain Fungicide Formulations on <u>Sclerotinia</u> <u>sclerotiorum</u> ----- | 107 |
| R. V. Sturgeon, Jr. and Kenneth E. Jackson | |
| Effect of Foliar Fungicides on Incidence of Sclerotinia Blight in Oklahoma Peanut Fields ----- | 107 |
| Roger R. Musick and R. V. Sturgeon | |
| Preservation of <u>Cercosporidium personatum</u> Conidia and a Method for Laboratory and Greenhouse Studies ----- | 108 |
| Robert H. Littrell | |
| Assessment of Disease Progress and Yield Loss in Selected Peanut Genotypes ----- | 108 |
| Robert Neundorfer and Robert H. Littrell | |
| Disease Occurrence and Yield Response of Three Spanish Varieties and Florunner Peanuts to Foliar Disease Control ----- | 109 |
| L. Menakanit, K. E. Jackson, and R. V. Sturgeon, Jr. | |
| Effects of Chlorothalonil Applied for Peanut Leafspot Control on Pod Rot, Stem Rot, Seed Quality, and Yield ----- | 109 |
| M. A. Crawford and P. A. Backman | |
| Insertion of Systemic Fungicides into a Contact Fungicide Program for Control of Peanut Leafspot ----- | 110 |
| P. A. Backman and M. A. Crawford | |
| <u>Process and Utilization</u> | |
| Quality Characteristics of Cake-type Doughnuts Containing Peanut, Cowpea, and Soybean Flours ----- | 111 |
| S. Kay McWatters | |
| Changes in Peanut Quality Related to Moisture Content and Storage Time ----- | 111 |
| H. E. Pattee, C. T. Young, J. L. Pearson, J. A. Singleton, and F. G. Giesbrecht | |
| Composition and Characteristics of Basic Proteins from Peanut Seed -- | 112 |
| Shaik-M. M. Basha and Sunil K. Pancholy | |
| The Production of a Homologous Series of Hydrocarbons in Ground Raw Peanuts During Storage ----- | 112 |
| N. V. Lovegren and A. J. St. Angelo | |
| Microflora of Peanuts Stored Under Modified Atmospheres ----- | 113 |
| D. M. Wilson, Ed Jay, and R. A. Hill | |

| | <u>Page</u> |
|---|-------------|
| <u>Production Technology</u> | |
| Using On-Farm Tests in Peanut Educational Programs ----- Gene A. Sullivan | 114 |
| Peanut Growth Model Predictions vs. Historical Yields in Virginia --- J. L. Steele and J. H. Young | 114 |
| Techniques for Reducing Energy Consumption in Peanut Drying ----- J. H. Young, J. W. Dickens, and J. W. Glover | 115 |
| Effects of Drought and Soil Temperature Modification on Florunner Peanut Properties ----- P. D. Blankenship, J. I. Davidson, Jr., T. H. Sanders, R. J. Cole, R. A. Hill, and Richard C. Layton | 115 |
| Rope-Wick Treatments for Controlling Tall Weeds in Peanuts ----- Ellis W. Hauser, Gale A. Buchanan, Mike Patterson, and R. H. Walker | 115 |
| Trace Mineral Contents of Selected Tissues from Bioregulator-Treated Peanut Plants ----- R. L. Ory, E. J. Conkerton, F. R. Rittig, M. Schroeder, and T. O. Ware | 116 |
| A Once-Over Peanut Harvester ----- P. H. White and R. C. Roy | 116 |
| Peanut Performance in Early or Late Yearly Sequence with Other Crops A. C. Mixon and C. C. Dowler | 117 |
| Effects of Crop Rotation Involving Peanuts and the Production of Flue-Cured Tobacco in Southern Ontario ----- J. M. Elliot and R. C. Roy | 117 |
| Applied Nutrient Effects on Suppression of Cylindrocladium Black Rot Disease ----- D. L. Hallock | 118 |

DISCUSSION GROUPS

| | |
|--|-----|
| Peanut Breeding and Germplasm ----- C. E. Simpson, Chairman | 119 |
| Integrated Pest Management ----- R. L. Robertson, Chairman | 120 |
| Pod Rot ----- D. Morris Porter, Chairman | 121 |
| Tissue Culture ----- Gregory C. Phillips, Chairman | 122 |

SOCIETY BUSINESS

| | |
|--|-----|
| Report of the APRES Delegation to China ----- | 123 |
| Minutes of APRES Board of Directors Meeting 13 July 1982 ----- | 127 |
| Minutes of APRES Board of Directors Meeting 14 July 1982 ----- | 129 |
| Minutes of the Regular Business Meeting of the American Peanut Research and Education Society ----- | 130 |
| Financial Statement ----- | 131 |
| President's Report ----- | 133 |
| Program Committee Report ----- | 135 |
| Finance Committee Report ----- | 144 |
| Report of the Publications and Editorial Committee ----- | 148 |
| Ad Hoc Committee Report ----- | 150 |

| | <u>Page</u> |
|--|-------------|
| Minutes of Regular Business Meeting (Cont.) | |
| Peanut Quality Committee Report ----- | 151 |
| Public Relations Committee ----- | 152 |
| Report of the Site Selection Committee ----- | 153 |
| 1982 Awards Committee Report ----- | 154 |
| Golden Peanut Award Advisory Committee Report ----- | 155 |
| Report of the 1981-82 Nominating Committee ----- | 156 |
| Fellows Committee Report ----- | 156 |
| Fellows - 1982 ----- | 157 |
| Report of Liason Representative Between the APRES, Inc., and the American Society of Agronomy ----- | 159 |
| By-Laws ----- | 160 |
| Membership Roster ----- | 166 |
| Author Index ----- | 189 |

U.S. AGRICULTURE AT THE CROSSROADS

L. S. Pope, Dean

College of Agriculture and Home Economics

New Mexico welcomes you to Albuquerque and to an outstanding convention program. You will gain much from this important meeting and you can look forward to friendly hospitality and a relaxing atmosphere in our state. Certainly, our staff, Drs. Hsi, Baker, Hooks, and others have done everything possible to make this an enjoyable and informative occasion.

Unfortunately, the changes taking place in U.S. agriculture today are not so enjoyable. Events of the past few months have further emphasized the economic plight of U.S. agriculture -- the backbone of America's free enterprise system and our chief source of renewable wealth. The impact on U.S. farmers and stockmen reaches into every home and business. Failures and bankruptcies send shock waves through the entire economy.

All of us eat, and the U.S. food and fiber system is the world's largest industry. Peanuts play an essential role in providing a cash crop, in employing people and in fueling the local economy of service and agribusiness in the area where they are produced. So, all of us have a definite stake in what is going on.

What has been going on, of course, is a steady weakening of the economic vitality of the farm sector. Nearly every crop and livestock enterprise is having a hard time in showing a profit. Some say that we will be forced to go back to a heavily subsidized and rigidly controlled agriculture -- very much different than the independent and open-market system we have today.

My crystal ball is cloudy as anyone else's, but I see a real "moment of truth" facing producers and agricultural lending agencies. Excessive interest rates are choking off credit, and the impact of inflation comes down hard on producers everywhere. Peanut farmers, like many farmers everywhere, may have a good equity in land, equipment and other assets, but are unable to lay hands on enough cash through earnings and borrowing to stay afloat. Outside investors may move in to exploit a weakened agricultural sector.

No one can be sure of the outcome, but we can certainly put our house in order as best, and as fast, as we can. We can put our agricultural operations on a more solid, businesslike basis -- thinning all non-essential costs and seeking every avenue of reducing costs of production. Research and extension specialists at our land-grant institutions stand ready to assist producers, and we have new computer-based competencies to aid in our efforts.

We can also band together more tightly to form cooperative alliances, to do a much better job of marketing our products and even get into the processing end of business if desirable, moving our product closer to the consumer. Self-help and check-off programs, within a reasonable framework, are opportunities to carefully consider. Computers and cost-accounting techniques must be employed to cut unnecessary expenses.

But there is question that we can seriously starve a profit into a failing farm enterprise, already heavily in debt. It is probable that a number of marginal producers may not survive these stringent economic times.

It is imperative, though, that we use available research and educational programs to full advantage. The resources of your own land-grant university and the professional staff at each location are as close as the nearest mailbox or telephone. Use them to the fullest, and assist them in developing worthwhile programs, geared to your needs and aimed at answering your questions.

There is no question but that the short-term economic crunch we are now experiencing will leave painful scars on U.S. agriculture as we have known it. The survivors will be the resourceful operators, the innovators and the true professionals, many of whom are present at this conference. Americans owe a great debt of gratitude to you for the wholesome, abundant and nutritious food we all enjoy. You have a vital part to play in agriculture's future in the years ahead.

Effect of Foliar and Soil Application of Urea on Yield and Biochemical Composition of Seed of Three Peanut (*Arachis hypogaea* L.) Cultivars.

S.K. Pancholy*, Shaik-M. M. Basha, A.L. Guy and D.W. Gorbet. Florida A&M University, Tallahassee, FL 32307, and Agri. Res. Center, IFAS, Univ. of Florida, Marianna, FL.

ABSTRACT

The effect of urea applications on yield and biochemical composition of peanut seed was studied. Urea was applied to the soil or to the foliage of three peanut (*Arachis hypogaea* L.) cultivars ('Early Bunch', 'NC-Fla 14', and 'Florunner'). Application of urea had no significant effect on the yield of all three peanut cultivars. However, NC-Fla 14 and Florunner had slightly higher yields with increasing foliar urea dosage. In contrast, soil application caused a reduction in the pod yield of Florunner and the oil content in all three cultivars. At both sampling stages (95 and 126 days after planting), the total protein and soluble carbohydrates were higher following urea application. Similarly, free amino acid content increased with the increasing rate of urea application. Early Bunch and NC-Fla 14 showed high levels of free methionine at both sampling when urea was applied to the foliage. Total methionine content of seed increased in all three peanut cultivars with increasing levels of urea application.

INTRODUCTION

Peanuts (*Arachis hypogaea* L.) are deficient in some essential amino acids such as lysine, threonine, tryptophan, and especially methionine (12). Improvements in the essential amino acid composition of peanut protein would have potential benefits in diets which lack in animal proteins. Several ways have been suggested to increase the methionine content of peanuts, including methionine supplementation (5); blending of peanut products with other high-methionine plant proteins (14); plant tissue culture techniques (7,10); increasing the urease content of the peanut seed (8) and breeding high-methionine peanut lines (9).

Little is known about induction of higher levels of urease in peanuts. Urease (urea aminohydrolase) from two commercially grown legumes, jack bean (*Canavalia ensiformis*) and soybean (*Glycine max*), has been shown to be high in methionine residues, being 2% of the total amino acids (17). Previous studies indicate that urease may be induced in the leaf slices of jack bean (13) and in callus cultures initiated from soybean tissue (3). The use of urea as a primary nitrogen source in soybean callus culture resulted in de novo protein synthesis increasing the urease level 10-20 fold over the control (17).

Pancholy and Guy (16) have reported the effects of foliar spray of urea on peanuts. Urea, when applied at 10 kg N/ha increased the yield and methionine concentration in peanut seeds. However, no differences were noted in oil, protein content, and protein composition of the peanut seed as determined by Polyacrylamide gel electrophoresis.

This investigation was undertaken to further study the effect of urea application on peanut yield and biochemical composition of the seed.

METHODS AND MATERIALS

Three peanut cultivars ('Early Bunch', 'NC-Fla 14', and 'Florunner') were grown during the 1979 season in experimental plots at Marianna, FL. The split plot, randomized complete block, experimental design, with three replications, consisted of growing cultivars in main plots with fertilizer treatments in sub plots. Urea was applied to the foliage of three peanut cultivars or to the soil on 85 and 116 days after planting at 0, 3, 6, and 9 kg N/ha. Ten days after application, one to two plants were harvested from each treatment and the pods were removed and stored at -20 C. The entire crop was dug at 130 days after planting, field dried, mechanically picked and yields determined. The seed collected following urea application were lyophilized and stored at -20 C. The lyophilized SMK seeds were ground into meal and analysed for oil (15). After removal of oil, the resulting defatted meal was used for the determination of total protein (1), soluble carbohydrates (21), free amino acids (2), and total amino acids (15).

Analyses of variance were computed on all data. Differences among treatments were tested with LSD method (19).

RESULTS AND DISCUSSION

There was no significant effect of urea application, foliar or soil, on the final pod yield of all three peanut cultivars (Table 1). The cultivar differences were found to be significant and the average yields were as follows: Florunner (3,216 kg/ha) Early Bunch (3,161 kg/ha) NC-Fla 14 (2,741 kg/ha). Foliar application of 6 kg N/ha produced the highest yield of Florunner, whereas, similar application to the soil gave the lowest yield. The reduction in yield, when urea was applied to the soil, has been attributed to either urea $\text{CO}(\text{NH}_2)_2$ itself or to one of its transformation products, such as ammonium cyanate (NH_4OCN), ammonium carbonate ($(\text{NH}_4)_2\text{CO}_3$), free ammonia and nitrate (4). Peanut, being a legume can fix atmospheric N, however, whether or not Rhizobia can fix adequate N required for peanut production remains questionable (18). Our results show that response to N fertilization seems to be cultivar specific. The inconsistency in peanut yields in response to N fertilization has been attributed to the cultivar or soil differences (18). Even though N fertilization of large-seeded Virginia type peanuts is not generally recommended, smaller runner and Spanish type peanuts often receive complete fertilizer (18).

The dosage of urea application, foliar or soil, and the cultivar differences were found to have significant effect on the oil content of Early Bunch, NC-Fla 14 and Florunner (Table 2). In general, a reduction in oil content, was noted for all three peanut cultivars with increasing urea application. The reductions in oil content were observed at both sampling times, i.e. 95 and 126 days after planting. Pancholy and Guy (16), in an earlier study, did not observe any significant changes in oil content of the same three peanut cultivars when urea was applied only to the foliage.

The cultivar differences, dosage of urea, and mode of urea application were found to have significant effect on the protein content of all three peanut cultivars (Table 3). The foliar application of urea resulted in

Table 1. Effect of Foliar and Soil Application of Urea on Peanut Yield[†]

| Urea-N Application kg/ha | Cultivars | | | | | |
|--------------------------------|-------------|-------|-----------|-------|-----------|-------|
| | Early Bunch | | NC-Fla 14 | | Florunner | |
| | Foliar | Soil | Foliar | Soil | Foliar | Soil |
| | kg/ha | | | | | |
| 0 | 3,254 | 2,969 | 2,539 | 2,664 | 3,200 | 3,416 |
| 3 | 3,165 | 2,933 | 2,592 | 2,664 | 3,021 | 3,147 |
| 6 | 2,951 | 3,957 | 3,211 | 2,378 | 3,433 | 2,969 |
| 9 | 2,915 | 3,147 | 3,162 | 2,718 | 3,183 | 3,362 |

[†]Values are averages of three replications.

LSD (.05) cultivar differences = 229.0; urea doses = N.S.; mode of application = N.S.

Table 2. Effect of Foliar and Soil Application of Urea on Oil Content of Peanuts^T

| Urea-N Application kg/ha | EARLY BUNCH | | | | NC-Fla 14 | | | | FLORUNNER | | | |
|--------------------------------|-------------|------|------|----------------|-----------|------|------|------|-----------|------|------|------|
| | Foliar | | Soil | | Foliar | | Soil | | Foliar | | Soil | |
| | A | B | A | B [†] | A | B | A | B | A | B | A | B |
| | Oil % | | | | | | | | | | | |
| 0 | 36.1 | 43.4 | 48.8 | 45.8 | 41.6 | 48.8 | 31.6 | 45.8 | 37.4 | 43.3 | 29.3 | 45.2 |
| 3 | 28.8 | 39.6 | 37.3 | 38.4 | 30.3 | 37.3 | 29.4 | 38.4 | 34.6 | 45.4 | 45.8 | 46.0 |
| 6 | 34.9 | 41.0 | 38.0 | 44.3 | 29.0 | 38.0 | 43.8 | 44.4 | 28.6 | 41.6 | 39.7 | 40.4 |
| 9 | 35.1 | 39.3 | 40.0 | 42.0 | 34.7 | 40.0 | 41.2 | 42.0 | 40.8 | 42.0 | 40.3 | 39.3 |

^T Values are averages of three replications.

[†]A = Sampling at 95 days after planting; B = Sampling at 126 days after planting.

LSD (0.05) cultivar differences = 3.88; urea doses = 4.52; mode of application = 3.16.

Table 3. Effect of Foliar and Soil Application of Urea on the Protein Content of Peanuts[†]

| Urea-N Application kg/ha | EAKLY BUNCH | | | | NC-Fla 14 | | | | FLORUNNER | | | |
|--------------------------------|-------------|------|------|----------------|-----------|------|------|------|-----------|------|------|------|
| | Foliar | | Soil | | Foliar | | Soil | | Foliar | | Soil | |
| | A | B | A | B [†] | A | B | A | B | A | B | A | B |
| % of defatted meal | | | | | | | | | | | | |
| 0 | 29.5 | 51.7 | 41.4 | 41.2 | 35.5 | 49.8 | 24.5 | 54.1 | 26.9 | 45.7 | 25.8 | 54.6 |
| 3 | 25.2 | 48.8 | 24.4 | 44.5 | 24.5 | 46.8 | 22.9 | 46.2 | 25.8 | 54.4 | 41.4 | 51.5 |
| 6 | 28.0 | 50.5 | 26.1 | 55.2 | 24.8 | 46.8 | 38.7 | 49.2 | 20.9 | 50.6 | 46.8 | 41.2 |
| 9 | 30.3 | 49.5 | 24.8 | 51.2 | 26.7 | 47.9 | 42.7 | 50.3 | 35.0 | 49.1 | 36.8 | 49.8 |

[†]Values are averages of three replications.

[†]A = Sampling at 95 days after planting; B = Sampling at 126 days after planting.

LSD (.05) cultivar differences = 8.06; urea doses = 9.37; mode of application = 6.63.

either no change or slight increase in protein content of Early Bunch and Florunner, whereas, in case of NC-Fla 14, a reduction in total protein content was noted. Soil application of urea at the first sampling stage, caused a reduction in total protein content of Early Bunch, however, an increase was noted for NC-Fla 14 and Florunner. A negative correlation between total protein and oil content in peanuts has been observed for several peanut cultivars (20). In cereals, application of nitrogen leads to enhanced grain protein content (6). In peanuts and fields beans (*Vicia faba*) application of sulfur with or without nitrogen fertilizer has been shown to increase the protein content and lower the oil/protein ratio of peanut kernels (11).

The application of urea and cultivar differences were found to have significant effect on the soluble carbohydrates content of peanuts (Table 4). The mode of urea application had no significant effect on the carbohydrate content of all three peanut cultivars. Foliar and soil application of urea, in general, resulted in higher carbohydrate levels in Early Bunch and NC-Fla 14. But, Florunner had reductions in soluble carbohydrates at both sampling times and modes of urea application. The carbohydrates levels were found to be much higher at the first sampling time for all three cultivars. These observations are in agreement with those of Basha *et al.*, (2) who observed that after pegging, carbohydrate content in maturing peanut seed increased and then declined. It was further suggested that carbohydrates could have been used in synthesis of lipids and proteins by the maturing peanut seeds (2).

During amino acid analysis, eighteen amino acids were determined, however, only three essential amino acids which are deficient in peanuts are being reported. Tryptophan, although an essential amino acid and deficient in peanuts was not measured. In general, the levels of all three essential free amino acids (lysine, threonine, and methionine) declined from the first sampling stage (Table 5). Such reductions in free amino acids have been observed earlier for maturing peanuts (2). The free lysine content was significantly affected by the urea dosage and cultivar differences, however, the mode of urea application was not significant (Table 5). The free lysine content of Early Bunch was unchanged at the first sampling by foliar application of urea, but, twice as much free lysine was observed when urea was applied to the soil at 6 and 9 kg/ha. Free lysine levels in NC-Fla 14 and Florunner either remained unchanged or declined at the first sampling stage with increasing doses of urea. At the second stage, free lysine levels increased with increasing urea levels on Early Bunch and NC-Fla 14 but not on Florunner.

The cultivar differences, doses of urea, and mode of urea application were found to have significant effect on the free threonine content of all three peanut cultivars (Table 5). Application of urea to soil or foliage generally resulted in 2 to 3 fold increase in free threonine levels at both sampling stages of Early Bunch except for 9 kg N/ha foliar application at the first sampling when urea was applied to the soil. In Florunner, application of urea had little effect on free threonine at the first sampling and threonine levels twice as high as control were noted at the second sampling with increasing N application.

Table 4. Effect of Foliar and Soil Application of Urea on Soluble Carbohydrates of Peanuts[†]

| Urea-N Application kg/ha | EARLY BUNCH | | | | NC-FLA 14 | | | | FLORUNNER | | | |
|--------------------------------|----------------------|------|-------------------|----------------|-----------|------|------|------|-----------|------|------|------|
| | Foliar | | Soil [‡] | | Foliar | | Soil | | Foliar | | Soil | |
| | A | B | A | B [†] | A | B | A | B | A | B | A | B |
| | g/100g defatted meal | | | | | | | | | | | |
| 0 | 1.10 | 0.93 | 1.28 | 1.66 | 1.00 | 0.73 | 1.05 | 0.33 | 1.13 | 0.85 | 1.35 | 0.25 |
| 3 | 2.45 | 0.32 | 2.82 | 1.67 | 1.00 | 1.07 | 1.22 | 0.35 | 1.61 | 0.40 | 1.19 | 0.65 |
| 6 | 1.38 | 0.46 | 1.74 | 0.80 | 0.89 | 0.86 | 0.81 | 0.07 | 1.47 | 0.77 | 1.19 | 0.65 |
| 9 | 1.71 | 1.06 | 1.99 | 0.74 | 1.20 | 1.42 | 1.19 | 1.20 | 1.05 | 0.48 | 1.17 | 0.24 |

[†] Values are averages of three replications.

[‡] A = Sampling at 95 days after planting; B = Sampling at 126 days after planting.

LSD (.05) cultivar differences = 0.363; urea doses = 0.403; mode of application = N.S.

Table 5. Effect of Foliar and Soil Application of Urea on Three Free Amino Acids in Peanut[†]

| Cultivars and Amino Acids | First Sampling (95 days after planting) | | | | | | | | Second Sampling (126 days after planting) | | | | | | | |
|---------------------------|--|------|------|------|------|------|------|----------------|---|------|------|------|------|------|------|------|
| | Foliar | | | | Soil | | | | Foliar | | | | Soil | | | |
| | 0 | 3 | 6 | 9 | 0 | 3 | 6 | 9 [‡] | 0 | 3 | 6 | 9 | 0 | 3 | 6 | 9 |
| Early Bunch | ----- g amino acid/100 g amino acids ----- | | | | | | | | | | | | | | | |
| Lysine | .026 | .024 | .023 | .029 | .019 | .011 | .030 | .038 | .005 | .005 | .012 | .009 | .004 | .016 | .010 | .013 |
| Threonine | .079 | .117 | .098 | .100 | .063 | .098 | .117 | .103 | .029 | .029 | .063 | .059 | .029 | .118 | .022 | .080 |
| Methionine | .013 | .022 | .014 | .020 | .007 | .013 | .016 | .024 | .011 | .006 | .012 | .010 | .010 | .007 | .010 | .007 |
| NC-Fla 14 | | | | | | | | | | | | | | | | |
| Lysine | .010 | .013 | .005 | .011 | .021 | .009 | .003 | .009 | .008 | .011 | .026 | .040 | .012 | .013 | .015 | .014 |
| Threonine | .090 | .135 | .039 | .099 | .146 | .090 | .048 | .073 | .117 | .043 | .107 | .214 | .053 | .058 | .100 | .095 |
| Methionine | .018 | .033 | .019 | .031 | .022 | .008 | .013 | .019 | .007 | .009 | .009 | .016 | .006 | .007 | .009 | .012 |
| Florunner | | | | | | | | | | | | | | | | |
| Lysine | .022 | .013 | .009 | .014 | .024 | .023 | .004 | .016 | .011 | .010 | .008 | .010 | .010 | .009 | .015 | .006 |
| Threonine | .093 | .140 | .113 | .051 | .133 | .231 | .100 | .116 | .039 | .071 | .040 | .068 | .038 | .073 | .109 | .036 |
| Methionine | .023 | .013 | .018 | .005 | .023 | .031 | .017 | .014 | .010 | .009 | .009 | .008 | .010 | .011 | .013 | .008 |

[†]Values are averages of three replications.

[‡]kg/ha Urea-N.

LSD (.05) Lysine (cultivar = 0.008, urea doses = 0.009 and mode of application = n.s.); Threonine (cultivar = 0.038; urea doses = 0.044 and mode of application = 0.032; Methionine (cultivar = N.S., urea doses = 0.008 and mode of application = N.S.)

Table 6. Effect of Foliar and Soil Application of Urea on Three Total Amino Acids in Peanuts^T

| Cultivar and Amino Acids | First Sampling (95 days after planting) | | | | | | | | Second Sampling (126 days after planting) | | | | | | | |
|--|---|------|------|----------------|------|------|------|------|---|------|------|------|------|------|------|------|
| | Foliar | | | | Soil | | | | Foliar | | | | Soil | | | |
| | 0 | 3 | 6 | 9 ^T | 0 | 3 | 6 | 9 | 0 | 3 | 6 | 9 | 0 | 3 | 6 | 9 |
| ----- g amino acid/100 g amino acids ----- | | | | | | | | | | | | | | | | |
| Early Bunch | | | | | | | | | | | | | | | | |
| Lysine | 5.26 | 4.20 | 3.86 | 4.08 | 4.34 | 4.88 | 5.88 | 5.15 | 4.45 | 4.35 | 4.72 | 3.86 | 4.73 | 4.98 | 4.60 | 4.63 |
| Threonine | 3.89 | 4.62 | 4.62 | 4.51 | 4.52 | 4.66 | 4.73 | 4.62 | 4.92 | 4.35 | 4.98 | 4.04 | 4.52 | 4.60 | 4.40 | 4.18 |
| Methionine | 0.66 | 0.78 | 0.88 | 1.11 | 0.62 | 0.70 | 0.78 | 0.86 | 1.30 | 1.36 | 1.38 | 1.22 | 1.35 | 1.41 | 1.28 | 0.90 |
| NC-Fla 14 | | | | | | | | | | | | | | | | |
| Lysine | 4.91 | 5.71 | 5.80 | 4.61 | 4.69 | 5.31 | 5.36 | 5.60 | 4.67 | 4.60 | 4.20 | 4.52 | 4.08 | 4.82 | 4.45 | 4.24 |
| Threonine | 4.77 | 3.33 | 5.32 | 4.84 | 4.70 | 5.94 | 4.90 | 5.36 | 4.65 | 4.52 | 4.45 | 4.78 | 4.38 | 5.48 | 4.48 | 4.58 |
| Methionine | 0.92 | 1.05 | 1.16 | 0.99 | 0.89 | 0.90 | 1.05 | 0.84 | 0.86 | 1.05 | 1.08 | 1.00 | 0.90 | 1.10 | 1.38 | 1.22 |
| Florunner | | | | | | | | | | | | | | | | |
| Lysine | 4.20 | 4.75 | 5.80 | 5.34 | 4.34 | 4.09 | 5.16 | 5.18 | 3.63 | 3.73 | 4.23 | 4.46 | 3.43 | 3.40 | 4.91 | 5.08 |
| Threonine | 5.24 | 5.57 | 4.82 | 5.15 | 5.28 | 4.45 | 4.87 | 4.49 | 4.44 | 4.50 | 4.48 | 4.80 | 3.65 | 3.98 | 4.51 | 4.25 |
| Methionine | 0.52 | 0.62 | 0.67 | 0.68 | 0.40 | 0.41 | 0.24 | 0.32 | 0.48 | 0.56 | 0.58 | 0.60 | 0.52 | 0.55 | 0.50 | 0.58 |

^T Values are averages of three replications.

^T kg/ha Urea-N.

LSD (.05) Lysine (cultivar = 0.44, urea doses = 0.05 and mode of application = 0.36); Threonine (cultivar = 0.35, urea doses = 0.40 and mode of application = 0.29); Methionine (cultivar = 0.17, urea doses = 0.20 and mode of application = 0.14).

Free methionine levels in peanuts were only significantly affected by the urea doses. The cultivar differences and mode of urea application were found to be nonsignificant (Table 5). Free methionine levels in Early Bunch showed a significant increase at the first sampling, especially when urea was applied to the soil. However, at the second sampling, no increase in free methionine was observed in Early Bunch, regardless of whether urea was applied to the soil or to the foliage. NC-Fla 14 showed significant increases in free methionine at both sampling times when foliar application of urea was made. Florunner responded negatively or not at all with free methionine levels declining at both stages of sampling with urea application.

The total amino acid analysis results for three essential amino acids (Lysine, Threonine, and Methionine) obtained following the hydrolysis of peanut meals are shown in Table 6. All three amino acids were significantly affected by the cultivar differences, urea dosage, and the mode of urea application. Total lysine content in Early Bunch showed a significant decline when urea was applied to the foliage and a slight increase or no change in lysine level was observed when urea was applied to the soil. The peanut cultivars, NC-Fla 14 and Florunner, showed slight to moderate increase in the level of total lysine with increasing urea doses.

Threonine levels in Early Bunch at the first sampling stages were significantly higher with increasing doses of foliar application of urea (Table 6). However, either no significant changes or reductions in threonine content were observed at the second sampling stage. In NC-Fla 14, significant increases in threonine at the first sampling and slight increases at the second sampling were noted with increasing doses of urea application. Threonine content in Florunner showed significant increase at the second sampling.

Total methionine levels were significantly affected by the doses of urea application, and cultivar differences (Table 6). Total methionine in Early Bunch significantly increased at the first sampling stage following foliar or soil application of urea. However, a significant reduction was observed at the second sampling when 9 kg N/ha was applied to the soil. In NC Fla-14, significant increase in total methionine content was noted at the second sampling but not at the first sampling. No significant differences were observed in methionine levels in Florunner when urea was to soil or foliage at either of the sampling times. Pancholy and Guy (16) have previously reported an increase in methionine levels when 10 kg N/ha urea applied to the foliage of three peanut cultivars. In soybean, it has been observed that foliar application of urea increased the amide, asparagine, arginine, and lysine content of leaves (4). Other observation resulting from N application include an increased rate photosynthesis and enhanced growth hormone synthesis (4).

Polacco (17) using tissue culture technique demonstrated that soybean suspension cultures with nitrogen source other than urea exhibit trace or zero urease level. However, when the cells were transferred to a fresh media containing urea, urease levels increase 10 to 20 times that of control. Results from our study show that levels of urease of intact plants do not increase as rapidly as that in cell cultures. However, increases in peanut seed methionine do occur when urea is applied to the soil or to the foliage during the seed formation stage. These findings provide basis for further investigation concerning the exact time of urea application during the peanut growth cycle which may result in high methionine levels in the seed. Successful induction of urease in peanut by urea application will be of great nutritional value.

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FATTY ACID COMPOSITION OF PEANUT GENOTYPES IN THE VIRGINIA-CAROLINA PRODUCTION AREA. R. W. Mazingo and J. L. Steele, VPI & SU and USDA ARS, Tidewater Research and Continuing Education Center, Suffolk, Va.

ABSTRACT

Fatty acid composition and iodine values were determined for six peanut genotypes dug on two dates (approximately two weeks apart) in Martin County, North Carolina, and Suffolk, Virginia, in 1980 and 1981. Differences in fatty acid composition were observed among genotypes for all measured fatty acids; palmitic, stearic, oleic, linoleic, arachidic, eicosenoic, behenic, and lignoceric. Slight differences were observed between digging dates for some of the acids. Location differences in composition were observed for all acids except lignoceric. Stearic, oleic, linoleic, arachidic, and eicosenoic had large differences between years. Iodine values were different for years, locations, digging dates and genotypes. The relative effects of the factors studied were presented in terms of mean square ratios; but because of test restrictions, the probability level for statistical significance was uncertain. Positive correlation coefficients were obtained between oleic and stearic (+0.534); arachidic and stearic (+0.858) and oleic (+0.539); and eicosenoic and linoleic (+0.557). Negative correlations were found between stearic and palmitic (-0.504); linoleic and stearic (-0.612) and oleic (-0.976); arachidic and palmitic (-0.543) and linoleic (-0.648); and eicosenoic and stearic (-0.703), oleic (-0.537) and arachidic (-0.617). From these results, the fatty acid composition of peanuts grown in Virginia and North Carolina was related to years, locations and genotypes and to a slight extent digging dates. More tests are needed to further establish these relationships.

INTRODUCTION

Oil quantity and quality of peanut genotypes is important to breeders working to improve the overall acceptance of peanuts and peanut products through genetic manipulation. Holley and Hammons (1) found the small-seeded spanish types to be higher in oil content than the larger-seeded virginia types. Worthington and Hammons (2,3) found that in general the large-seeded virginias were lower in linoleic acid than the small-seeded spanish. Of the

110 genotypes they examined, linoleic acid varied from approximately 14 to 40 %. The stability of oils has been shown to be related to the linoleic acid content (1,2).

Young, et al (4) reported maturity to have an effect on the fatty acid composition with oleic acid increasing and linoleic acid decreasing with maturity. Oleic/linoleic (O/L) ratios, which are correlated with oil stability, were higher in the more mature peanuts.

Worthington, et al (5) found relatively small differences in yearly mean fatty acid values for all varieties tested but yearly variations were significant ($P < 0.01$). The source of this variation was unknown, but appeared to be related to factors which are seasonal in nature such as yearly variations in environmental conditions prevailing during seed formation.

This study was undertaken in an effort to document fatty acid composition of six large-seeded virginia genotypes grown in the Virginia-Carolina production area. The genotypes are of different germplasm from the Virginia and North Carolina breeding programs in addition to standard varieties now being grown by producers.

MATERIALS AND METHODS

Six large-seeded virginia genotypes were grown in 1980 and 1981 in the bi-state peanut variety and quality evaluation trials in Martin County, North Carolina, and Suffolk, Virginia. Standard production practices were used for all six genotypes. The released varieties Florigiant, NC 6, NC 7, Virginia 81 Bunch (VA 81B) and NC 8C were used along with the advanced breeding line VA 751014. Two digging dates (approximately two weeks apart) were used at each location with three replications per digging.

After harvesting and drying, samples from three field replicates were pooled and one sample obtained. Approximately 30-35 grams of sound mature

kernels from each sample were ground in a Krups¹ mill. From this ground sample 300 mg were weighed, put into a large glass culture tube and 10 ml of 0.5 N NaOH in methanol were added. Culture tube tops were tightened and the samples were heated in a water bath for 1 hour at 75 C and then cooled to room temperature before adding 5 ml of BCl₃. They were put back in the water bath for 15 min and shaken twice during this time. After cooling to room temperature, they were transferred to 50 ml flasks and 3 ml of hexane added and shaken gently. NaCl saturated salt solution was added to bring the hexane layer into the flask neck. This layer was withdrawn with a pipet and filtered over glass wool packed with sodium sulfate into a vial. The vials were put in a water bath at 50 C and purged with a steady stream of nitrogen to remove the hexane leaving the pure methyl esters. The vials were sealed with rubber caps and stored in a refrigerator until analyzed. All chemical procedures were performed under an explosion-proof hood as a safety precaution.

The methyl esters were analyzed on a Shimadzu GC Mini 2 chromatograph equipped with a temperature programmer TP-M2R and a Chromatopac-E1A integrator. Initial column temperature of 160 C was held for 3 min with a programmed temperature increase rate of 6 C/min until a final temperature of 240 C was obtained and held for 1 min. The injection/detector port temperature was 215 C. Two on-column injections of approximately 0.1 ul of methyl esters were made into the 1.8 m x 2 mm I.D. glass column packed with Alltech CS-10 on 100/120 Chromosorb W (AW). Fatty acid levels were calculated by normalization of peak areas and the values of each acid reported as relative proportions of the total fatty acids present.

Iodine values were calculated from the fatty acid values using the formula: (% oleic) (.8601) + (% linoleic) (1.7321) + (% Eicosenoic) (.7854).

RESULTS AND DISCUSSION

The fatty acid composition, iodine values and oleic/linoleic ratios for

¹ Mention of firm names or trade products does not imply that they are endorsed or recommended by Virginia Polytechnic Institute and State University nor the U.S. Department of Agriculture over other firms or similar products not mentioned.

six genotypes over years, locations, and digging dates are shown in Table 1. Palmitic, stearic, oleic, arachidic, and lignoceric were higher in 1980; whereas, linoleic, eicosenoic, and behenic were higher in 1981. The greatest differences were observed with oleic and linoleic acid. In 1980, oleic made up 52.98% of the total fatty acid composition; whereas, in 1981 it was only 50.13%. In turn, linoleic was 26.51% in 1980 and 29.62% in 1981. These two acids plus eicosenoic, which was also higher in 1981, were used to compute iodine values. These values were higher in 1981 along with a lower O/L ratio indicating a less stable oil.

Brown, et al (8) found fatty acid composition to be associated with temperatures, partially the relationship between oleic and linoleic acids. Generally monounsaturates increase and polyunsaturates decrease with increasing temperature. These relationships might be expected in these results since the two years differed greatly in climatic conditions. During the growing season, May through September, the temperature was 6.8 C above the normal monthly average at the Suffolk, Virginia, location in 1980 and 0.4 C below the normal monthly average for the same growing period during 1981 (6,7). Although temperature data was not recorded at the Martin County, North Carolina, location, similar trends in temperature were observed for the two years. Based on this information, temperature may account for the differences in the fatty acids composition between years. Yearly differences have also been reported by other researchers (1, 5).

Fatty acid composition varied between locations for all acids except lignoceric. Stearic, oleic, and arachidic were higher at the Martin County, North Carolina, location while palmitic, linoleic, eicosenoic, and behenic were higher at the Suffolk, Virginia, location. Iodine value was higher and O/L ratios lower at the Suffolk, Virginia, location indicating a less stable oil was produced at this location.

Within the Virginia-Carolina peanut production area, the Suffolk location is approximately 90 miles north of the Martin County location. Northern locations have been reported to produce higher linoleic acid, higher iodine values and lower O/L ratios (8, 9). Although these two locations are not that widely separated, this northern distance which contributes to environmental

differences could account for these location effects.

Two digging dates approximately two weeks apart had very little effect on fatty acid composition. Slightly higher linoleic and eicosenoic acids were measured for the later digging along with slightly lower palmitic, stearic, oleic, arachidic, behenic, and lignoceric acid. These differences were small and probably of no real significance.

The iodine value was slightly higher and O/L ratio slightly lower at the second digging indicating a less stable oil. This small variability between digging dates is probably due to the maturity range of the genotypes used. Of the six genotypes studied, two would be classified as early, three as intermediate and one as late maturing. All genotypes were harvested at each of the two diggings. When one mean was obtained for each digging date across all genotypes, very little difference in fatty acid composition was measured.

Genotypes varied considerably in fatty acid composition as shown in Table 1. Florigiant had the lowest level of oleic acid and the highest concentration of palmitic and linoleic acid. Florigiant and VA 751014 each had 1.76% lignoceric which was the highest recorded for that acid. NC 7 had the lowest levels of palmitic, linoleic, eicosenoic, and lignoceric. NC 7 also had the highest level of stearic, oleic, and arachidic. VA 81B had the lowest levels of stearic, arachidic, and behenic. VA 751014 had the highest level of eicosenoic and, along with Florigiant, the highest lignoceric while NC 8C had the highest behenic content.

Florigiant had the highest iodine value and the lowest O/L ratios while NC 7 had the lowest iodine value and highest O/L ratio. Considering these results, the Florigiant genotype should have the least stable oil and NC 7 should have the most stable oil resulting in a longer shelf life for products made from NC 7 peanuts.

Genotypic variation in fatty acid composition has been reported (1,2,3,4,5,8,9,10). These researchers used many different sources of germplasm. Diverse sources of germplasm provided the greatest variability in fatty acid content. Genotypes used in this study were classified as large-seeded virginia type peanuts. The resulting range of variation was as expected for this type of peanut.

Since the field replicates were pooled, an analysis of variance for the fatty acid data is subject to certain restrictions. However, a factorial partition of the sum of squares was completed as shown by the partition source and degrees of freedom in Table 2. The ratios of the partitioned mean square to the four-way mean square were computed for each acid, iodine value and O/L ratio. The magnitude of the four-way mean square (residual) is also provided. The determination error mean square was always smaller than the residual except for behenic acid. The determination mean square (duplication of sampling from the vial of extract, injection, and chromatographic analysis) was always small when compared to other differences and indicated a high degree of repeatability from the point of duplication. The magnitude of this error was of primary interest since the equipment and procedures were being used for the first time at Suffolk in the Peanut Variety and Quality Evaluation Program.

The mean square ratios (Table 2) suggest relative effects for the factors studied even though a valid estimate of test error cannot be made without certain assumptions. Except for palmitic, stearic, and behenic, some justification exists for pooling the three- and four-way interactions to estimate test error. Without further evidence of validity, the authors prefer to denote only potential significance with no definitive statement regarding significance probability levels.

Yielding to this restriction, lignoceric was the only acid not different between years and locations. Palmitic was highly different between digging dates with less potential difference shown by eicosenoic, behenic, and iodine value. All acids, iodine value, and O/L ratio were highly different among genotypes. Year by location differences were observed in several acids, iodine value, and O/L ratio; year by genotype differences were observed for stearic and behenic acids with less potential difference observed for arachidic and eicosenoic acids. Location by genotype and year by location by genotype differences were observed for behenic acid.

The correlation coefficients of the eight fatty acids of oil from the six genotypes grown at two locations and harvested at two digging dates in 1980 and 1981 are given in Table 3. Previous studies have established

relationships among the eight fatty acids (3,8,9). However, in most cases these results have been across different types or classes of peanuts. The genotypes studied herein would be in Group 2 according to Worthington and Hammons' (2) classification and are, therefore, in a limited range of fatty acid variability. This could account for the acid correlations which are not in agreement with those of other workers (3,8,9). From the genotype means in Table 1, the relationship among acids was not the same for all genotypes. The correlation coefficients (Table 2) reflect a combined relationship across all genotypes.

The high negative correlation (-0.976) between linoleic and oleic has been reported by other researchers (3,8). The positive (+0.456) correlation obtained between linoleic and palmitic was in agreement with that of Worthington and Hammons' (3) although not as high. Other workers (8,9) have reported negative correlations between these acids.

CONCLUSIONS

Fatty acid composition varied between years, locations, to some extent diggings dates and among the six genotypes studied. Through genetic manipulation of existing peanut germplasm, the potential exists for improved fatty acid composition and oil stability. Year and location effects should be considered in breeding programs in addition to differences in germplasm.

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Table 1. Fatty Acid Composition, Iodine Values and Oleic/Linoleic Ratios of Peanut Genotypes Over Years, Locations, and Digging Dates.

| | Fatty Acid Composition (% of Total) | | | | | | | | Iodine Value | O/L Ratio |
|----------------------|-------------------------------------|--------------|------------|---------------|----------------|-----------------|--------------|-----------------|--------------|-----------|
| | Palmitic 16:0 | Stearic 18:0 | Oleic 18:1 | Linoleic 18:2 | Arachidic 20:0 | Eicosenoic 20:1 | Behenic 22:0 | Lignoceric 24:0 | | |
| <u>Years</u> | | | | | | | | | | |
| 1980 | 10.07 | 2.99 | 52.98 | 26.51 | 1.50 | 1.15 | 3.13 | 1.66 | 92.40 | 2.022 |
| 1981 | 9.92 | 2.85 | 50.13 | 29.62 | 1.41 | 1.27 | 3.18 | 1.61 | 95.42 | 1.709 |
| <u>Locations</u> | | | | | | | | | | |
| Martin Co., NC | 9.86 | 3.02 | 52.76 | 26.94 | 1.51 | 1.16 | 3.11 | 1.63 | 92.96 | 1.990 |
| Suffolk, VA | 10.13 | 2.83 | 50.35 | 29.19 | 1.40 | 1.26 | 3.21 | 1.63 | 94.86 | 1.741 |
| <u>Digging Dates</u> | | | | | | | | | | |
| I | 10.08 | 2.94 | 51.64 | 27.84 | 1.47 | 1.19 | 3.18 | 1.65 | 93.58 | 1.881 |
| II | 9.91 | 2.91 | 51.47 | 28.29 | 1.43 | 1.23 | 3.14 | 1.62 | 94.25 | 1.850 |
| <u>Genotypes</u> | | | | | | | | | | |
| Florigiant | 10.39 | 2.86 | 48.11 | 31.22 | 1.39 | 1.18 | 3.09 | 1.76 | 96.40 | 1.555 |
| NC 6 | 10.24 | 2.72 | 51.59 | 28.22 | 1.33 | 1.24 | 3.04 | 1.62 | 94.23 | 1.844 |
| NC 7 | 9.46 | 3.50 | 54.86 | 24.91 | 1.72 | 1.08 | 3.10 | 1.37 | 91.19 | 2.218 |
| VA 81B | 10.14 | 2.62 | 51.96 | 28.48 | 1.29 | 1.19 | 2.73 | 1.59 | 94.96 | 1.843 |
| VA 751014 | 9.83 | 2.74 | 51.87 | 27.65 | 1.35 | 1.39 | 3.41 | 1.76 | 93.59 | 1.892 |
| NC 8C | 9.91 | 3.09 | 50.96 | 27.92 | 1.64 | 1.18 | 3.58 | 1.72 | 93.12 | 1.841 |
| <u>Grand Mean</u> | 10.00 | 2.92 | 51.56 | 28.06 | 1.45 | 1.21 | 3.16 | 1.63 | 93.91 | 1.866 |

Table 2. Mean Square Ratios, Residual Mean Squares and Potential Differences Based on a Factorial Partition of the Sum of Squares for Fatty Acids, Iodine Value, and O/L Ratio.

| Source | df | Fatty Acid | | | | | | | | Iodine Value | O/L Ratio |
|-----------------------|----|------------|---------|----------|----------|-----------|------------|----------|------------|--------------|-----------|
| | | Palmitic | Stearic | Oleic | Linoleic | Arachidic | Eicosenoic | Behenic | Lignoceric | | |
| Years (Y) | 1 | 12.35+ | 20.28++ | 425.07++ | 284.45 | 26.89++ | 85.10++ | 14.81+ | 5.22 | 217.78++ | 298.76++ |
| Locations (L) | 1 | 44.12++ | 36.91++ | 304.39++ | 148.70++ | 41.29++ | 59.52++ | 50.68++ | 0.01 | 85.57++ | 189.57++ |
| Dig Dates (D) | 1 | 17.61++ | 0.93 | 1.46 | 6.02 | 5.91 | 7.37+ | 9.75+ | 2.27 | 10.62+ | 2.88 |
| Genotypes (G) | 5 | 43.39++ | 73.55++ | 163.47++ | 79.70++ | 75.65++ | 44.90++ | 339.86++ | 36.32++ | 49.31++ | 91.07++ |
| Y x L | 1 | 0.14 | 74.13++ | 33.16++ | 20.40++ | 3.74 | 49.66++ | 94.80++ | 4.16 | 16.14+ | 35.53++ |
| Y x D | 1 | 4.17 | 1.55 | 0.20 | 0.04 | 3.10 | 0.02 | 1.13 | 0.87 | 0.23 | 0.02 |
| Y x G | 5 | 1.58 | 16.36++ | 1.62 | 2.05 | 5.18+ | 9.54+ | 18.38++ | 1.05 | 2.82 | 0.42 |
| L x D | 1 | 3.22 | 6.23 | 5.75 | 2.74 | 0.18 | 0.10 | 1.68 | 0.50 | 1.25 | 3.07 |
| L x G | 5 | 4.40 | 3.08 | 1.10 | 0.56 | 0.13 | 0.84 | 20.51++ | 4.95 | 0.39 | 1.76 |
| D x G | 5 | 0.64 | 4.55 | 0.71 | 1.15 | 1.33 | 1.33 | 2.67 | 4.72 | 1.59 | 0.90 |
| L x D x G | 5 | 3.26 | 1.19 | 1.93 | 1.37 | 1.66 | 1.30 | 3.68 | 2.05 | 1.27 | 1.40 |
| L x D x Y | 1 | 15.24+ | 9.79+ | 4.08 | 4.72 | 0.01 | 0.01 | 6.07 | 0.72 | 5.06 | 4.80 |
| D x G x Y | 5 | 2.88 | 0.33 | 2.80 | 1.11 | 0.53 | 2.38 | 10.44+ | 2.04 | 0.77 | 1.36 |
| Y x L x G | 5 | 2.35 | 1.18 | 3.52 | 0.92 | 2.13 | 0.98 | 23.76++ | 3.50 | 0.38 | 1.11 |
| Determinations/(YLDG) | 48 | 0.37 | 0.18 | 0.04 | 0.01 | 0.20 | 0.11 | 2.01 | 0.79 | 0.05 | 0.01 |
| Residual | 5 | 0.041 | 0.023 | 0.459 | 0.816 | 0.007 | 0.004 | 0.004 | 0.010 | 1.100 | 0.008 |

++ Potential differences, no probability level suggested.

+ Lesser potential differences, no probability level suggested.

Table 3. Correlation Coefficients Among the Eight Fatty Acids of Oil From Six Genotypes Grown at Two Locations and Harvested at Two Digging Dates in 1980 and 1981.^{a/}

| Fatty Acid | Stearic | Oleic | Linoleic | Arachidic | Eicosenoic | Behenic | Lignoceric |
|------------|---------|--------|----------|-----------|------------|---------|------------|
| Palmitic | -0.504 | -0.487 | +0.456 | -0.543 | +0.075 | -0.236 | +0.312 |
| Stearic | | +0.534 | -0.612 | +0.858 | -0.703 | +0.013 | -0.364 |
| Oleic | | | -0.976 | +0.539 | -0.537 | -0.213 | -0.412 |
| Linoleic | | | | -0.648 | +0.557 | +0.060 | +0.300 |
| Arachidic | | | | | -0.617 | +0.307 | -0.214 |
| Eicosenoic | | | | | | +0.413 | +0.330 |
| Behenic | | | | | | | +0.463 |

^{a/} d.f. = 128, significant values for r: 5% = 0.201, 1% = 0.262

PARENT-PROGENY RELATIONSHIPS FOR THE FLAT SEED

TRAIT IN THE FLORUNNER CULTIVAR.

by

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ABSTRACT

Improving milling and processing qualities and developing lines with fruit and seed of specific size and shape are among the objectives of peanut (*Arachis hypogaea* L.) breeding programs. Previous studies showed that the Florunner cultivar has a comparatively large percentage of 'flat' seed which may be defined as deviating from cross-section circularity by a given amount and which make the shelling, separation, and blanching processes more difficult. Shelled Florunner peanuts from the 1979 crop were separated into three categories of flatness and a fourth non-flattened uniform-shaped seed sample. Seed from each of these four samples were grown at Gainesville, Florida in 1980 and the progeny evaluated for size and shape in the laboratories at Dawson, Georgia and Gainesville, Florida. No apparent relationship between the parental seed shape categories and the seed size distributions and numbers of flattened seed in the progeny were obtained. The results suggest that selection within the Florunner cultivar to alter the flat seed problem would have limited success. The solution to the problem will probably best be accomplished by crossing and possibly backcrossing the Florunner lines with other more uniform material.

INTRODUCTION

Seed shape is an important aspect of a peanut (Arachis hypogaea L.) cultivar because it affects the milling, processing and consumer acceptability, and thus indirectly determines the market value. Although the market value of peanuts at the farm level is based on current prices, their value when they leave the shelling plant depends on the quality and quantity of the outturn involved.

Reed (5) described a mature peanut seed as having "a straight embryo, consisting of two fleshy cotyledons, a short hypocotyl, and a plumule, the latter composed of a terminal and two lateral buds, the whole enclosed within a thin testa". In this paper 'flat' seed are defined as those seed deviating from cross-section circularity by 2.38 mm (6/64 in.) and which make the shelling, separation and blanching processes more difficult.

Flat seed are compressed perpendicular to the embryonic axis and parallel to the soil surface (Fig. 1). When seed split it is usually along the embryonic axis. When large, severely flattened seed split the resulting cotyledons are approximately the same size as some of the whole seed causing problems in separation and blanching and resulting in loss of peanut material and lower grades.

As a follow-up of complaints from the industry about flat peanut seed, investigators at the National Peanut Research Laboratory, Dawson, Georgia devised an objective method for evaluating this trait and demonstrated the use of the method by evaluation of the 'Florunner' cultivar and its four component lines (1). Davidson et al. (1) found that the four component lines of Florunner varied significantly from 28 to 41 percent in expression of the flat seed trait. On a rating scale

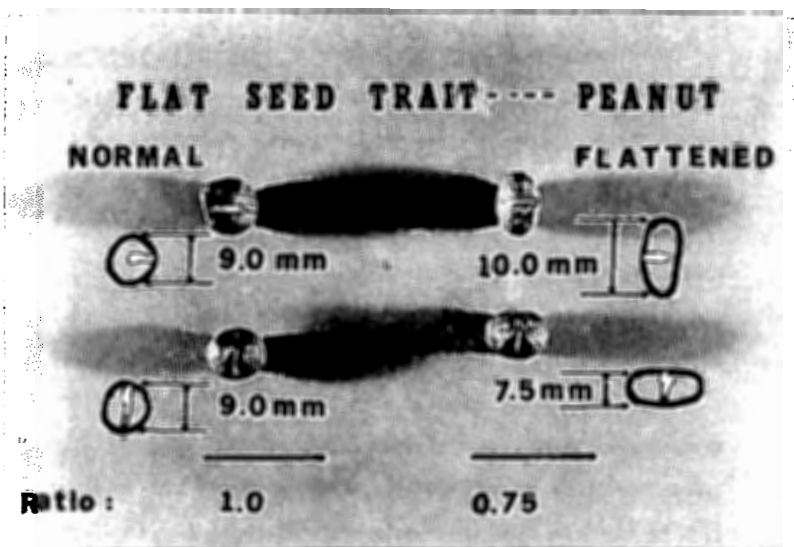


Fig. 1. Diagrammatic sketch and photograph of end views of normal and flat seed. The flattened side is perpendicular to the embryonic axis and parallel to the soil surface.

of 1 to 5 with 1 being poor, 2 fair, 3 average, 4 good and 5 excellent the component lines ranged from poor to good with the composite rating good. They indicated that the flat seed trait may be related to maturity, the use of pesticide chemicals, soil type and genetic factors.

Gorbet (2) found that the planting seed size of the Florunner cultivar had a significant effect on the harvested-seed size some years, but the patterns of response were not consistent.

This study was conducted to determine the feasibility of attempting to correct by selection the undesirable flattened seed trait of the Florunner cultivar.

MATERIALS AND METHODS

Slotted (S-H) and round-hole (R-H) screens were used simultaneously during the screening operation to obtain the following four samples of 1979 crop Florunner peanut seed at the National Peanut Research

Laboratory:

| | |
|----------|--|
| Sample A | Regular, rode a 7.94 mm S-H (20/64 in.) and fell through a 10.32 mm R-H (26/64 in.) |
| Sample B | Flat, rode a 9.52 mm S-H (24/64 in.) and a 11.91 mm R-H (30/64 in.) |
| Sample C | Flat, rode a 8.73 mm S-H (22/64 in.) and a 11.11 mm R-H (28/64 in.) |
| Sample D | Flat, rode a 7.94 mm S-H (20/64 in.) and a 10.32 mm R-H (26/64 in.) |

The round-hole screens measure seed width and are used for determination of the percentage of seed that are 2.38 mm greater (6/64 inch) in width and thickness than the rest of the seed. Such seed are identified here as "flat seed." In the first part of the screening procedure, slotted-hole screens are stacked on the vibrator such that the screen with the narrowest slots is on the bottom of the stack and each successive screen in the upward pattern has slots that are wider than those of the screen immediately below. After the seed from each subsample are sized over these screens, they are removed from each successive screen, weighed, and placed on a round-hole screen with holes 2.38 mm larger in diameter than the width of the slots in the respective slotted-hole screens. The seed that ride the respective round-hole screens are stood on end and positioned by hand over the holes. Those that do not pass through are weighed and identified as flat seed. Calculations of percentages are based upon weight.

Seed of the above samples were planted on May 7, 1980 at the University of Florida Green Acres Agronomy Farm in five replications and handled similar to the other 1980 peanut yield tests in the breeding project. The plots were dug October 3, 1980, 147 days after planting and cured on stack poles. After picking and shelling, the seed were

subdivided into two lots. One lot was graded at Gainesville, Florida using the following four sizes of slotted-hole screens; 9.52, 9.12, 8.73, 7.54 mm and the other lot was graded at the National Peanut Research Laboratory following the same procedure as discussed above for the 1979 crop. The arcsine transformation of the percent data was applied before performing the statistical analysis.

RESULTS AND DISCUSSION

The mean squares from the analysis of variance of the size of Florunner seed derived from four different size/shape categories are given in Table 1. The seed size/shape of the parental samples did not have a significant effect on the seed size of the progeny, and

Table 1. Mean squares from the analysis of variance.

| Source of variation | Degrees of freedom | Mean square |
|-----------------------|--------------------|-------------|
| Treatments | 23 | 762.87** |
| Samples ^{1/} | 3 | 0.21 |
| Screens ^{2/} | 5 | 3498.47** |
| Samples x Screens | 15 | 3.54 |
| Error | 96 | 2.82 |

^{1/} Samples represent the four seed size/shape categories of the parental stocks.

^{2/} Screens represent the six seed size categories of the harvested seed.

** F value significant at the 1% level.

the interaction between the original samples and the different seed size categories also was not significant at the 5% level.

Highly significant differences were obtained between the different screen size categories (Table 2). More than half of the harvested seed (54 to 56%) rode the 7.54 mm (19/64 in.) slotted-screen regardless of the size of the seed planted. The seed size distributions of the harvested seed, including the split seed percentages, were similar whether regular or flat seed was planted.

Tables 3 and 4 present the size and shape distributions of the harvested seed evaluated at the National Peanut Research Laboratory, Dawson, Georgia. The seed size distributions compare with those obtained at Gainesville and reported in Table 2. The percent of flat seed obtained from the four size/shape categories of planted seed was very similar, varying from 19% flat seed for the regular to 22% for the larger flat seed (Table 3). A higher percentage of seed that rode the medium size screen (7.14 mm) were flat (35-39%) compared with 3-6% of the seed that rode the large (8.37 mm) screen (Table 4). In a previous paper Davidson et al. reported 29.7% flat seed for the Florunner cultivar, which at that time was comprised of four component lines (1). They found significant differences in percent of flat seed between the component lines and indicated that if two of the lines were dropped it would tend to improve the shape of the seed of the cultivar. One of the four lines was removed from the Florunner composite in 1970 after four years of testing indicated that the removal of this one line would not detract from the yield or quality of Florunner, while somewhat improving the uniformity of pod size (4).

Table 2. Seed size distributions derived from planting regular and flat Florunner seed.

| Planted seed type and screen size (mm) | Mean percent by weight of harvested seed riding slotted-hole screen size (mm) ^{1/} | | | | | Split seed (%) |
|--|---|------|------|------|-------|----------------------|
| | 9.52 | 9.12 | 8.73 | 7.54 | <7.54 | |
| 10.32 R-H ^{2/} (Regular) | 3.8 | 7.4 | 6.7 | 54.8 | 16.1 | 11.1 |
| 9.52 S-H (Flat) | 2.9 | 8.6 | 7.1 | 56.0 | 13.4 | 11.9 |
| 8.73 S-H (Flat) | 2.8 | 9.6 | 8.4 | 54.3 | 14.2 | 10.6 |
| 7.94 S-H (Flat) | 3.2 | 9.8 | 6.4 | 54.5 | 14.7 | 11.2 |

^{1/} Data represent the mean of five replications. Means between planted seed sizes not significant at 5% level.

^{2/} R-H = round-hole screen; S-H = slotted-hole screen; flat seed were those that rode round-hole screen having a hole diameter 2.38 mm larger than width of slot in the slotted-hole screen.

Table 3. Seed size and shape distributions derived from planting regular and flat Florunner seed.

| Planted seed type and screen size (mm) | Sample wt. (g) | Type of screen ^{1/} | Gram weight of seed riding screen size (mm) | | | | | | | | Flat seed (%) |
|--|-------------------|---------------------------------|---|------|------|------|------|------|------|-------|---------------------|
| | | | 10.32 | 9.52 | 8.73 | 7.94 | 7.14 | 6.35 | 5.56 | <5.56 | |
| 10.32 R-H (Regular) | 2562 | S-H | 0 | 99 | 507 | 1091 | 672 | 173 | 7 | 13 | 19 |
| | | R-H | 0 | 0 | 19 | 170 | 250 | 49 | 1 | 0 | |
| 9.52 S-H (Flat) | 2363 | S-H | 0 | 104 | 451 | 1063 | 614 | 120 | 5 | 9 | 22 |
| | | R-H | 0 | 1 | 30 | 225 | 242 | 22 | 0 | 0 | |
| 8.73 S-H (Flat) | 2328 | S-H | 1 | 90 | 406 | 1040 | 617 | 151 | 9 | 13 | 22 |
| | | R-H | 0 | 0 | 30 | 211 | 238 | 41 | 2 | 0 | |
| 7.94 S-H (Flat) | 2506 | S-H | 1 | 96 | 447 | 1114 | 526 | 305 | 7 | 9 | 21 |
| | | R-H | 0 | 0 | 16 | 180 | 182 | 136 | 2 | 0 | |

^{1/} S-H = Slotted-hole screen (sizes given); R-H = round-hole screen, [sizes of R-H screens are 2.38mm (6/64 in.) larger than width of slot in the slotted-hole screen].

Table 4. Distributions of flat seed derived from planting regular and flat Florunner seed.^{1/}

| Planted seed type and screen size (mm) | Percent flat seed riding slotted-hole screen size (mm) | | | | | Flat seed (%) |
|--|--|------|------|------|------|---------------|
| | 8.73 | 7.94 | 7.14 | 6.35 | 5.56 | |
| 10.32 R-H (Regular) | 3.2 | 15.6 | 37.2 | 28.6 | 4.5 | 19 |
| 9.52 S-H (Flat) | 5.1 | 21.2 | 39.4 | 18.3 | 2.1 | 22 |
| 8.73 S-H (Flat) | 6.0 | 20.3 | 38.6 | 27.2 | 9.1 | 22 |
| 7.94 S-H (Flat) | 2.9 | 16.2 | 34.8 | 44.6 | 12.5 | 21 |

^{1/} Flat seed are those that ride a round-hole (R-H) screen having a hole diameter 2.38mm larger than the width of the slot in the slotted-hole (S-H) screen.

The four sister lines in the original makeup of Florunner were composited in the F₃ and F₄ generations in 1966 and in a self-pollinated species, such as peanut, the initial individual plant selections are most important. As Johannsen found with beans in the early 1900's, the progeny of individual plants within a pureline varied around the mean of the line (3). Although the progeny of individual plants in self-pollinated crops breed true, theoretically in later generations, mutations do occur and minor mutations of a non-defective type are relatively frequent, although not sufficiently large to be of major selective value (3). If the flat seed trait were easier to measure, and less affected by environmental factors such as maturity, pesticides and soil type, there is reason to believe based on earlier work (1, 2) that some progress could be made in selecting for reduced flat seed in the Florunner cultivar.

We speculate that certain cultivars have more flat seed than others because of their shell/seed size relationships, and the type and extent of tissue formation in the shell. The fact that the seed are flattened parallel to the soil surface is probably because the sutures of the shell, the tissue of which are more resistant to pressure, are perpendicular to the soil surface and not because of soil pressure

from above. Cultivars with seed less compacted in the shell are likely to have less flat seed and a lower percentage of meats. Peanut breeders in an effort to develop lines with high shelling percentages may be promoting the tendency for formation of flat seed.

Woodward (6) found that testa strength is a major factor in the prevention of seed splitting. From our experiences in this study we believe that the degree of flatness also affects the amount of seed splitting. Seed with ratios of 0.75 or less seem to split with less effort than those with ratios near 1.0 (Fig. 1).

The results of this study, although based on only one season and one location are adequate to suggest that selection within Florunner to reduce the flat seed problem would have limited success.

The best short-term solution would be in the area of improving the procedures and processing equipment for this cultivar. The long-term solution to the problem will probably best be accomplished by crossing and possibly backcrossing the Florunner lines with other more uniform material.

ACKNOWLEDGEMENTS

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Effect of Ground Spray Equipment on the Distribution of Sclerotium rolfsii in Peanut Fields. F. M. Shokes, Research Plant Pathologist and Assistant Professor, and J. A. Arnold, County Extension Pest Management Specialist, University of Florida, Agricultural Research and Education Center, Quincy, Florida, 32351 and Jackson County Extension Unit, Marianna, Florida 32446.

ABSTRACT

Eighteen north Florida peanut fields were surveyed September 1-18, 1981, for the incidence of stem rot caused by Sclerotium rolfsii Sacc. Stem rot was found in all fields checked and high numbers of disease loci/305m of row were found in two fields. Eleven of the fields had periodic traffic from row crop spraying equipment. Paired analysis of variance between S. rolfsii loci in equipment tire rows versus non-tire rows resulted in no significant differences. Numbers of sites of wilted, dead or dying plants or branches without evidence of S. rolfsii were no different for tire and non-tire rows. Symptoms of Rhizoctonia limb rot (Rhizoctonia solani Kuehn) and signs and symptoms of Aspergillus crown rot (Aspergillus niger v. Tiegh) were present in many fields but 64% of the 2274 loci checked had evidence of S. rolfsii.

INTRODUCTION

Stem rot of peanut (Arachis hypogaea L.) is a serious disease in most of the peanut growing areas of the world (3). The causal agent Sclerotium rolfsii Sacc. has been reported on nearly 100 plant families worldwide (1). It is a pathogen of soybean which is often used in rotation with peanuts in the southeastern United States.

Stem rot is characterized by sudden wilting of branches on which leaves become chlorotic, turn brown, and dessicate quickly (1).

Mats of white mycelium are observed when the fungus is actively growing on branches or around the crown of the plant. Sclerotia are often evident even after mycelial mats have disappeared. Recommended controls for stem rot in Florida (4) include 3-4 yrs between peanut crops, deep plowing to bury surface debris, weed control with herbicides so that soil and debris are not deposited on plants by cultivation, control of peanut leafspot diseases to decrease defoliation of plants, and use of soil fungicides containing pentachloronitrobenzene (PCNB).

Stem rot may be spread into uninfested areas by any means through which sclerotia may be transported, such as by water, on infected transplants, or by soil adhering to agricultural implements or the feet of animals (1). Taubenhaus (8) found that mechanical injury of plants facilitates growth of the fungus into certain plant parts. In peanut fields traffic with row crop sprayers may cause injury to vines particularly when growth is sufficient to cover the middles between rows. In north Florida, peanuts may be sprayed 5-9 times a season with fungicides for leafspot control. Small fields 2-8 ha are used many times for peanut culture and are often surrounded by trees. In such fields proper spray coverage by aerial application is difficult. These fields and many larger fields in north Florida are sprayed by ground equipment.

Peanut fields in Jackson County, Florida, were surveyed for the incidence of stem rot. In fields where field crop sprayers were regularly used we checked equipment tire rows and non-tire rows to determine if there was any difference in stem rot due to field traffic. This paper reports the results of the survey.

MATERIALS AND METHODS

Eighteen fields were surveyed from September 1-18, 1981. Eleven of the fields chosen had traffic by row crop sprayer equipment. Seven of the fields were irrigated five or more times during the growing season. The age of the peanuts surveyed ranged from 112-130 days with an average age of 126 days after planting.

In fields where fungicides were applied aerially, 305m of row were checked, with examination of each dead or dying plant or branch. In fields sprayed with ground application equipment 305m of tire row were checked for comparison against 305m of non-tire row in the same area of the field. Generally the non-tire row evaluated was within 2-4m of the tire row checked. In all fields with periodic equipment traffic, tire rows were readily discernible. In field number 11 only 152.2m for tire and non-tire rows were checked due to the high number of disease loci within this field. Fields 14 and 15 were actually two parts of the same 19.4 ha field. Two-thirds of this field (herein designated field 15) was treated with a granular fungicide-insecticide PCNB plus fensulfothion (O, O-Diethyl O- 4 (methylsulfinyl) phenyl Phosphorothioate] at the rate of 112 kg/ha. The other third (designated as field 14) was untreated. This field had no regular equipment traffic.

Plants with symptoms were examined for actively growing S. rolfsii or sclerotial remains of that fungus. Disease loci without evidence of S. rolfsii were categorized as 'other'. Infection loci were counted using the system of Rodriguez-Kabana et al. (7) in which a locus is defined as an infected area equal to or less than 30 cm of row. Numbers of disease loci were transformed before analysis using a square root transformation [$n = (\text{no. of disease loci}/305\text{m of row}) + 1/2$]^{1/2}. Data from tire and non-tire rows were analyzed for differences using the comparison of sample means for paired observations.

RESULTS AND DISCUSSION

Sclerotium rolfsii was the prevalent fungus on wilting, dead, or dying plants in the 18 fields surveyed (Table 1). The number of disease loci/305m of row varied from as low as 2 in field 17 to as high as 187 in field 11. Other loci ranged from a low of 7 to a high value of 77. Field 15, treated with PCNB-fensulfothion had approximately one-half as many infection loci of S. rolfsii as untreated, adjacent field 14, but it had a higher number of other loci (46 as compared to 32). The mean number of disease loci/305m of row for all fields was 52 compared to a mean of 31 other loci. Typical symptoms (3) of Rhizoctonia limb rot (Rhizoctonia solani Kuehn) or the symptoms and signs of crown rot (Aspergillus niger v. Tiegh) were evident at some of the loci designated as other. Lesser cornstalk borer (Elasmopalpus lignosellus Zeller) may have been a causal agent also since it can kill branches of peanut plants and is a sporadic pest in north Florida fields. No examination was made of individual plants or branches for larvae or silken tubes indicative of lesser cornstalk borer infestation.

A comparison of tire and non-tire rows in the same area of 11 fields (Table 2) using a paired analysis of variance gave no significant differences ($p = 0.05$) for the mean number of loci with S. rolfsii. Forty seven loci were obtained for tire rows compared to 50 for non-tire rows. In some fields numbers of infection loci were higher for non-tire rows than for tire rows. There were also no differences between other loci ($p = 0.05$) for tire and non-tire rows, respectively.

Stem rot is a serious disease in north Florida peanut fields. None of the 18 fields surveyed was devoid of S. rolfsii. Of the wilted, dead, or dying plants checked (2274 loci) in all fields, 64% had

evidence of the stem rot fungus, S. rolfsii. In fields 11 and 14 the number of diseased plants were high (12%). One of these fields (#14) had no ground traffic, having had all post-plant treatment applied by aircraft. Field 11 had leafspot sprays applied five times by ground equipment and 4 times aerially. There was no difference statistically in the stem rot in tire rows compared to non-tire rows. Field 12 had leaf-spot sprays applied nine times and field 3 had sprays applied eight times by ground application equipment. One had a higher number of S. rolfsii loci in tractor tire rows (field 12), but the other had a higher number in non-tire rows (field 3). The lack of evidence for spread of S. rolfsii by ground application equipment might be due to the characteristic development of the disease in the rows near the crown of the plant. Rhizoctonia limb rot is a disease which infects lateral branches where they come into contact with the soil, another infected branch, or fallen leaves. One might expect some increase in Rhizoctonia limb rot due to injury of branches by equipment tires but this was not evident when the loci designated 'other' were compared for tire and non-tire rows. However, no attempt was made to specifically enumerate loci with symptoms of limb rot.

Seven fields were irrigated with 2.5 cm or more of water, five or more times during the season. An unpaired analysis of irrigated fields versus dryland fields for S. rolfsii disease loci indicated no significant differences. This does not agree with our observations (authors-unpublished) in research plots. Two times as many infection loci of S. rolfsii were observed in 1981, in research plots that were irrigated, when tensiometers at a 15.2 cm depth registered -0.6 bars, than were observed in dryland plots in the same test. It is likely that the

fields checked in this survey had such a wide variation in rainfall in addition to irrigation that no differences were detectable. Rainfall was considerably below normal in north Florida in 1981.

CONCLUSIONS

Results of this survey seem to indicate that spraying with ground application equipment does not increase the likelihood of spread of S. rolfsii within peanut fields. Precautions should still be observed, however, under wet conditions. If 1981 had been a wet year the results may have been different. More data is needed under various environmental conditions before one can preclude all possibility of dissemination of S. rolfsii by field equipment.

Data is available with other crops (2,6) to indicate that the effect of soil compaction by field equipment is very important. Compaction of peanut soils by field traffic could decrease the number of pegs which penetrate the soil and produce pods, thus decreasing yields. Mazingo (5) has shown that several peanut cultivars with the runner growth habit had less fruit on the side of a row exposed to traffic. If ground pesticide application equipment is used the number of traffic rows should be minimized by use of multi-row spray booms for this reason.

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Table 1. Number of loci/305m of row with wilting dead or dying plants or branches for eighteen North Florida peanut fields.

| Field No. | No. ha | Irrigated ^a | <u>S. rolfsii</u> ^b | Other ^c |
|-----------------|--------|------------------------|--------------------------------|--------------------|
| 1 | 3.2 | No | 13 | 8 |
| 2 | 20.2 | No | 30 | 18 |
| 3 | 64.7 | Yes | 32 | 12 |
| 4 | 13.0 | No | 29 | 50 |
| 5 | 24.2 | No | 35 | 76 |
| 6 | 16.6 | Yes | 19 | 77 |
| 7 | 6.1 | Yes | 41 | 37 |
| 8 | 12.1 | Yes | 43 | 15 |
| 9 | 44.9 | Yes | 54 | 22 |
| 10 | 19.4 | No | 29 | 7 |
| 11 ^d | 4.5 | Yes | 187 | 20 |
| 12 | 3.8 | Yes | 42 | 28 |
| 13 | 15.4 | No | 79 | 10 |
| 14 | 6.5 | No | 174 | 32 |
| 15 | 13.0 | No | 81 | 46 |
| 16 | 6.7 | No | 30 | 20 |
| 17 | 7.0 | No | 2 | 17 |
| 18 | 8.1 | No | 8 | 59 |
| \bar{X} | | | 52 | 31 |

^aYes indicates that a field was irrigated five or more times with at least 2.5 cm of water each time.

^bNumber of disease loci at which S. rolfsii was actively growing or evidenced by sclerotia. Loci for fields 1-4, 9-13, 6 and 18 are a mean for tractor and non-tractor rows. Fields 5-8, 14, 15, and 17 had no tractor rows.

^cOther represents wilting, dead or dying plants or branches without direct above-ground evidence of S. rolfsii.

^dOnly 152.5m of row were examined in this field due to the high incidence of disease loci. Values were adjusted to represent the number of loci for 305m of row.

Table 2. Stem rot disease loci/305m of row for equipment tire rows versus non-tire rows for eleven North Florida peanut fields.^a

| Field No. | Tire Row | Non-Tire Row |
|-----------------|----------|--------------|
| 1 | 13 | 13 |
| 2 | 29 | 31 |
| 3 | 27 | 38 |
| 4 | 32 | 26 |
| 9 | 44 | 65 |
| 10 | 30 | 28 |
| 11 ^b | 182 | 192 |
| 12 | 46 | 37 |
| 13 | 58 | 100 |
| 16 | 43 | 18 |
| 18 | 10 | 6 |
| \bar{x} | 47 | 50 |

^aNumbers of disease loci represent sites where *S. rolfsii* was evident above-ground for each wilting, dead or dying plant or branch.

^bOnly 152.5m of non-tire row and the same distance of tire row were examined in this field due to the high incidence of disease loci. Values were adjusted to represent the number of loci for 305m of row.

Table 3. Numbers of loci/305m of row at which wilted, dead or dying plants or branches were noted without direct evidence of S. rolfsii.^a

| Field No. | Tire Row | Non-Tire Row |
|-----------------|----------|--------------|
| 1 | 8 | 8 |
| 2 | 16 | 21 |
| 3 | 18 | 6 |
| 4 | 38 | 62 |
| 9 | 25 | 20 |
| 10 | 5 | 9 |
| 11 ^b | 15 | 25 |
| 12 | 29 | 28 |
| 13 | 9 | 11 |
| 16 | 10 | 30 |
| 18 | 58 | 60 |
| \bar{X} | 21 | 25 |

^aNumbers represent sites with no evidence of S. rolfsii. Some sites had symptoms of Rhizoctonia limb rot or signs and symptoms of Aspergillus crown rot.

^bOnly 152.5m of row were examined in field 11 due to the high incidence of disease or injury loci. Values were adjusted to represent the number of loci for 305m of row.

Pressing Peanuts: New Procedures for Removing Oil

J. Pominski, H. M. Pearce, Jr. and J. J. Spadaro

Introduction

In the commercial cage pressing of peanuts for the production of partially defatted products problems arise in which peanuts require excessive pressing times that may result in undesirable products. Previous investigations showed that a number of parameters affect oil removal during cage pressing. These include pressing pressure, temperature, number of splits in the peanuts and storage time (4,5,7). Methods have also been reported for adequately processing peanuts from which sufficient oil cannot be conventionally removed (6). This paper reports on new laboratory scale pressing procedures that use cloth pads and/or variable rates of pressure application for removing oil from peanuts.

MATERIALS AND PROCEDURES

Tests were conducted on commercial spin-blanched Jumbo Runner and Medium Virginia peanuts. The Jumbo Runners had 5.1% moisture and 50.9% oil; the Medium Virginia peanuts had 4.8% moisture and 48.4% oil (2, 3).

Pressing experiments were conducted in a laboratory hydraulic cage press equipped with a 3 1/2 in diameter vertically slotted cylindrical mold (4). This press can be either manually or motor operated. In previous work the press was manually operated (4,5,6,7). For a given procedure, pressing results are essentially the same whether manual or motor controlled. However, all pressure tests being reported were motor operated and were conducted on 600g (1.32 lb) and 200g (0.44 lb) portions of peanuts. Peanuts were pressed with or without cloth pads between layers of peanuts: one or more layers of peanuts were pressed. In tests conducted with cloth pads, unless otherwise stated, the pads were made from cheese cloth which had the following specifications: weight 0.93 oz/yd², 27 ends/in (warp) X 23 picks/in (filling) and 0.0088 in single

thickness (1). Cloth pads were placed at the top and bottom of each layer of peanuts and inserted in the mold so that there was an interference fit (i.e.--the outside edge of the circular pad contacted the side of the mold). Tests were also conducted with pads made of nylon, polypropylene and cotton duck cloths. Unless otherwise indicated, pressing tests were conducted so that the operating pressure of 2000 psig (pounds per square inch pressure on peanuts) was attained in 4 1/2 minutes. Reaching the operating pressure in less than 4 1/2 minutes may cause the peanuts to extrude through the mold slits. Differences in weights of peanuts before and after pressing determined the amount of oil removed. The percentage of oil removed was based on the oil content of the unpressed peanuts. All tests were conducted at 75°F. Pad thicknesses were measured at 2000 psig before and after pressing with peanuts. To do this pads were pressed with the press ram and measurements were made with a dial indicator attached to the ram of the laboratory press.

RESULTS AND DISCUSSION

Duncan's Multiple Range Test was used to statistically evaluate the data in Table 1 for the 200 and 600 g samples. For the 200g samples, there was a significant increase ($p < .05$) in oil yield between 0 and 1, 1 and 2, and 2 and 4 layers of cloth; beyond 4 layers the change in oil yield was not significant. For the 600g samples there was a significant increase in oil yield between 0 and 1, and 1 and 2 layers; there was no significant increase in oil yields between 2, 4 and 8 layers, and between 4, 8, 16 and 64 layers of cloth.

With use of cloth pads (Table 1), oil yields from pressing 600g of peanuts at 2000 psig for 30 minutes were increased from 56.8% where no pads were used to 64% when pads 4 layers thick were used. Similarly for pressing 200g of peanuts, the oil yield increased from 62.9% to 77.0%. The 4 layers of cloth under a pressure of 2000 psig had a thickness of 0.0059 in. Pads of only 2 cloth layer with a thickness of 0.0033

in increased yields from 56.8% to 62.5% when pressing 600g of peanuts. For practical purposes using pads with more than 4 layers of cloth gave no additional increase in oil yields. For pressing at 2000 psig for 30 minutes, cake thicknesses for 600g of peanuts before and after pressing were $5 \frac{5}{8}$ and $2 \frac{1}{4}$ in respectively; for 200g peanuts, thicknesses were $1 \frac{15}{16}$ and $\frac{3}{4}$ in respectively. Peanuts with the smaller cake thickness after pressing yielded the most oil.

Table 2 shows the thicknesses of new pads containing various number of layers of cloth when measured at pressures of 3.125 (50 oz/in²) and 2000 psig. For the new pads under 50 oz/in² pressure, the average single layer thickness ranged from 0.0088 for one layer to 0.0062 inches in 16 layers; under 2000 psig the single layer thickness ranged from 0.0026 for one layer to 0.0013 in 16 layers (1). Measurements at 2000 psig of the pads used once in pressing peanuts showed essentially no differences from the values obtained at 2000 psig on the unused pads.

Table 3 shows effects of processing time on oil removal during the pressing of peanuts at 2000 psig. 55% oil removal is a major commercial objective. For 600g samples pressed with cloth pads, over 55% oil was removed in less than 20 minutes; without the pads 30 minutes of pressing time was required. When 200g of peanuts were pressed with cloth pads, over 55% oil was removed in 5 minutes; oil was removed quicker because of the decrease in cake thickness. Pressed cakes from 600 and 200 g were $2 \frac{1}{2}$ and $\frac{3}{4}$ in thick respectively.

Rate of application of pressure (Table 4) during the pressing of peanuts is an important factor for oil removal. Six hundred grams of peanuts with and without cloth pads were pressed for a total time of 30 minutes, during which time pressure was raised to and maintained at 2000 psig. Times to reach 2000 psig varied from $4 \frac{1}{2}$ to 27 minutes. Peanuts pressed without pads to attain 2000 psig in 18 minutes or more yielded essentially the same amount of oil (66.8%) as peanuts pressed with cloth pads (68.9%). Peanuts without pads, pressed to reach 2000 psig in $4 \frac{1}{2}$ minutes, yielded 57.6% oil; 9.2% less oil. Apparently a slow rate of pressure application is important, as oil flow can proceed with less dif-

ficulty. In a rapid rate of pressure application the peanut mass is so compressed that the flow of oil is restricted. Analysis of variance showed effects of increasing time to reach operational pressure on increasing oil yields to be significant at the 99.9% level. Also, use of 4 layers of cloth for increasing oil yields was significant at the 99.9% level .

Table 5 shows effect of non-interference fits of cloth pads on oil removal. Two hundred grams of Medium Virginia peanuts were pressed with cloth pads that had diameters ranging from an interference fit (edge of pad pressing against inside mold cylinder wall) of 3 1/2 in to 3 in. Edges of pads less than 3 1/2 in diameter do not touch the inside cylinder mold wall. Oil removal decreased from 74.6% for an interference fit of 3 1/2 in diameter to 69.7% for a 3 in diameter cloth pad. Oil removal with no cloth was 60.6%.

Evaluation of the data by Duncan's Multiple Range Test showed there is a significant increase in oil yield at the 95% level between no pad and 3 in diameter pad, and between 3 and 3 1/4 in diameter pads. There was no significant increase in oil yield between 3 1/4 and 3 3/8 in diameter pads. There was a significant increase on the 95% level between 3 1/4 or 3 3/8 and 3 1/2 in diameter pads. Since interference fits of cloth pads may not be necessary for removal of large sufficient amounts of oil, the use of cloth pads in pressing can be a simple and practical operation, especially if used commercially as anticipated.

By inserting cloth pads between thin layers of peanuts, passageways were provided for oil removal during pressing. The distances through peanuts for oil to flow thru were reduced and greater amounts of oil were removed. Table 6 shows oil removal when pressing Medium Virginia peanuts at 2000 psig for 30 min with various type cloths. With cheese cloth pads, pressing of three 200g (3 X 200g) portions in one pressing removed 70.7% oil, compared to 74.6% oil removal when pressing a single 200g portion peanuts. The pressing of a single 600g portion of peanuts between cheese cloth pads removed 59.7% oil. Oil removal from a single

200 g portion with no cloth pad was 60.6%. Pressing 3 X 200g portions of peanuts with commercial polypropylene or nylon cloth pads resulted in oil removal of over 70%; for cotton duck, the oil removal was 67.4%. By pressing thin layers of peanuts with cloth pads between them, increased oil yields were obtained.

Results of peanut pressing investigations showed that increased oil yields were obtained by use of cloth pads between layers of peanuts. Decreasing the depth of peanuts between cloth pads further increased oil yields. In addition, increased oil yields were obtained by increasing time to reach operation pressure. Use of this procedure when pressing peanuts without cloth pads resulted in oil yields essentially equal to those obtained with cloth pads.

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mb1: 3/30/82
ygb: 4-12-82
slh: 5-20-82

302

TABLE 1. PRESSING^{1/} PEANUTS WITH CLOTH PADS

| Layers of Cloth | | % Oil Removed ^{2/} Peanuts Pressed, g | |
|-----------------|---|---|------|
| Number | Thickness ^{3/} at 2000 psig mil inches | 200 | 600 |
| 0 | 0 | 62.9 | 56.8 |
| 1 | 2.4 | 69.7 | 59.4 |
| 2 | 3.3 | 74.5 | 62.5 |
| 4 | 5.9 | 77.0 | 64.0 |
| 8 | 11.2 | 76.5 | 63.4 |
| 16 | 20.8 | 76.7 | 64.4 |
| 64 | 39.4 | 77.2 | 65.0 |

^{1/} Pressing Runner Peanuts at 2000 psig, total pressing time of 30 min.

^{2/} Average of two pressings.

^{3/} Thousandths of an inch, average of 4 determinations.

TABLE 2. PRESSING PADS, THICKNESS EVALUATION^{1/}

| Test Pressure | Thickness, mil inches ^{2/} Layers of cloth | | | | | | |
|---|--|------------|-----|------|------|------|------|
| | psig | No. Layers | 1 | 2 | 4 | 8 | 16 |
| NEW UNUSED CLOTHS | | | | | | | |
| 3.125 ^{3/} | Total | | 8.8 | 13.7 | 25.2 | 50.1 | 99.5 |
| | One | | 8.8 | 6.9 | 6.3 | 6.3 | 6.2 |
| 2000 | Total | | 2.6 | 3.8 | 6.0 | 10.8 | 20.4 |
| | One | | 2.6 | 1.9 | 1.5 | 1.4 | 1.3 |
| CLOTHS ^{4/} USED IN PRESSING PEANUTS | | | | | | | |
| 2000 | Total | | 2.4 | 3.3 | 5.9 | 11.2 | 20.8 |
| | One | | 2.4 | 1.6 | 1.5 | 1.4 | 1.3 |

^{1/} Average of 4 determinations

^{2/} Thousandths of an inch

^{3/} 50 oz/in²

^{4/} Cloth used one time

TABLE 3. PRESSING PEANUTS^{1/}, EFFECTS OF TIME

| Pressing Time | % Oil Removed ^{2/} | | | |
|---------------|-----------------------------|------|-----------------|------|
| | 4 Layers Cloth | | No Cloth | |
| | Peanuts Pressed | | Peanuts Pressed | |
| Min | 200g | 600g | 200g | 600g |
| 5 | 57.6 | 48.5 | 46.8 | 43.9 |
| 10 | 66.5 | 54.6 | 53.5 | 49.4 |
| 20 | 74.3 | 61.4 | 58.6 | 54.6 |
| 30 | 77.5 | 64.0 | 62.9 | 56.8 |
| 60 | 81.0 | 70.2 | 69.0 | 62.7 |

^{1/} Pressing Runner Peanuts at maximum of 2000 psig.

^{2/} Average value of two replicates.

TABLE 4. EFFECT OF RATE OF PRESSURE APPLICATION ON OIL REMOVAL^{1/}

| Layers Cloth | % Oil Removed | | | |
|--------------|--------------------------------|------|------|------|
| | Time in Min to Reach 2000 psig | | | |
| | 4 1/2 | 9 | 18 | 27 |
| 0 | 57.8 | 62.8 | 66.4 | 66.2 |
| | 57.5 | 63.7 | 67.1 | 66.3 |
| | Avg 57.6 | 63.2 | 66.8 | 66.2 |
| 4 | 63.7 | 67.8 | 68.4 | 67.8 |
| | 64.5 | 67.9 | 69.4 | 68.1 |
| | Avg 64.1 | 67.8 | 68.9 | 67.9 |

^{1/} Pressed 600g Runner Peanuts to and maintained at 2000 psig, total pressing time of 30 minutes.

TABLE 5. EFFECTS OF NON-INTERFERENCE FIT ON % OIL REMOVED^{1/}

| Test | | % Oil Removed | | | |
|--------|-------|--|-------|-------|------|
| Number | No | Diameter of Cloth Pad ^{2/} , inches | | | |
| | Cloth | 3 1/2 ^{3/} | 3 3/8 | 3 1/4 | 3 |
| 1 | 59.8 | 74.9 | 72.4 | 71.9 | 69.6 |
| 2 | 61.4 | 74.3 | 72.8 | 71.5 | 69.7 |
| Avg | 60.6 | 74.6 | 72.6 | 71.7 | 69.7 |

^{1/} Pressing 200g Virginia peanuts at maximum of 2000 psig, total pressing time of 30 min.

^{2/} 8 layers of cloth on top and bottom.

^{3/} Interference fit.

TABLE 6. PRESSING ^{1/} PEANUTS WITH VARIOUS TYPE CLOTH PADS

| Cheese cloth 8 layer | | Polypropylene 1 layer | | Nylon 1 layer | | Cotton Duck 1 layer | |
|-----------------------------|----------------------|--------------------------|--------|------------------|--------|------------------------|--------|
| 0.0108" thick ^{2/} | | 0.0257" thick | | 0.0185" thick | | 0.0119" thick | |
| 200g | 3X200g ^{3/} | 200g | 3X200g | 200g | 3X200g | 200g | 3X200g |
| % Oil Removed | | | | | | | |
| 74.9 | 70.8 | 75.3 | 72.8 | 75.7 | 70.9 | 74.1 | 67.6 |
| 74.3 | 70.7 | 75.1 | 71.7 | 74.1 | 69.7 | 73.7 | 67.3 |
| Avg 74.6 | 70.7 | 75.2 | 72.2 | 74.9 | 70.3 | 73.9 | 67.4 |

^{1/} Pressing Virginia peanuts to and maintaining at 2000 psig total pressing time 30 minutes.

^{2/} Thickness at 2000 psig.

^{3/} Pressing three 200g portions of peanuts with cloth pads between them. Pressing single 600g portion of peanuts between cheese cloth pads removes 59.7% oil.

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BREEDING AND GENETICS

Collection Of Arachis Germplasm In South America. C.E. Simpson*, D.J. Banks, W.C. Gregory, A. Krapovickas, J. Pietrarelli, H. Zurita O., J.F.M. Valls and A. Schinini. Texas Agric. Exp. Stn., Stephenville, TX; USDA-ARS and Oklahoma State Univ., Stillwater, OK; North Carolina State Univ., Raleigh, NC; Univ. Nacional del Nordeste, Corrientes, Argentina; INTA, Manfredi, Argentina; Saavedra Agric. Exp. Stn. Santa Cruz, Bolivia; EMBRAPA/CENARGEN, Brazilia, Brazil; and Corrientes, Argentina.

Since 1976 the authors have conducted eleven Arachis germplasm collection expeditions in South America. These explorations were sponsored by the International Board for Plant Genetic Resources (IBPGR) FAO, Rome, Italy, and supported by the authors' respective agencies.

Expeditions have covered areas in Argentina, Brazil, Bolivia, Peru and Paraguay. A total of 477 cultivated and 292 wild species Arachis accessions have been collected. Where possible seeds have been our main concern, but live plants were collected if no seed were found. Herbarium specimens were taken of the wild species, and nodules were collected from wild and cultivated types when they were present. Most of the cultivated collections were made from fields or vendors and farmers in local markets.

The original materials were distributed to the host country and team members. The United States portion of each collection has been (or will be) multiplied and distributed to the USDA Regional Plant Introduction Station, Experiment, GA, U.S.A. and to ICRISAT, Patancheru, India. These latter two agencies will be responsible for distribution of the materials to interested scientists.

The Arachis germplasm collection work is far from complete. Much searching remains to be done in Bolivia and Brazil for the wild Arachis species and additional exploration will be necessary in several areas for cultivated types to complete our germplasm collections from the primary gene center, South America.

Peanut Germplasm Development. D. J. Banks*, H. A. Melouk, and D. L. Ketring, USDA-ARS, Departments of Agronomy and Plant Pathology, Oklahoma State University, Stillwater, Oklahoma 74078.

The research of the USDA-ARS Peanut Research Unit, cooperative with Oklahoma State University, is directed toward selection and development of basic peanut germplasm for use in breeding programs to improve peanut varieties in all peanut growing areas. Toward this goal, the general objectives are: 1) develop superior peanut germplasm with ability to resist or tolerate biological and environmental stresses and to improve plant efficiency utilizing wild and cultivated genetic sources; 2) identify basic heritable traits in peanut germplasm that combine the above factors with increased plant productivity; and 3) develop basic techniques to increase efficacy in germplasm evaluation and hybridization procedures thereby permitting the production of superior hybrids for further use in breeding. Specifically, the work involves the evaluation and selection of parents, followed by hybridization procedures that will permit successful flow of germplasm into cross-compatible genotypes. All of these require a high degree of originality in promoting the production of viable, fertile hybrids across time-enhanced biological barriers that formed these distinct species with rigorous genetic isolation. The disciplines required to obtain these objectives include: plant breeding, genetics, cytology, cytogenetics, plant pathology, plant physiology, entomology, plant tissue culture methodology, and taxonomy. One major area of emphasis is the development of leafspot resistant peanut cultivars. In this regard, we have combined the genomes of two wild species (each with resistance to early leafspot) with cultivated peanuts. A back-crossing program is presently underway. In these endeavors we are cooperatively involved with many researchers in the USA as well as abroad. We have excellent facilities and equipment and one of the world's best germplasm collections to aid us in achieving our objectives.

Improvement of *A. hypogaea* by Combining Ancestral and Other Wild Species Genomes.
A.K. Singh* and J.P. Moss, Groundnut Program, ICRISAT, Patancheru P.O. 502 324
A.P., INDIA.

Utilization of wild species is important for widening the genetic base and in crop improvement. In *A. hypogaea* the initial potential for such improvement lies with compatible taxa of section Arachis; the following methods were adopted for the 8 available diploids.

Earlier, hexaploids were produced involving 3 diploid species, resistant to leaf spot. Recently hexaploids have been produced involving five other species resistant to other pathogens. Subsequent backcrossing of earlier hexaploids has produced progenies with 40 chromosomes with features from wild species; some progenies are stable.

In another method the F1 hybrid seedlings of diploid species were treated with colchicine to establish 40-chromosome amphiploids which were crossed with *A. hypogaea*. The majority of the 31 amphiploid combinations are meiotically irregular and are either sterile or have low fertility. Twenty two amphiploids were crossed, and then backcrossed, with *A. hypogaea*. Some *A. hypogaea* x amphiploid derivatives have good fertility, and are a very promising route for transfer of desired features. These results indicate which species are probable ancestors of *A. hypogaea*.

The third method used was to produce autotetraploids, and cross these with *A. hypogaea*. Autotetraploids are mostly vigorous, but meiotically irregular and sterile. Six autotetraploids were crossed and backcrossed with *A. hypogaea*. *A. hypogaea* x *A. batizocoi* (4x) progenies were fertile, indicating another possible route for incorporation of disease resistance, and that *A. batizocoi* is one of the closest relatives of *A. hypogaea*.

Screening For Field Resistance To Peanut Leafspot In Virginia.
T. A. Coffelt* and D. M. Porter, USDA, ARS, Suffolk, Virginia.

Leafspot in peanuts (*Arachis hypogaea* L.), caused by *Cercospora arachidicola* Hori and *Cercosporidium personatum* (Berk. & Curt.) Deighton, continues to be a major disease problem. Using fungicides for leafspot control results in a 10 percent increase in production costs in Virginia. Several peanut lines were screened for field resistance to leafspot in 1978, 1979, 1980, and 1981. The susceptible cultivars Florigiant and VA 72R were used as checks in 1978, whereas Florigiant alone was used as a check in 1979, 1980, and 1981. The percentage of defoliation, leaflets infected, and number of spots per infected leaflet were determined for each line. In 1978, eight of the ten lines had significantly less defoliation than Florigiant, three had significantly fewer infected leaflets than Florigiant and VA 72R, and one had significantly fewer spots per leaflet than Florigiant and VA 72R. In 1979, five lines from the cross Chico x Florigiant and one from the reciprocal cross were compared to Florigiant. All lines had significantly less defoliation, while the five Chico x Florigiant lines had significantly fewer infected leaflets and spots per leaflet than Florigiant. In 1980 and 1981, the six lines screened in 1979 plus three additional lines from the reciprocal cross were compared to Florigiant. All genotypes had less defoliation, fewer infected leaflets, and fewer spots per infected leaflet than Florigiant. The five Chico x Florigiant lines had consistently less defoliation, infected leaflets and spots per leaflet than the four Florigiant x Chico lines, indicating that a cytoplasmic factor may influence resistance to leafspot in these lines.

Evaluation of Peanut Genotypes for Resistance to Leafspot and for Agronomic Performance. D. W. Gorbet*, A. J. Norden, and F. M. Shokes, University of Florida, Agricultural Research Center, Marianna, Florida, Department of Agronomy, Gainesville, Florida, and Agricultural Research and Education Center, Quincy, Florida.

Twelve peanut (*Arachis hypogaea* L.) breeding lines and two cultivars, 'Florunner' and 'Dixie Runner', were grown in 1981 at Marianna and Gainesville, Florida, in a split plot RCB study to evaluate their leafspot (*Cercospora arachidicola* and *Cercosporidium personatum*) resistance and agronomic performance. Genotypes included Virginia, runner, and valencia market types, ranging in maturity from 120-150 days. Some entries were previously rated as resistant to leafspot. Plots were irrigated but not sprayed with a fungicide for control of leafspot. All entries in both tests were rated for leafspot resistance just prior to each of three bi-weekly harvest dates. Leaf samples were taken from all entries in the Marianna test at 98 and 116 days after planting (DAP). Mean diseased tissue area per leaf ranged from 3.7 to 29.2% at 98 DAP and from 6.8 to 33.8% at 116 DAP, with the dominant pathogen being *C. personatum*. Based on disease ratings, there was a major increase in leafspot development in the upper plant canopy between 120 and 136 DAP at both locations, especially on the more susceptible genotypes. Florunner was among the more susceptible and Dixie Runner was among the more resistant entries at both locations. Test extremes for pod yield were noted at the last harvest date at both locations, ranging from 4804 - 867 kg/ha at Marianna (153 DAP) and from 4147 - 786 kg/ha at Gainesville (134 DAP). The same breeding line gave the highest pod yields at both locations and rated among the most resistant to leafspot.

Genetic Study of a Miniature Phenotype in *Arachis hypogaea* L.
W. D. Branch* and R. O. Hammons, Dept. of Agron., Univ. of Georgia and USDA-ARS, Coastal Plain Expt. Stn., Tifton, GA.

A mini phenotype was found within a nursery plot of a valencia cultivar. The original heterozygous plant was greatly reduced in size and fruiting. Plant measurements and inheritance data were determined from hybrid cross populations involving distinct progeny classes (macro, mini, and micro) as parental lines. Simple inheritance was indicated for this aberrant phenotype among segregating progenies from F₁ mini hybrids. The macro and micro progenies bred true to type, respectively.

Cytological Relationships Among Varieties of *Arachis hypogaea* L. H. T. Stalker,* North Carolina State University, Raleigh, NC

Cultivars of *Arachis hypogaea* L. plus *A. monticola* Krap. et Rig. were analyzed cytologically. Normal meiosis was observed in most pollen mother cells of hybrids between botanical varieties. A few univalents were recorded, with the highest frequency in var. *fastigiata* (Valencia) x var. *hypogaea* (Virginia) hybrids. To further characterize the chromosomes of *A. hypogaea*, the karyotypes of 4 var. *hypogaea*, 2 var. *fastigiata*, 3 var. *vulgaris* (Spanish), 1 var. *hirsuta* (Peruvian runner) and *A. monticola* were determined. Based on chromosome length and morphology, homologues were ordered from 1 = longest to 20 = shortest. In all 10 *A. hypogaea* cultivars, chromosomes 4, 8, 10, 12, 14, 15 and 18 were median and nearly identical and chromosomes 9 and 19 were slightly submedian to submedian and very similar. Because variation was observed for the other 11 *A. hypogaea* chromosomes, a standard karyotype for all cultivars could not be formulated. However, patterns of variation were observed within botanical varieties. Based on short/long arm ratios of the 20 chromosome pairs, the 10 cultivars were karyologically separated into four groups which closely corresponded to designated varieties. Varieties *vulgaris* and *hypogaea* represented the extreme karyological groups while vars. *fastigiata* and *hirsuta* were intermediate. *Arachis monticola* was cytologically very similar to var. *vulgaris* cultivars which suggests that var. *vulgaris* may possibly be the most ancient *A. hypogaea* group.

Linkage Between Genes For Non-nodulation and Variegated Testa Color In Peanuts. K. E. Dashiell* and D. W. Gorbet, University of Florida, Agricultural Research Center, Marianna, Florida.

In 1980 Gorbet and Burton described a non-nodulating peanut which was identified in the F₃ generation from the hybridization of 487A-, a University of Florida breeding line, with PI 262090. From this source two non-nodulating peanut lines that have variegated (red/light red) testa were selected for use in genetic studies. Reciprocal crosses were made between the two non-nodulating lines and 487A- which has normal nodulation and pink testa. The F₁ plants were nodulated and the testa was pink with a trace of light pink. The F₂ populations segregated for nodulation and variegated testa color. Two levels of nodulation were observed, normal nodulated and non-nodulated, and three levels of variegated testa were observed, solid color, a trace amount of light color, and variegated in which 10-30% of the testa had a lighter color. This is similar to the variegated testa color in peanuts described by Branch and Hammons in 1980. The data indicates monogenic recessive inheritance for non-nodulation and monogenic partial recessive inheritance for variegated testa. The average recombination frequency for non-nodulation and variegated testa was 7.1%. Data from the F₃ and BC₁ generations also provided evidence of linkage.

Pedigreed Natural Crossing To Identify Peanut Testa Genotypes.

Ray O. Hammons* and W. D. Branch, USDA-ARS and University of Georgia, Coastal Plain Experiment Station, Tifton, GA

Pedigreed natural crossing to produce hybrids for specific end uses has been exploited in the USDA-ARS/Georgia cooperative peanut breeding and genetics research projects since the discovery of suitable dominant genetic markers in the early 1960s. Principal advantages of the method are that (1) the production of F_1 hybrid plants is not dependent upon conventional manual emasculation, (2) their identification and harvest can be performed by semi-skilled workers, and (3) the procedure is more economical than the standard method. We evaluated pedigreed natural crossing as a tool for screening an extensive sample of white testa peanut phenotypes from the world germplasm pool to identify the 5-locus recessive $r f_1 f_2 d_1 d_2$ and other genotypes.

Classification of White Testa Peanuts by Flavonoid Analysis.

D. J. Daigle* and E. J. Conkerton, Southern Regional Research Center, P.O. Box 19687, New Orleans, LA 70179, and R. O. Hammons, Crop Research Unit, P.O. Box 740, Tifton, GA 31793.

The skins and defatted flours of thirty-three white testa peanut genotypes were analyzed for flavonoids. After separation from methanolic extracts of the skins or flours using polyvinylpyrrolidone, the flavonoids were detected using high pressure liquid chromatography and UV spectrometry. These flavonoids were principally sugar derivatives of the aglycones quercetin, rhamnetin, and isorhamnetin. From these data, it was possible to classify the 33 genotypes into several groups, based upon the presence of various flavonoid compounds.

Response of resistant and susceptible genotypes to chemical soil-borne disease controls. O. D. Smith*, T. E. Boswell, and W. J. Grichar, Texas Agricultural Experiment Station, College Station and Yoakum, TX

Breeding lines selected for varied soil-borne disease reactions were grown in paired-plot yield tests dominated by Pythium myriotylum Drechsler or Sclerotium rolfsii Saccardo, to assess the effectiveness of the resistances in preventing economic yield loss. Significant yield and grade increases resulted from fungicide use on susceptible checks at both locations. Some lines responded favorably to fungicidal control of P. myriotylum but not S. rolfsii; the converse occurred for others. The data suggests differing resistance mechanisms for these organism complexes and that the resistances can be combined into the same genotype, but that evaluations for reactions to both organisms are necessary.

Field Performance of Two Peanut Cultivars Relative to Resistance to Invasion by *Aspergillus flavus* and Subsequent Aflatoxin Contamination.

J. I. Davidson, Jr., R. A. Hill, and R. J. Cole, USDA-S&E-ARS, National Peanut Research Laboratory, Dawson, GA 31742, A. C. Mixon, USDA-S&E-ARS, Coastal Plain Experiment Station, Tifton, GA 31793, and R. J. Henning*, Cooperative Extension Service, Rural Development Center, Tifton, GA 31793.

Field studies were conducted to evaluate Sunbelt and Florunner, two runner type varieties identified by a laboratory method as having large differences in resistance of their seed to invasion by *Aspergillus flavus*. Peanuts were grown on three nonirrigated farms during 1980 using two planting dates and three harvest dates for each variety. Peanuts grown on two farms experienced moderate to severe drought stress and both cultivars contained high levels of aflatoxin. Peanuts on the third farm had adequate rainfall and contained very low levels of aflatoxin. Microflora, grade, and aflatoxin data showed that Sunbelt (reported to be resistant to *A. flavus* infection) had no advantage over Florunner (reported to have moderate resistance to *A. flavus*) in reducing levels of *A. flavus* and subsequent aflatoxin contamination under field conditions. Levels of infestation and contamination were related primarily to conditions in the soil environment (geocarposphere) during pod filling. These and prior results show that *A. flavus* and subsequent aflatoxin contamination of peanuts in the field cannot be easily simulated under laboratory conditions. Thus genetic resistance to invasion by *A. flavus* and subsequent aflatoxin production must be verified in real storage and field environments or under conditions simulating those environments.

ENTOMOLOGY

Evaluation of Peanut Pest Management In Georgia - 1981. H. Womack*, G. K. Douce, C. Sivasailam, Georgia Cooperative Extension Service and D. Linder, Department of Agricultural Economics, University of Georgia, Tifton, GA. 31793.

Georgia's extension sponsored peanut pest management program encompassed 98,390 acres (17.7%). In this program peanuts were checked at weekly intervals by 114 scouts for 649 growers at an average cost of \$2.43 per acre. An additional 109,400 acres were scouted by or for farmers not participating in the extension sponsored programs.

Overall, participating growers used slightly more pesticide applications than did the non-participating growers. The average yield of the participant grower group was approximately 300 pounds more per acre than the average yield of the non-participant.

Absolute and Relative Density Studies on the Tobacco Wireworm and Southern Corn Rootworm. P.F. Lummus* and J.C. Smith, Tidewater Research Center, Suffolk, VA

The tobacco wireworm, Conoderus vespertinus, has been found to be a widespread pest of peanuts in Tidewater Virginia. It often exists in mixed populations with the southern corn rootworm, Diabrotica undecimpunctata howardi. The damage which it inflicts to the peanut fruit is indistinguishable from that of the rootworm. Studies were conducted at 8 sites in southwestern Virginia to determine absolute densities of the tobacco wireworm and southern corn rootworm and relate this data to relative densities given by solar baiting. A soil-sifting apparatus which permitted rapid inspection of large volumes of soil was designed for use in this study.

The southern corn rootworm was the most abundant species in 3 of the 8 study sites; the tobacco wireworm, however, was found in large numbers in each of these sites. Of the remaining 5 sites, the tobacco wireworm was the dominant species in 2. Other important insects included granulate cutworms, white grubs, and lesser corn-stalk borers. The recovery of 1 wireworm per 2 solar bait stations per acre was found to indicate a population of ca 1400 wireworms per acre.

Fecundity of the Lesser Cornstalk Borer, Elasmopalpus lignosellus, from "Florunner" and "Spanhoma" Peanut Varieties. R. C. Berberet* and D. A. Sander, Oklahoma State University, Stillwater, OK 74078

Pupae of the lesser cornstalk borer, Elasmopalpus lignosellus (Zeller) were collected from nonirrigated plots of Florunner and Spanhoma peanuts during the 1976, 1977, and 1978 growing seasons. The pupae were incubated for laboratory studies designed to compare reproductive rates in moths from the two peanut varieties. Weights of pupae from Florunner averaged 26.8 mg compared with an average of 27.7 mg for those from Spanhoma. Egg production by moths emerging from pupae collected in Florunner (mean=301/female) was significantly lower ($p=0.05$) than for moths from Spanhoma peanuts (mean=352/female). In both groups, viability of eggs averaged approximately 94%.

Oviposition of the Potato Leafhopper, *Empoasca fabae* (Harris) in Peanut Plants. Edwin T. Hibbs,* Georgia Southern College, Statesboro, Georgia, Loy W. Morgan, University of Georgia, Coastal Plain Experiment Station, Tifton, Georgia, and H. Joel Hutcheson, Georgia Southern College, Statesboro, Georgia.

The distribution of potato leafhopper eggs (*Empoasca fabae* (Harris)) was observed in lacto-phenol cleared tissues of field grown Florunner peanut plants in the reproductive stage (R-7, Beginning Maturity, K.J. Boote's classification). Of all eggs deposited, the plant stems received 12.5%, the leaf petioles 49.3%, the rachises 12.5%, and leaf midribs 25.7%. The number of eggs deposited in leaves, rachises, petioles, and stems combined was greater toward the apex of lateral stems and their branches with 51% placed in the apical one-third of the length, 29% in the central one-third, and 20% in the basal one-third. In more youthful plants (Vegetative Stage - 5), the leaf midribs received proportionally fewer eggs.

Florunner plants (Vegetative Stage - 5) responded differentially to 8-day infestations with six male or six female potato leafhoppers. The six females deposited an average of 34 eggs per plant during the 8-day infestation. The growth of the plants' central axes was reduced 53% by the infestation with females, but only 26% by the males; the number of leaves expanded during the period was reduced 77% by females, but only 57% by males; the fresh weight of aerial plant parts was reduced 22% by females, but only 3.7% by males during the 8-day infestation. Both feeding and oviposition processes are implicated in plant injury responses of peanuts to potato leafhopper infestation.

Control of Peanut Insects in Research/Demonstration Tests in Virginia.

J. C. Smith, Virginia Polytechnic Institute and State University, Tidewater Research & Continuing Education Center, Suffolk, Va.

Research/demonstration tests were conducted in the counties of Greensville, Isle of Wight, Southampton, Surry, Sussex and in the City of Suffolk in 1981. Four tests were conducted to demonstrate the efficacy of registered chemicals and formulations for southern corn rootworm (SCRW) control. Only granular formulations are registered for SCRW control in Virginia, but liquid formulations of two chemicals were included for comparative purposes. A test in the City of Suffolk included a comparison between the control efficacy of four chemicals when applied at the conventional time (early pegging) or when applied in an IPM fashion based on the observation of newly-emerged adults of the 2nd generation. At test sites, SCRW infestations were light to moderate with a range of 9.9 to 28.5% injured pods as maximum injury in various tests.

No registered chemical was consistently superior, however, the spray formulation of carbofuran (Furadan 4F) was consistently superior to the spray formulation of chlorpyrifos (Lorsban 4E) and was often equal to granular formulations. Chemicals applied in an IPM fashion performed in an inconsistent manner with ethoprop (Mocap 10G) being the most effective and chlorpyrifos being the least.

In two tests designed to determine the efficacy of soil-applied systemic insecticides vs. preventative sprays against spider mites, data were also taken on tobacco thrips and potato leafhopper control. Spider mites occurred in both tests. Only preventative sprays of dicofol (Kelthane MF) and soil-applied aldicarb (Temik 15G) were effective. Yield and value data of various treatments will be discussed.

Influence of Systemic Insecticides on Thrips Damage, Plant Growth, and Yield of Florunner Peanuts. R. E. Lynch*, J. W. Garner, and L. W. Morgan, Southern Grain Insects Research Laboratory, USDA-ARS, and Department of Entomology, Coastal Plain Experiment Station, Tifton, GA.

Studies were conducted in 1979 and 1980 on the influence of in-furrow application of aldicarb, carbofuran, disulfoton, and phorate on thrips damage, plant growth and yield. All materials provided excellent control of thrips for 28 days in 1979. In 1980, however, a resurgence of thrips occurred on the carbofuran-treated peanuts. Treated plants tended to grow faster in comparison to the untreated plants in both years. However, the increased rate of growth did not produce a significant yield increase. No differences were found in yield, total sound mature kernels, extra large kernels, g/100 seeds or value/hectare in either year.

Application of Insecticides to Plants Through Irrigation Systems. Loy W. Morgan, University of Georgia, Coastal Plain Experiment Station, Tifton, GA

In 1981 an experiment was designed to use the large center pivot irrigation system at Plains, Ga., to study the effects of several insecticides on the yield and quality of peanuts. The design permitted the taking of replicated data from each treatment and the untreated check. Five equal segments of ca. 6 acres each were used for the test, which included Lorsban®, Sevin®, Dyfonate®, Diazinon® and an untreated check. Each insecticide was applied at the rate of 2.0 lb AI/A in 0.12 A. inches of water. Immediately before the application, four 25 ft lengths of 4 ml. clear plastic were placed on A-frames over a 2-row bed in each section in order to have an untreated check in each treatment. At the same time, four 25 ft lengths of 2-row beds were staked off for taking data for the treatment. Application of the chemicals was made at night to avoid excessive drift and to allow for removal of the tents in the early morning to prevent sun damage to the peanuts. Insect pressure in this field was very light throughout the growing season. Southern corn rootworm larvae (SCR) damage to pods did not exceed 7%, and foliage damage was negligible. Yield increases were 128-739 lbs/A greater than the checks in all treatments, but these differences were not significant.

Modified Atmospheres: Effectiveness in Control of the Red Flour Beetle and the Almond Moth in Stored Peanuts. E. G. Jay*, USDA-ARS, Savannah, GA.

All life stages of the red flour beetle, *Tribolium castaneum* (Herbst) and the almond moth, *Ephestia cautella* (Walker) were exposed for periods of from 1 to 6 days to modified atmospheres containing either: (1) ca. 15% carbon dioxide (CO₂), 1% Oxygen (O₂), and 84% nitrogen (N₂); (2) ca. 99% N₂; or (3) ca. 60% CO₂, 8% O₂, 32% N₂. These tests were conducted with caged insects in 625 l. steel towers containing ca. 248 kg. shelled peanuts at a temperature of 75.9 ± 1.3°F in conjunction with long term studies on shelled peanut storage in modified atmospheres. In general, the N₂ atmosphere gave the most rapid (100%) mortality of pupae and adults of both species and larvae of the red flour beetle while the high CO₂ atmosphere produced the fastest (100% mortality) kill of larvae of the almond moth and eggs of both species. Minimum number of days for 100% mortality of eggs and adults of the red flour beetle was 2 days, for larvae 3 days and for pupae of this species 4 days. Similarly, minimum number of days for complete kill of eggs, pupae and adults of the almond moth was 2 days and was 5 days for the larvae.

Monitoring Low-level Populations of the Twospotted Spider Mite on Peanut Field Borders. L. S. Boykin* and W. V. Campbell, North Carolina State University, Raleigh, N.C.

The twospotted spider mite, Tetranychus urticae Koch, often causes economic damage in North Carolina peanut fields. Locating reservoirs of mites in weeds of field borders enables prediction of potential mite infestations. Mites usually occur in weeds in low-level populations. Preferences of the twospotted spider mite for 18 weeds were tested in the laboratory and in the field. Vicia sp., Ipomoea sp., Polygonum pensylvanicum, Sida spinosa, Datura stramonium, Convolvulus sp., and Ambrosia artemisiifolia were the most preferred. Xanthium pensylvanicum, Sorghum halepense, Taraxacum officinale and Rumex crispus were moderately preferred. Amaranthus sp., Paspalum sp., and Plantago lanceolata were only slightly acceptable and Cyperus esculentus, Chenopodium album, Cynodon dactylon and Cassia obtusifolia were not acceptable. Peanut, Arachis hypogaea was preferred over all weeds tested in the field except Vicia sp. A list of 32 mite-infested weeds on the edges of peanut fields was compiled. This list includes weeds in the families Compositae (6 spp.), Leguminosae (4 spp.), Malvaceae (3 spp.), Convolvulaceae (3 spp.), Solanaceae (3 spp.), Polygonaceae (2 spp.), Caryophyllaceae (2 spp.), Rosaceae (2 spp.), Euphorbiaceae (2 spp.), Labiatae (2 spp.), Gramineae (1 sp.), Commelinaceae (1 sp.), Chenopodiaceae (1 sp.), Phytolaccaceae (1 sp.), Portulacaceae (1 sp.), Oxalidaceae (1 sp.), and Cucurbitaceae (1 sp.). Specific searching techniques were developed.

Spider Fauna Of Peanuts In The West Cross-Timbers Area Of Texas.
C. W. Agnew*, TAES, Stephenville, TX, D.A. Dean and J. W. Smith, Jr.
Texas A&M University, College Station. TX.

A project was undertaken in 1981 to study the spider fauna of peanuts in the West Cross-Timbers area of Texas. About 97 species representing 61 genera and 17 families were collected from 3 fields located in Erath and Comanche Counties.

Spiders were abundant throughout the growing season averaging 3.04 spiders/m in plots sampled by visual examination. The Lycosidae were the most abundant group of spiders in peanuts (29.5% of the total) with Pardosa pauxilla Montgomery by far the most numerous lycosid. Oxyopes salticus Hentz (17.4%) and Misumenops spp. (mostly celer (Hentz)) (14.7%) were also dominant species, while Latrodectus mactans (Fab.) (4.5%), Aysha gracilis (Hentz) (4.0%), the Erigonidae (3.4%), Oxyopes apollo Brady (3.1%), Tetragnatha laboriosa (Hentz) (2.3%), Ebo spp. (2.1%) and Chiracanthium inclusum (Hentz) (1.3%) were abundant as well.

Hunting and ambushing spiders far outnumbered web-builders (84 to 16%). The hunting spiders fell into 2 groups: the foliage inhabiting spiders such as O. salticus, C. inclusum and A. gracilis and the ground spiders such as the lycosids and gnaphosids. The ambushing spiders, Misumenops spp. and Xysticus spp., were found on both foliage and ground. Most web-builders such as L. mactans, erigonids and dictynids build their webs on the ground or at the plant base. The dominance of hunting and ground dwelling spiders is probably due to the low-growing nature of the peanut plant and the type of prey available.

A study of spider prey showed over half of observed predation was on insects of the orders Hemiptera and Lepidoptera. More beneficials were taken than phytophagous species (40.6 to 34.0%) and 16% of the prey consisted of other spiders.

Resistance of Wild Species of Peanuts to an Insect Complex. W. V. Campbell* and H. T. Stalker, North Carolina State University, Raleigh, N.C.

Cultivated peanuts have been screened for resistance to a complex of insects in North Carolina. The program has resulted in identifying germplasm with low levels of resistance to thrips, moderate resistance to the corn earworm and high resistance to the potato leafhopper and southern corn rootworm.

Wild species representing all sections of the genus were also evaluated for resistance to this same insect complex. Very high levels of resistance to thrips, potato leafhopper and corn earworm were identified among the wild species collections. Since highly resistant species to this insect complex included section Arachis collections, the resistant germplasm should be easily introgressed into the cultivated peanut. For example, crosses made between section Arachis collections and cultivated species resulted in lines with higher levels of resistance to corn earworm and the southern corn rootworm than the resistant cultivated standard NC 6. A breeding program is underway to improve cultivated peanuts utilizing the wild species.

EXTENSION AND INDUSTRY

New Developments in Controlled Droplet Application. M.G. Wiltse
Micron Corporation, Houston TX 77043

Controlled Droplet Application (CDA) is the term used to describe the dispersing of liquids through spinning disc or cups designed to produce droplets of uniform size. Droplet size can be controlled by the centrifugal force used and flow rates of the solution dispensed.

Lower volumes of solution can be applied with more uniform coverage when CDA is used with greater retention of the solution on the sprayed surface. Many herbicides, insecticides, growth regulators and fungicides have shown greater effectiveness when applied with CDA applicators.

Developments in equipment engineering have provided CDA equipment with greater flexibility for grower use. Vegetable oils such as cottonseed oil, soybean oil and peanut oil have been shown to be effective as carriers for CDA application of insecticides and hold promise as more efficient carriers for herbicides and fungicides for many applications.

Pesticide manufacturers are evaluating CDA as a tool for more efficient application of their pesticides and leading companies are adding recommendation to their product labels to include CDA for grower use.

1981 CDA Versus Hydraulic Leafspot Spray. Thomas A. Lee, Jr.
Stephenville, TX

During the growing season of 1981, an attempt was made to compare controlled droplet application of fungicides in a total volume of 3,050 milliliters to the standard application of 3 hollow cone nozzles per row putting out a total volume of 15 gallons per acre. The CDA units were spaced on 72 inch centers immediately behind the tractor wheels and the spinner unit was operated at 5000 RPM and approximately a 15 degree angle with relation to the ground. The unit was operated about 4 inches above the plant canopy. A series of plots were sprayed in this manner throughout the growing season and yield data taken at the end.

Immediately prior to harvest, the leafspot and leaf drop ratings were made. Leafspot pressure was moderate, only reaching severe levels late in the season. In looking at the data and at the same time reflecting on what was seen in the field, it can be said that control droplet application, even at rates as low as one quarter of the labeled amount of BRAVO 500, gave entirely acceptable control throughout the season. However, when we looked at the three nozzle arrangement, the lower rates of chemical applied in 15 gallons of water with standard application techniques did not give adequate control throughout the season. Even though the quarter X rate of CDA did not yield or grade as well as the best plot, its gross per acre was higher due to the fact that a significantly lesser amount of chemical was used during the season.

Use of Controlled Droplet Application Technique to Apply
Fungicides for Suppression of Peanut Foliar Diseases.
Robert H. Littrell. University of Georgia, Department of
Plant Pathology, Tifton, GA.

CDA technology is a new method for applying fungicides for control of peanut foliar diseases. Field test results showed effective disease control using the CDA technique. Fungicide dosage was reduced by 50% and disease control was equal to full dosage using the conventional boom sprayer. When reduced amounts of fungicides are used with the CDA technique, there was a corresponding decrease in chemical residue on foliage. Good disease control at reduced dosages was related to improved coverage of leaf surfaces.

A Comparison of CDA and Conventional Spray Coverage with a
Fluorescent Dye. F.M. Shokes. University of Florida, Quincy, FL

Blaze-Orange dye plus Activate 3 surfactant were mixed until the dye was thoroughly suspended in water (5g of dye/l of water). The dye was applied to 'Sunrunner' peanuts with a Controlled Droplet Applicator (CDA) sprayer at a rate of 1.3 GPA and with a conventional spray boom at 12 GPA. A #20 orifice was placed in line with each CDA spray unit and a pressure of 21 psi was used. With the conventional sprayer hollow cone nozzles (D2-25) were used and the application pressure was 38 psi. Both sprayers covered six rows; the conventional sprayer with three nozzles per row and the CDA sprayer with five spray units on 40-inch centers. The peanuts were about 75 days old when sprayed and were beginning to cover the row middles. On the date of spraying the wind velocity was 3-5 mph. CDA units were used at 15°, 30°, and 45° from horizontal. Approximately 150 ft of row length was sprayed and samples were taken from the centers of the sprayed areas. Each sample consisted of 50 leaves randomly taken from the 5th to 8th node down from the growing point of upright stems. Over 100 leaflets were observed in the dark under a uv light. Leaflets were indexed for coverage on a scale from 1-10 with one representing no coverage and 10 representing complete coverage. Peanut plants were also examined in the field under the uv light after dark. Results of the evaluation are shown in table 1.

Table 1. Coverage of 75 day old peanuts sprayed with CDA and conventional spray booms.

| | | Coverage ^a | | Overall ^b uniformity |
|------------------|-----|-----------------------|--------|------------------------------------|
| | | top | bottom | |
| CDA ¹ | 15° | 6.4 | 1.1 | 5.0 |
| Units | 30° | 4.6 | 1.3 | 6.0 |
| | 45° | 5.3 | 1.2 | 4.0 |
| Conventional | | 7.7 | 1.7 | 7.0 |

^aCoverage of dye on the top and bottom of leaflets. Each number represents a mean index of coverage (scale 1-10) on at least 100 leaflets.

^bOverall uniformity is an estimate of the uniformity of coverage of all leaflets on a 1-10 scale.

Spray coverage in the lower canopy seems to be greater using the conventional boom sprayer. Overall uniformity of coverage on the leaflets is also greater but uniformity of droplet size is better with the CDA sprayer. Best coverage with the CDA sprayer in the lower canopy was obtained when sprayer units were set at 15° from horizontal. Further assessment of spray coverage and foliar disease control is needed before one can say anything definite about the effectiveness of CDA sprayers. An experiment is in progress using four rates of chlorothalonil (Bravo 500 4.17F) with CDA versus conventional application. Analysis of residues at three levels in the canopy is being checked before and after spraying. Control of the peanut leafspots is being assessed and yields will be measured. Coverage of plants with a fluorescent dye will be tested at about 100 days after planting. Hopefully enough will be known about CDA sprayers by harvest time to determine whether continued testing on peanuts for control of leafspots is warranted.

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Chlorothalonil Deposition with CDA. W. C. Odle, Diamond Shamrock Corporation, Cordova, TN

Diamond Shamrock Corporation is currently evaluating the use of BRAVO 500 fungicide with controlled droplet application equipment. In addition to the tests being conducted at the Diamond Shamrock Research Farm in Florida, studies at several university locations are also being supported. These studies are being conducted primarily on peanuts to evaluate fungicide deposition within various levels of the crop canopy at different stages of growth.

Chemical analytical methods are being used to determine deposition of three BRAVO rates (2, 1, 0.5 pts/A) applied with CDA and conventional hydraulic equipment. Each treatment is replicated four times and analytical samples consist of 15 leaves selected randomly from the top, middle or bottom canopy of each replication.

Very preliminary results from early season applications indicate no statistical differences in chlorothalonil deposition with CDA and conventional equipment. Statistical differences were noted among the three fungicide rates. This study will be continued throughout the growing season to determine if differences in canopy penetration and deposition occur as the plant canopy enlarges. Efforts will also be made to correlate deposition data with disease control data.

In addition to these peanut tests, similar tests are also being conducted using corn and squash to determine the effect of different leaf and canopy characteristics on chlorothalonil deposition.

Electrostatic Application. J.R. Boone. ICI Americas, Inc.,
Goldsboro, North Carolina

Effective and efficient use of pesticides is dependent on many factors: perhaps, none more important than proper application. Parameters such as volume per acre, droplet size and drift characteristics must be closely monitored to obtain the level of pest control desired and to minimize non-target exposure.

The ElectrodynTM Sprayer affords a means of producing uniform droplets at low volumes (0.5 to 1.0 pint/A) which are electrically charged as a means of directing them to the target. Electrodyn spraying is unique in that droplets are formed, sized and propelled toward the target totally through electrical means.

Peanut Disease Loss Estimates for Major Peanut Producing States in the United States for 1981. R.V. Sturgeon, Oklahoma State University, Stillwater, OK

The peanut has become an important world food and oil crop. Due to its high content of digestible protein, the peanut has a high potential as an edible food crop and should play an important role in supplying the world's protein needs.

Throughout the United States diseases continue to be a major limiting factor in producing maximum peanut yields. More than 3,893,460,000 lbs. of peanuts were produced by the eight states reporting, with an estimated disease loss of a low 6.57% loss reported by New Mexico to a high loss of 24.0% reported for Texas. This amounted to an approximate loss of 498,480,000 lbs. and at \$450 per ton the peanut growers from those reporting states lost over \$112,258,000 during the 1981 season.

Peanut disease incidence will vary from year to year, depending on the weather and control practices used by growers. The southern climate is favorable for plant diseases and with continuous planting of peanuts, the disease potential loss increases. It is well known that disease causing organisms become established and build up under continuous cropping systems and can cause heavy crop losses when conditions are favorable. The severity of the disease is dependent on several environmental factors such as temperature, moisture, nutrition, light, etc., interacting with one another affecting both parasite and peanut plant simultaneously. These conditions vary between infection sites and are never the same each year. Therefore, disease severity will vary according to existing conditions.

Control practices have a great influence on disease incidence and loss. The performance of these control practices become increasingly important because heavy loss in production can critically affect growers financially. Disease control and an economic dollar return depends greatly on early, accurate identification of the disease, selection of fungicide and proper application. Commercial scouting or growers closely monitoring their peanut fields have provided early accurate identification of pests problems and with proper use of available control practices, yields have greatly increased during recent years.

How much of the 112 million dollar loss reported this past year could have been prevented will never be known, yet we are confident that much of this loss could have been prevented by properly using available disease control practices.

Seedling disease continues to be important each year, however, it can be reduced by using recommended cultural practices, high quality seed and fungicide seed and infurrow treatments.

Southern blight is one of the major soilborne diseases causing heavy losses in many states. What the heavy loss reported can be attributed to is debatable since we have soil fungicides available that will control Sclerotium rolfsii when properly applied.

The cooperation of The Plant Pathologists and Nematologists from those states reporting is greatly appreciated and acknowledged.
Peanut disease loss estimate compiled by R. V. Sturgeon, Jr., Extension Plant Pathologist, Oklahoma State University. Chairman, Peanut Disease Loss Committee.

Only in recent years has Sclerotinia blight become a serious problem in Virginia, North Carolina and Oklahoma. The disease was found in Texas this past year. There have been several explanations why this disease has become a problem. In Oklahoma, the disease seems to have developed with improved foliar disease control practices. Sclerotinia sclerotium can be controlled with early detection and proper fungicide applications.

Pod and root rot diseases seem to be a serious problem in every peanut producing area and has increased in recent years. Why the disease is more severe in certain fields is not know. Field studies show certain cultural and chemical practices will reduce the severity of Pod rot. However, because a satisfactory control has not yet been attained, we can expect heavy Pod rot disease losses to continue.

Early and late peanut leafspots, Cercospora arachidicola and Cercosporidium personatum continue to be a major problem with peanut growers in spite of the excellent fungicides presently available. Growers tend to let these fungi become established and do not fully appreciate the program required to obtain control.

Nematodes are found in damaging populations throughout the peanut producing areas. The Southern and Northern Root knot nematode, Meloidogyne arenaria and Meloidogyne hapla cause the most dramatic plant response and can cause severe economic loss. The Root lesion nematode, Pratylenchus brachyurus seems to be living in more areas than the Root knot nematodes and may be causing more extensive losses due to its association with various soilborne diseases. The Ring nematode, Criconeoides spp. is known to cause injury to the roots and pods, however, we lack information concerning what population level can be considered damaging. Cultural practices and nematicides are available that will control these nematodes and with proper use of these practices the heavy loss credited to nematodes can be reduced.

There is a tremendous challenge for Extension and Research Plant Pathologists and Nematologists and Industry to reduce disease losses. We must cooperate and provide the peanut growers more effective and economical disease control practices.

Over the past six to eight years, a new disease has caused increasingly severe problems for Georgia peanut growers. This disease is caused by Rhizoctonia solani. We have called this Rhizoctonia limb rot. Plants are not killed. The fungus infects lower branches in contact with the soil. These branches first show reddish-brown to dark brown lesions which partially or completely girdle the stem. Infected branches usually die. A layer of dead branches and leaves with greyish white to light tan mycelium is often found on the soil surface. Pod stems attached to diseased branches rot and are lost at digging. Growers usually do not know they have this disease until the peanuts are dug and inverted. At that time, the dark brown dead branches can be seen up and down the windrows.

Rhizoctonia limb rot is nearly always limited to irrigated fields and excessive vegetative growth. Irrigation apparently provides high soil moisture, lowers soil temperature and temperature within the vines and encourages excessive vine growth. The excessive vine growth maintains high soil surface moisture and provides shade which lowers temperatures.

In 1981, there was an epidemic of Rhizoctonia limb rot in Georgia, Florida and Alabama in non-irrigated as well as irrigated fields. This was related to much cooler than normal temperatures in late August and September accompanied by frequent rain.

Comparison of In-Furrow Applications and Banded Treatments for Control of Meloidogyne arenaria in Peanut. R. Rodriguez-Kabana, P.S. King and M.H. Pope. Department of Botany, Plant pathology and Microbiology, Auburn University, Agricultural Experiment Station, Auburn, AL 36849

Aldicarb, oxamyl, phenamiphos and carbofuran were applied at planting time in experiments with Florunner peanuts to study the effect of the method of application on their efficacy against Meloidogyne arenaria. Each nematicide was applied at rates of one, two and three pounds a.i. per acre. Each nematicide rate was applied in-furrow, and in five, seven and 14-inch bands followed by light incorporation. Results indicated that banded applications were superior to in-furrow applications both for control of the nematode and in consequent yield response. Band widths of five or seven inches were adequate for optimal efficacy of the nematicides; no particular advantage was derived from the use of the 14-inch band when compared with the narrower bands of application. When aldicarb and phenamiphos were applied in banded, in-furrow and combination banded + in-furrow treatments, the combination treatments did not result in any significant advantage over the simple banded treatments at equivalent rates for nematode control or yield response.

A Consultant's Responsibility to the Grower. Roger Musick
Crop Guard Inc., Eakley, OK

CROP-GUARD, INC. employs three professional plant pathologists, Bruce Nowlin, David Nowlin and Roger Musick. Bruce and Roger initiated the consulting service in March of 1980 in Caddo County, Oklahoma. We were fortunate to find enough progressive knowledgeable farmers to sign up approximately 4500 acres of peanuts, cotton and potatoes.

All of us were "raised" and experienced in pest management systems under Dr. R.V. Sturegon of Oklahoma State University. We had little previous experience in face-to-face confrontation with farmers whenever the big "M" (money) was involved! We did have one big plus on our side that was the pest management program run by OSU extension plant pathology in previous years, even though on a small scale (2000 acres) had good grower acceptance which helped us find that initial nucleus of good, strong progressive farmers we needed to get established.

In contemplating this overwhelming title of my talk, I went back to a person which I feel must be like the "Godfather" of consulting, Dr. Robert Cox, who in his book "The Agricultural Consultant" stated that the success of private consulting hinges on three basic principles which must be acquired and that effect the consultants relationship with his/her clients: 1) technical knowledge and ability to diagnose problems; 2) knowledge of effective and practical control procedures; 3) acceptance and proper implementation of the recommendation by the grower.

Agricultural consultants want to provide the best service possible to growers everywhere. However, many pitfalls are encountered which do not deal with the technical or scientific aspects of the profession. I am inclined to suggest that the consultant's first responsibility to a grower is to take a good, tough course in human psychology.

Should Product Formulations Complement Delivery Systems or Vice Versa. R.K. Lankow. Diamond Shamrock Corporation
T.R. Evans Research Center, Painesville, Ohio 44077.

Chemical companies deal with application technology from the earliest stages of product discovery through the entire economic life of a product. During that period one objective remains clear: deliver a biologically effective dose to the target in the most cost-effective manner. Crop protection chemicals must be formulated to be effective when applied with commonly available equipment. However, as application technology advances, successful chemical producers will modify their products to allow effective use of superior delivery systems.

Should Product Formulations Complement Delivery Systems or Vice Versa. Reid Faulkner, Olin Corporation, Little Rock, AR

The discussion evolves the idea(s) that we are not matching our knowledge of how to control the soil diseases effecting peanuts with weeds -- we are not taking advantage of the things we know about the organisms we are trying to control.

The past and present application techniques are examined with their short comings or weaknesses together with the several types of fungicide formulations available to fit the so-called standard application technique/methods. Current use patterns are examined along with new ideas/thoughts on irrigation, micro-sprayers, high concentration formulations, and exotic carriers.

Ridomil - Section 18. Aithel McMahon. Ciba Geigy Corporation, Ardmore, OK

Texas and Oklahoma have requested a Section 18 label for Ridomil 2E at 2 qts/A to be applied by fungigation at pegging for Pythium pod rot control in peanuts.

A Positive-Flow Pump for Application of Soil Fumigants.
David A. Rickard. Great Lakes Chemical Corp., Memphis, TN

A corrosion-resistant, compact, highly accurate pump has been developed for application of soil fumigants (i.e., ethylene dibromide, chloropicrin, D-D and 1,3-D materials). This pump also has closed system transfer capability to affect applicator exposure to fumigants when refilling. A wide range of delivery rates is possible with a single orifice plate by adjusting a pressure-relief valve on the discharge side of the pump. This unit represents an improvement in fumigation technique over gravity-flow systems.

Ronilan and BAS 436 00 F for Sclerotinia Control on Peanuts.
Jess Davis. BASF Wyandotte Corporation, Lake Dallas TX.

Ronilan and BAS 436 00 F reduced Sclerotinia minor blight on peanuts which resulted in significantly higher pod yields. Preventative disease control schedules gave higher levels of disease control than on demand schedules.

BAS 436 00 F applied in tank mixture with the leafspot fungicide to the crop canopy was as effective as when applied alone through large droplet nozzles directed toward the soil and lower plant parts. Additional testing will be done during the 1982 crop season.

NITROGEN FIXATION

Nitrogen and Other Peanut Shoot Nutrients as Influenced by Cultivar and Strain of Nitrogen Fixing Rhizobium. R. K. Howell* and T. A. Coffelt, USDA-S&E-ARS, Beltsville, MD and Suffolk, VA.

Effective research strategy to enhance biological N₂ fixation depends on an inventory of knowledge for the potentials of combinations of compatible germplasm for both the micro and macrosymbionts. We report the results from field evaluations at Beltsville, MD and Suffolk, VA.

Cultivars NC-7, Florunner, and Tamnut-74 were treated with either 4 individuals or 6 combinations of Rhizobium strains. Parameters evaluated were shoot concentrations of N, Ca, P, Mg, and Zn during the growing season and pod yields. Significant pod yield differences were observed for cultivars but not for Rhizobium treatments. Percent shoot nitrogen was significantly different for Rhizobium treatments in 1980 but not in 1981. Concentrations of foliar P, Ca, Mg, and Zn were significantly influenced by cultivar and/or Rhizobium treatments. No significant differences for cultivar x Rhizobium treatments were observed.

Nitrogen Fixation and Translocation in the Peanut. C. S. Kvien*, J. E. Pallas, D. W. Maxey and J. Evans, Univ. of Georgia C.P.E.S., Tifton, USDA-ARS Southern Piedmont Conservation Research Center, Watkinsville, Ga., and Russel Research Center, Athens, Ga.

Twenty-two peanut (Arachis hypogaea L.) Rhizobium strains were screened for nitrogen fixing ability and serological specificity in growth chamber and laboratory studies. Effective strains were further evaluated in a three year field test. Bacteroids from less effective nodules were noted to contain increasing amounts of poly- β -hydroxybutyrate. Total nitrogen in the plant increased throughout the growing season. The most recently mature leaves increased in nitrogen until developing pods became a strong N sink; N levels in these leaves then started to decline. Nitrogen was found to be transported as γ -methylene glutamine.

Biological Nitrogen Fixation in Peanuts: Relative Importance of Genetic Components of Symbiotic Variability. J. C. Wynne,* T. G. Isleib, G. H. Elkan and T. J. Schneeweis, North Carolina State University, Raleigh, NC

Variability of the plant-Rhizobium symbiosis can be attributed to additive effects of the plant genotype, additive effects of the Rhizobium strain and the nonadditive effects of individual plant and Rhizobium combinations. The relative contribution of these sources of variability is important in adopting the best procedure to maximize genetic advance from selection. Six peanut (*Arachis hypogaea* L.) genotypes were grown in all possible combinations with 10 Rhizobium strains in order to estimate the relative importance of the three genetic components of symbiotic variability. Additive genetic effects of host and Rhizobium genotype were significant for plant color, nodule weight, $N_2(C_2H_2)$ fixed and plant dry weight. Only additive effects of the Rhizobium genotype were significant for nodule number. Nonadditive variation attributable to specific host-strain combinations was significant for all traits measured except for plant dry weight. The large additive effects of the host genotype for nodule weight and plant weight suggest that the available variability for these traits can best be exploited by selection of host plants. However, the large nonadditive effects for nodule number and $N_2(C_2H_2)$ fixed suggest that these traits can best be improved by coincidental selection of both host and bacterium.

Interactions Between Rhizobium Strains and Peanut Cultivars. G. H. Elkan,* J. C. Wynne and T. J. Schneeweis, North Carolina State University, Raleigh, N.C.

Peanuts are nodulated by *Rhizobium* sp. (the cowpea miscellany). Although these bacteria can nodulate many other legumes, nitrogen fixation is a more specific property. In order to determine whether there is a subgroup whose basic host is peanut, 28 diverse *Rhizobium* sp. isolates were analyzed using DNA-DNA hybridization, nitrogenase activity with various hosts, nodule number and plant weight. DNA homology analysis confirmed the taxonomic diversity of these bacteria. At least 9 taxonomic groups were determined. Principal component analysis indicated a group of rhizobia effective with peanuts.

Greenhouse and field studies were established to determine the effects of the cultivar and the bacterial strain on nitrogen fixation. In greenhouse trials, highly significant effects (0.01 α -level) were observed for plant color rating, nodule weight and total plant nitrogen as affected by cultivar, bacterial strain interaction. The bacterial strain and the cultivar by strain interactions had a highly significant effect on nitrogenase activity. Nodule number was influenced by the bacterial strain. Similar results were obtained in the combined field studies. The high correlation between the greenhouse and field experiments establishes the usefulness of such greenhouse studies for screening effective *Rhizobium* isolates and peanut cultivars for subsequent field trials.

Studies on Peanut Bacteroids. Dipankar Sen and R. W. Weaver*, Texas
A&M University, College Station, TX

Rhizobia undergo a spheroplast-like modification in the root nodules of peanut and other members of the genus Arachis that does not occur in other legumes. To determine the possible effect of this modification peanut, cowpea and siratro plants were inoculated with six strains of Rhizobium and their nitrogen fixing activities were measured by the use of acetylene reduction and nitrogen accumulation. All strains of rhizobia showed several fold higher activity, per unit nodule mass, on peanut as compared to cowpea and siratro. The bacteroidal protein contents, per unit nodule mass, were similar among the legume hosts which suggests that some physiological character of the bacteroids in peanut root nodules might be responsible for the higher specific activity of peanut nodules. To determine whether the high activity was due to the unusual bacteroids and not directly due to the plant, nitrogen fixing activity (C_2H_2) of isolated peanut and cowpea bacteroids were compared using N_2 , Ar or He gasses for displacement of air, low concentrations of O_2 and a succinate containing medium. The results were not conclusive because of differential O_2 tolerance of peanut and cowpea bacteroids leading to conditions where maximal activity of the two bacteroid sources could not be directly compared. Maintaining the microaerophilic conditions required for these assays has been improved and experiments are under way that will lead to more definitive results.

NUTRITION AND PHYSIOLOGY

Effects of Salinity on Nodulation in Peanuts (*Arachis Hypogaeae* L.).
J. S. Calahan, Jr., Tarleton State University and Texas Agricultural
Experiment Station, Stephenville, TX.

Greenhouse experiments were performed to determine the effects of sodium chloride and/or calcium chloride developed salinity on nodule formation. Plants, inoculated with *Rhizobium* were grown in containers of sterilized sand and perlite. Treatment solutions of modified Hoagland's (minus nitrogen) nutrient solution containing added salts were used to irrigate the plants. Sodium chloride, at rates of 0, 10 and 100 meg. per liter and calcium chloride at rates of 1, 10, 20 and 100 meg. per liter and all possible combinations of these rates were added to the modified Hoagland's solution. The high salinity treatments were found to completely inhibit nodulation.

Response of Nodulating and Non-nodulating Peanut Lines to N Application. S. K. Pancholy* and S. M.M. Basha, Florida A&M University, Tallahassee, FL, and D. W. Gorbet, Agricultural Research Center, Marianna, FL.

The effect of N application on peanut yield and composition of seed and leaf tissue was studied. A field experiment was laid-out in a randomized block design, employing four rates of N (0, 67, 134, and 268 kg/ha), applied one month after planting, and four peanut lines (one non-nodulating line, two of its parental lines: PI 262090 and 478A, and a commercial cultivar, 'Florunner'). Leaf samples were collected at 45, 80, and 110 days after planting, lyophilized, ground, and stored at -20C. The crop was dug at 136 days after planting, yield determined, and after shelling, seed samples were lyophilized and stored at -20C. Results were analyzed statistically by analysis of variance and regression analysis. Application of N had a significant negative effect on peanut yields of PI 262090 and Florunner. However, in case of non-nodulating peanut line and 487A, no obvious trends were observed. Analysis of leaf tissue revealed that application of N resulted in significant increase in nitrogen (20 to 75%), soluble carbohydrates (15 to 60%), α -amino nitrogen (5 to 15%), and chlorophyll (17 to 80%) contents only in non-nodulating peanut line. The seed protein content of non-nodulating line and PI 262090 increased (50% to 12%, respectively), with N application. Higher iodine values were observed for all four peanut lines following N application.

Potato Leafhopper Inhibits Peanut Leaf Photosynthesis. J. E. Pallas, Jr.* and Edwin T. Hibbs, USDA-ARS, Watkinsville, Georgia and Georgia Southern College, Statesboro, Georgia.

The potato leafhopper, *Empoasca fabae* (Harris) is a polyphagous insect that has been reared on nearly 200 plant species. Under field conditions it can cause considerable damage to the cultivated peanut (*Arachis hypogaea* L.). The symptoms are foliar necrosis and severe stunting. These studies were initiated to investigate whether during its feeding and/or ovipositing any effect on peanut photosynthesis could be detected. Peanut plants, variety Florunner, were grown and treated under highly controlled environmental conditions. Recently mature leaves or whole plants were placed into a closed-system to measure net photosynthesis. After establishing a leaf or plant photosynthetic rate, a given population of *E. fabae* was released or individually contained in small chambers within the closed-system. A very marked inhibition of peanut leaf photosynthesis was found to be associated with feeding by the insect.

Effect of Drought and Soil Temperature on Peanut Canopy, Stem, and Pod Temperatures. T. H. Sanders*, P. D. Blankenship, R. J. Cole, and R. A. Hill, USDA, ARS, National Peanut Research Laboratory, Dawson, GA

Rainfall control plots equipped with heating cables and cooling coils were utilized to grow Florunner peanuts at various soil temperatures under drought conditions. Peanut stem and pod temperatures were monitored automatically at 2 hr intervals with attached and implanted thermocouples, while leaf canopy temperatures were determined by infrared thermometry. Plant canopy temperatures were related to drought but were unrelated to soil temperatures in drought. Late season afternoon canopy temperatures in the irrigated control plot averaged 28.5 C and mean canopy temperatures in heated, cooled, and natural drought plots were all 35±1 C. Mean late season plant stem temperatures/mean soil temperatures in control, drought-heated, drought, and drought-cooled plots were 72.1 C/71.1 C, 78.3 C/86.4 C, 78.1 C/77.7 C and 73.3 C/67.8 C, respectively.

Effects of Trickle Irrigation Rate and Interval and of Fertilization Level on Rhizobium-Inoculated Peanuts. I.S. Wallerstein*, Div. of Industrial Crops, B. Bar-Yoseph, B. Sagiv, Div. of Soil Chemistry & Plant Nutrition; Rina Lobel and J. Schiffmann, Div. of Legume Inoculation, Agricultural Research Organization, The Volcani Center, Bet Dagan 50 250, Israel.

The effect of various combinations of trickle irrigation and of N, P nutrition on the yield and quality of peanuts (*Arachis hypogaea* L. cv. 'Shulamit') inoculated with *Rhizobium* sp. was investigated during the 1981 season at the Besor Experiment Station in the northern Negev Desert of Israel. Water rates were determined on the basis of evaporation from a class A pan (=E): 0.4E, 0.65E and 0.95E. The value of 1E through the growing season was 921mm. Irrigation intervals were 0.5, 2 and 8 days between irrigations, with a water rate of 0.65E. Nutrition rates (C_N) were 0.60 and 120 ppm N in water, applied as "Nutricol" (N:P:K = 5.0:0.9:5.0) at water rates 0.4E, 0.65E and 0.95E. The effect of P level without N was determined with two fertilizers: as super phosphate before planting (0, 150 and 300 kg/1000m²) and as phosphoric acid (0, 24 and 48 ppm P) dissolved in the irrigation water, at 0.65E. The results, as total pod yield (TP) and as pod yield of export quality (EP), were as follows: Water rates. The 0.4E treatment had a significant decrease in TP and EP, compared with 0.65E and 0.95E; 0.65E and 0.95E did not differ significantly. Intervals between irrigations: the 0.5-day interval reduced TP and EP; the 2- and 8-day intervals did not differ significantly. Nutrition levels: At 0.65E and 0.95E, the addition of N did not affect TP but it reduced EP. The peanut's response to P fertilizer differed according to application method. When applied as superphosphate TP were not affected, but the highest P level (300 kg/1000m²) reduced EP. Phosphoric acid in the irrigation water caused a small but not significant decrease in TP and EP.

Skip-Row Culture of Peanuts in South Central Texas. A. M. Schubert,* C. L. Pohler, and D. H. Smith, TAMU-TAES, Yoakum, TX

'Florunner' and 'Tamnut-74' peanuts were tested 4 years under solid, 2 rows planted and 1 row fallow (2&1), and 2&2 planting patterns. There were no differences in yield, grade, or crop value among planting patterns under irrigation in 1978. In 1979, we began testing rainfed peanuts only. Since the test area had been in pasture for 10 years, foliar fungicide treatments were included to study first-year disease levels, disease development with continuous peanuts, and the effect of planting pattern on disease levels.

In 1979, yield and crop value were higher in skip-row than in solid plantings, as were grades for Florunner. Foliar diseases were light in the first year out of pasture, and spray and no-spray plots were equal in all variables. In 1980, drought stress caused low disease incidence in all treatments. Yield and value/acre for 2&2 significantly exceeded 2&1 and both exceeded solid plantings. Grade response in Florunner paralleled that of yield and value. In 1981, yield and value/acre were higher in 2&2 and 2&1 than in solid peanuts. Again, only Florunner had higher grades in skip-row patterns. Foliar disease levels were high enough in 1981 to cause significant yield, grade, and crop value decreases in no-spray plots. There were no differences in foliar disease levels among planting patterns in rainfed peanuts in any year.

Influence of Humus-Containing Fertilizers and Sludge on Peanut Plant Growth.
R. E. Pettit*, B. L. Jones, and C. L. Martin, Plant Sciences Department,
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Center, Texas A&M University, Stephenville, Texas 76401.

Fertilizers containing humic minerals (eg. lignite, leonardite) were examined for their ability to influence peanut growth. Fertilizers consisted of varying combinations of urea, phosphoric acid, soluble potash, leonardite, lignite, sludge and trace amounts of calcium, magnesium, sulfur, boron, copper, iron, manganese and zinc. Applications of lignite or leonardite alone at rates of 561, 1122, 2,244, 5,609 and 11,218 kg/ha failed ($P=0.05$) to increase yields above check treatments. Fertilizers containing combinations of N-P-K, lignite, leonardite and trace elements applied at 449 and 897 kg/ha improved peanut yields over check in replicated field plots. In a series of greenhouse experiments the addition of sludge to varying combinations of N-P-K (135 kg/ha) lignite, and leonardite increased yields ($P=0.05$) over check, N-P-K (135 kg/ha) and N-P-K (269 kg/ha) treatments. These results provide evidence that the addition of some humic materials to fertilizers applied to soils with less than 0.05% organic matter can have a beneficial effect on fertility and peanut yields.

Evaluation of Peanut Genotypes for Root and Shoot Growth. D. L. Ketring*, USDA-ARS, Agronomy Department, Oklahoma State University, Stillwater, Oklahoma 74078.

The availability of mineral nutrients and water from soil depends largely on shape and extent of the plant root system. A means to estimate root growth of peanuts by measuring root volumes was developed and used to make comparisons among peanut genotypes. Plants were grown in the greenhouse for 46 to 49 days in PVC tubes 10.2 cm inside diameter and 76.2 cm in length containing fritted clay. They were fertilized twice weekly with 200 ml of modified Hoagland solution and watered twice daily. Comparisons were made among and within virginia-, spanish-, valencia-, and runner-type peanuts. Entries differed in both root (volume and dry weight) and shoot (height, dry weight, leaf area, and leaf number) characteristics. Root volume and dry weight were highly correlated. Shoot dry weight, leaf area, and number of leaves were significantly correlated in most tests. Root dry weight and volume were correlated with shoot dry weight, leaf area, and number of leaves, but not necessarily all of these in every test. The data indicate strong coordination between aerial and subterranean growth and considerable diversity in root volume which is an estimate of fine root structure.

Physiological Basis for Yield Differences Among Peanut Cultivars. S. T. Ball,* J. C. Wynne and L. A. Nelson, North Carolina State University, Raleigh, NC

Growth analysis concepts were used to estimate the physiological basis for yield differences among eight peanut (*Arachis hypogaea* L.) cultivars. Eleven growth parameters which describe the dry weight and leaf area vs time relationship were used to calculate the mean value of selected growth functions during the growing season. Multiple regression of fruit weight (yield) on all 11 parameters was conducted. Individually selected parameters were regressed upon values of orthogonal polynomials up to the fourth degree to study the change in growth over time.

Significant variation for all growth parameters were demonstrated, except for relative growth rate and unit shoot weight. Biomass duration, crop growth rate, net assimilation rate, and specific leaf area explained about 98% of the variation in yield. Biomass duration alone accounted for 80% of the variation observed in fruit yield. Biomass duration was positively correlated with fruit yield suggesting that indirect selection for fruit yield may be possible.

Investigation of Protein-Bound Lipids from Stored Raw Peanuts and Peanut Flours. A. J. St. Angelo*, USDA, ARS, Southern Region Research Center, P.O. Box 19687, New Orleans, LA

Lipid oxidation is known to be a major problem in the storage of fresh and processed foods. The oxidation process is related to deterioration of nutritive value, flavor, odor, and color. Peanuts readily undergo lipid oxidation because of their high polyunsaturated fatty acid content in both their triglycerides and polar lipid components. Defatted peanut flour can contain up to 2% phospho- and sulfolipids, which because of their various reactive groups, can affect the ultimate quality of the flour destined for human consumption.

Since peanuts contain bound lipids, the role of these compounds was investigated as to their involvement in protein-lipid or amino acid-lipid interaction. Polar and non-polar bound lipids were extracted and identified by thin layer chromatography and charring with cupric acetate/phosphoric acid solution. The neutral fraction was found to contain sterols, triglycerides, and esterified and free fatty acids. The polar fraction contained phospho- and glyco-lipids. The electrophoretic mobilities of the proteins that contained the bound lipids were changed after extraction. This information on the nature of the bound lipids should be useful in maintaining quality and stability of peanuts, products, and flours stored for long periods before utilization.

PATHOLOGY

Feasibility of Peanut Leafspot Forecasting in North Carolina. Jack E. Bailey* and Suzanne Spencer, North Carolina State University, Raleigh, N. C.

A peanut leafspot forecasting model, developed by Jensen and Boyle (1965, 1966) was evaluated in this study. Experiments were conducted at seven locations in the peanut growing region of northwestern North Carolina. Relative humidity and temperature, the cardinal weather inputs for the model, were recorded at each location with hygrothermographs located in the peanut canopy. Time/temperature/relative humidity indices (e.g. predicted infection rates) were calculated and spray advisories were generated using the procedures developed by Parvin, Smith and Crosby (1974). Fungicide treatments (benomyl plus mancozeb) were applied to replicated peanut plots (var. Florigiant) every two weeks or according to the spray advisories generated from the leafspot model. Disease incidence and yield were the same regardless of the spray schedule; however, the advisory plots were sprayed an average of 1.4 fewer times than were the two-week plots (5.0 sprays vs. 6.4). Plots of cumulative predicted infection rates (based on leafspot model) vs. time for each location were compared. Regional weather patterns were reflected simultaneously in the predicted infection rates at all sites, however, the magnitude of these changes appeared to be unrelated to the proximity of one site to another. Variation among sites may be attributed to two factors: a) inaccuracies of the hygrothermographs and, b) weather variations between sites. It was concluded that weather monitoring equipment must be as accurate as possible and in close proximity to the area for which the forecast is to be given, for maximum accuracy. Leaf-spot forecasting appears to be a good method for timing peanut leafspot spray applications in North Carolina.

Resistance in Peanut Germplasm to *Cercospora arachidicola*. H. A. Melouk* and D. J. Banks, USDA-ARS, Departments of Plant Pathology and Agronomy, Oklahoma State University, Stillwater, Oklahoma 74078.

New sources of resistance to *Cercospora arachidicola* were identified in peanut (*Arachis* sp.) using a detached leaf technique (Peanut Sci. 5:112-114, 1978) or a detached shoot modification. Leaf spot reactions on peanut were compared with a standard susceptible genotype ('Tamnut 74') and evaluated by the following criteria: (1) number and size of lesions, (2) degree of sporulation of *C. arachidicola* on the lesions, and (3) leaf chlorosis and defoliation. The following peanut genotypes exhibited good levels of resistance: (a) two entries of *A. helodes* Mart. ex Hoehne from Brazil (GK 30031 and GK 30036), (b) an F₁ hybrid (M-216) derived from a cross between an early maturing spanish peanut (EM3) and *A. helodes* (GK 30036), and (c) a yellow-flowered selection from BPZ 98, a cultivated peanut, *A. hypogaea* L., from Bolivia. Results from field plot evaluations at Perkins, Okla. in 1981 were in agreement with those obtained in the greenhouse. Also, three *A. hypogaea* accessions (GKSPSc 224 from Brazil, and SPA 417 and 422 from Peru) were moderately resistant to *C. arachidicola* in field trials at Perkins, Okla. in 1981. In this regard they were superior to PI 109839, an accession from Venezuela which was released in 1979 as *C. arachidicola* resistant germplasm. The accessions listed are from the IBPGR expeditions in 1976-1981. Collector initials are as follows: G = W. C. Gregory, K = A. Krapovickas, S = C. E. Simpson, P = J. Pietrarelli, Sc = A. Schinini, A = V. O. Arriola, B = D. J. Banks, and Z = H. Zurita. These collections are being processed for PI numbers.

Additional Studies on Biological Control of Late Leafspot with *Dicyma*. Donald H. Smith*, Texas Agricultural Experiment Station, Yoakum, Texas 77995; Ruth A. Taber and James K. Mitchell, Department of Plant Sciences, Texas Agricultural Experiment Station, College Station, Texas 77843; and Susan H. Woodhead, Abbott Research Center, Long Grove, Illinois 60047.

The mycoparasite, *Dicyma* (Hansfordia), is recognized as a natural biocontrol agent for late leafspot in localized areas of some Texas peanut fields. This fungus has been isolated, and it grows best at 25 to 28 C. The efficacy of *Dicyma* as a biocontrol agent was evaluated in 1981 field tests. A wettable powder formulation (Abbott Laboratory) of *Dicyma* was applied to infected plants in three plots at two locations. At Yoakum 14mnut 74 plants infected with late leafspot were sprayed once with a *Dicyma* foliar spray, and *Dicyma* was observed on late leafspot lesions later in the growing season. Florunner and several experimental lines with established late leafspot lesions were sprayed with a dense suspension of Abbott's formulation of *Dicyma*. In addition, spores from *Dicyma* cultures were applied to late leafspot lesions. Plastic bags were placed over inoculated plants to provide an humid atmosphere. *Dicyma* infection was observed 4 days after inoculation in both cases. Abbott's formulation was evaluated at 1.0 and 2.0 lbs/A in a field test with cv. Starr. Control of late leafspot with either the 1.0 or the 2.0 lb rate was not significantly different from the unsprayed control plots.

Effects of Irrigation on Peanut Diseases in Virginia. D. M. Porter*, F. S. Wright, and N. L. Powell, USDA, ARS, Tidewater Research Center, Suffolk, Va.

'Florigiant' peanuts (*Arachis hypogaea* L.) planted in an Emporia loamy fine sand were irrigated several times during the 1980 and 1981 growing seasons using a traveling gun irrigation system. Rainfall in 1980 was below normal and required 7 applications of irrigation water with 1.6 inches per application. In 1981, rainfall was normal but 4 applications of irrigation were applied at 1.6 inches per application. Peanuts and corn were grown in a two year rotation. The severity of several diseases increased, with one exception, in the irrigated plants when compared with the non-irrigated plants. In 1980, Sclerotinia blight, caused by *Sclerotinia minor*, was not observed in non-irrigated plants. However, under irrigated conditions Sclerotinia blight was severe with a disease index of 3.0 (scale: 1-no disease and 5-dead plants). The number of branches per plant infected with *S. minor* was 7.78 and 0, respectively, in irrigated and non-irrigated plants. Pod breakdown, caused by *Pythium myriotylum*, was several times greater in irrigated peanuts. Leafspot, caused by *Cercospora arachidicola*, was several times greater in the irrigated peanuts. Total fungal populations of the peanut shell were greater in the irrigated peanuts. However, *Aspergillus flavus* was isolated at a much greater frequency from peanut pods from non-irrigated plants. *Rhizoctonia* spp. and *Trichoderma* spp. dominated the shell mycoflora of irrigated peanuts while *Fusarium* spp. and *Penicillium* spp. dominated shells of non-irrigated peanuts. Similar disease increases were noted at the end of the 1981 growing season in irrigated peanuts.

A Field Selection Procedure for Resistance in Peanuts to Verticillium Wilt. D. F. Wadsworth*, H. A. Melouk and J. L. Sherwood, Department of Plant Pathology, Oklahoma State University, and USDA-ARS, Stillwater, OK 74078.

Verticillium wilt of peanut (*Arachis hypogaea* L.), caused by *Verticillium dahliae*, is a major disease in Oklahoma. None of the varieties commonly grown are resistant. However, large populations of plants from peanut varieties have not been systematically examined for resistant plants under field conditions of disease development. Each of eight peanut varieties ('Starr', 'Florunner', 'Comet', 'Spanhoma', 'Pronto', 'Dixie Spanish', 'Tammnut 74' and 'Early Bunch') was planted randomly in six large field plots with naturally infested field soil. When symptoms were pronounced, segments of rows with severe and high prevalence of wilt were examined for symptomless plants. These parent plants were marked, and at least two shoots from each plant were taken for inoculation in the greenhouse with *V. dahliae* as described (Phytopathology 65: 767-769, 1975). Surviving and rooted shoots were transplanted into pots (15 cm) containing a suitable soil mixture and grown in the greenhouse for production of seeds for field testing. Also, seed harvested from parent plants of shoots surviving greenhouse inoculation will be tested under field conditions. Several resistant selections were made from 'Early Bunch', 'Tammnut 74', and 'Starr'. These selections will be further tested under greenhouse and field conditions.

The Severity of Peanut Blackhull in South Africa and Studies on the Survival of the Pathogen. Christa Laubscher, S. W. Baard* and G.D.C. Pauer, Department of Plant Pathology, University of the Orange Free State, Bloemfontein, Republic of South Africa.

Since its discovery in South Africa in 1978, peanut blackhull caused by *Thielaviopsis basicola* has increased to such an extent that it presently poses a threat to peanut production. In severely infested fields, production of clean peanut seeds decreased eight-fold. Apart from the black discoloration usually associated with the disease, the pathogen also causes peg and pod rots. Seeds consequently germinate while still in the soil with the result that severe losses occur.

Alfalfa residues in absence of peanut plants caused decline in pathogen population, but in presence of peanut plants a three-fold increase in propagule number was recorded. This phenomenon was considered to be the result of the high nitrogen content of the soil after amendment with alfalfa residues. It was subsequently determined that nitrogen aggravated the disease to such an extent that the plants developed severe root and stem rots which in turn resulted in sudden wilting and death of the plants. Calcium cyanamid delayed the onset of the disease, but did not prevent it altogether.

Thermal inactivation of fungi associated with pod rot of peanuts.

J.L. Sherwood*, H.A. Melouk and D.F. Wadsworth, Department of Plant Pathology, Oklahoma State University and USDA-ARS, Stillwater, OK 74078.

Soil solarization has been found effective in controlling some soil-borne diseases. (Phytopathology 71:954-959, 959-964.) This study was initiated to determine if temperatures achieved under plastic mulchings would be lethal to Pythium myriotylum, Rhizoctonia solani and Fusarium solani; the organisms believed to be involved in the plant pod rot complex in Oklahoma. A water suspension of propagules of each fungus was exposed to 40, 45, or 50 C for different periods. At 40 C, exposure for an LD₅₀ were 4.4, 6.9 and 13.2 hr for P. myriotylum, R. solani, and F. solani, respectively. At 45 C, exposure for an LD₅₀ were 2.6, 7.13 and 16.1 min for P. myriotylum, R. solani and F. solani respectively. At 50 C, exposure for an LD₅₀ were 0.77, 1.50 and 4.25 min for P. myriotylum, R. solani and F. solani, respectively. The LD₅₀ length of exposure was correlated with the exposure temperature for P. myriotylum ($r=-.948$), R. solani ($r=-.968$) and F. solani ($r=-.962$). To determine if the water potential of the suspending medium influenced the LD, propagules of each fungus were suspended in water amended with polyethylene glycol-6000 to obtain water potentials of 0, -1, -5 or -10 bars prior to exposure to 50, 45 or 40C for a period required for an LD₅₀. The water potential of the suspending medium had no effect on the susceptibility of propagules to thermal inactivation. Presently, we are determining the viability of solarization as a control for peanut pod rot in Oklahoma.

Comparative Resistance To Pythium myriotylum In Juvenile And Mature Peanuts. B. L. Jones, Texas Agricultural Experiment Station, Stephenville, Texas 76401.

A study was conducted to determine if resistance to Pythium myriotylum Drechsler during the juvenile stage of growth is correlated with Pythium pod rot resistance in older peanut plants. Five genotypes, (Toalson, Tamm 74, Florunner, PI 365553, and PI 378012), which have been screened in the field for Pythium pod rot resistance were inoculated with P. myriotylum zoospores and evaluated for percent of permanently wilted and dead plants. Zoospores were produced in aerated, deionized water at 29 C. Four day old plants were inoculated with 1.5×10^3 zoospores per ml water at 27 C and maintained in a greenhouse for 15 days before being evaluated. The percent of plants either wilted or dead in ascending order were: PI 365553 (2.5%), Toalson (21.6%), Florunner (43.2%), Tamm 74 (67.5%) and PI 378012 (71.0%).

In field tests conducted from 1974-1977, the average Pythium pod rot ratings, (using a scale of 0-5 with 0 representing no rot and 5 representing severe rot), for the five genotypes were PI 365553 (0.8), Toalson (1.4), Tamm 74 (2.8), Florunner (3.9), and PI 378012 (4.7).

The correlation between the results of the greenhouse and field tests indicated that the former may be used in conjunction with field tests to screen peanuts for pod rot resistance.

Influence of Calcium Source on Peanut Peg and Pod Rot Complex. A. S. Csinos*, T. P. Gaines and M. E. Walker, Departments of Plant Pathology and Agronomy, University of Georgia, Coastal Plain Experiment Station, Tifton, GA.

Early Bunch peanuts established in a field with a history of peg and pod rot, were used to evaluate the effect of application of two sources of calcium on the disease complex. Gypsum, applied at 2240 Kg/ha, controlled disease significantly better than calcite lime (1317 Kg/ha) at an equivalent rate of calcium. Soil calcium was high in both treatments after application, but at harvest, plots receiving gypsum were significantly lower in calcium than plots receiving calcite lime. Tissue analysis indicated significantly more calcium in pegs and pods at mid-season, and in hulls and kernels at harvest from peanuts receiving gypsum than from peanuts receiving calcite lime. Pod rot at harvest correlated negatively with calcium in pegs and pods at mid-season, and in hulls and kernels at harvest.

Vesicular-arbuscular Endomycorrhizal Fungi in Weed Seeds in Peanut Soils. Ruth Ann Taber, Department of Plant Sciences, Texas Agricultural Experiment Station, Texas A & M University, College Station, Texas 77843.

In 1982, a survey of Texas crop soils for the presence of vesicular-arbuscular mycorrhizal (VAM) fungi led to the discovery that weed seeds in the soil serve as inoculum reservoirs for VAM fungi. Seeds of eight weed species were shown to harbor VAM fungi in peanut soils. Loose sporocarps of *Glomus* spp. were found in seeds of *Amaranthus retroflexus* L., *Stellaria media* (L.) Cyrill., *Portulaca oleracea* L., *Mollugo verticillata* L., and four other unidentified weed species. An examination of seeds from other crop soils revealed the presence of VAM fungi also in *Trianthema portulacastrum* L. and a *Rumex* species. Seeds therefore serve as previously unrecognized niches for VAM fungi in the soil. Spores of the most common *Glomus* species averaged 75-90 μ m in diameter, were light yellow, and appeared to be alive. Species identification is currently being determined, as well as viability through host plant inoculation. In view of the importance of VAM fungi to crop plants, particularly in low fertility soils, a re-evaluation of the level of weed control may need to be considered.

Yield and Vigor Improvements in Florunner Peanut Following Seed Bacterization with *Bacillus subtilis*. R. P. Clay*, P. A. Backman, and M. A. Crawford, Botany, Plant Pathology and Microbiology Dept., Agr. Exp. Stn., Auburn University, AL 36849.

Field trials in 1980 and 1981 indicated that *Bacillus subtilis* (Abbott ABG-4000), applied as a seed treatment to Florunner peanut seed improved emergence and vigor during early season growth. In addition, yield studies during the 1981 season showed substantial yield increases with certain Gustafson liquid fungicide/ABG-4000 seed treatment combinations. The high populations ($> 10^5$ CFU/g fresh root) of *Bacillus subtilis* on the roots late in the season may point toward long term root bacterization as a probable mechanism for the observed stimulation. Isolates of the bacterium, recovered from roots at harvest in 1981, were produced in powdered form and included in field trials in the Rio Grande Valley as well as in Headland, Alabama. It is hoped that natural selection will have produced an adapted strain of the bacterium that will be more efficient at colonizing the rhizoplane, and thus produce even more desirable benefits. Seed germination studies with various rates of ABG-4000, applied as powder, and with Gustafson liquid fungicide formulations, have shown the optimum rate of *Bacillus subtilis* was about 7×10^7 CFU/seed.

Application Time and Effectiveness of Four Systemic Nematicides Against *Meloidogyne arenaria* on Florunner Peanuts. R. Rodríguez-Kabana*, R. A. Shelby, P. S. King, and M. H. Pope, Department of Botany, Plant Pathology, and Microbiology, Auburn University, Agricultural Experiment Station, Auburn, AL 36849.

The influence of application time on the efficacy of four systemic nematicides (aldicarb, carbofuran, oxamyl, and phenamiphos) against the peanut root-knot nematode (*Meloidogyne arenaria*) on Florunner peanuts was studied in field experiments at Headland, Alabama. The nematicides were applied at planting time and at two, four, and eight weeks after planting. Each nematicide was studied in a separate experiment at rates of 1.1, 2.2, and 3.4 Kg. a.i./ha. Performance of the treatments was compared with that of a no treatment control and a positive control consisting of a planting time injection of EDB 90 (Soilbrom 90) at 18.7 l/ha. Greatest yield increments were obtained when the nematicides were applied during the first two weeks of the crop; lowest yields were obtained when peanuts were treated at the blooming-early pegging stage, eight weeks after planting. Applications of phenamiphos depressed larval populations of *M. arenaria* at all application times. The eighth week applications of aldicarb at all rates and of oxamyl at 1.1 Kg./ha resulted in higher larval populations than earlier applications. Larval populations in the carbofuran experiment were highest in plots treated with the two lowest rates at planting time.

Comparison of In-Furrow, Banded, and Combination Banded + In-Furrow Treatments for Control of the Peanut Root-Knot Nematode. R. Rodríguez-Kabana*, R. A. Shelby, P. S. King, and M. H. Pope. Department of Botany, Plant Pathology, and Microbiology, Auburn University, Agricultural Experiment Station, Auburn, AL 36849.

Aldicarb (Temik 15G) and phenamiphos (Nemacur 15G) were applied at planting in banded (30 cm), in-furrow, and combination banded + in-furrow treatments to control *Meloidogyne arenaria* on Florunner peanuts. The banded treatments were applied at rates of 1.1, 2.2, 3.4, and 4.5 Kg. a.i./ha and the in-furrow treatments at 1.1 and 2.2 Kg. a.i./ha. Combination treatments were at rates of 1.1 and 2.2 Kg. a.i./ha for both the banded and the in-furrow components. The experiments were established in a field near Headland, AL, heavily infested with the nematode. Banded and in-furrow treatments with aldicarb significantly increased peanut yields; however only the banded treatments reduced soil larval populations. The interaction of band x in-furrow was not significant for yield or larval data indicating that no advantage was obtained from the use of combined treatments over the use of banded or in-furrow treatments alone. Banded treatments resulted in higher yield increases than in-furrow treatments. Yield differences between banded and comparable in-furrow treatments with phenamiphos were not significant. The interaction between band x in-furrow for yield and larval data from phenamiphos treatments was also not significant. The only phenamiphos treatments that resulted in significant yield increases were those with a total rate of 2.2 Kg. a.i./ha or higher.

Use of CGA-64250 in Managing Fungal Pathogens of Peanuts. J. M. Hammond*, John D. Weete and H. G. Hancock, Ciba-Geigy Corporation, Charlotte, N.C., (1st author) and Department of Botany, Plant Pathology and Microbiology, Auburn University, Alabama (2nd and 3rd author)

CGA-64250, a sterol inhibiting fungicide being developed by Ciba-Geigy Corporation, has shown excellent activity against three of the most damaging fungal pathogens of peanuts. These include the foliar leafspot pathogens *Cercospora arachidicola* and *Cercosporidium personatum* and the soil-borne pathogen *Sclerotium rolfsii*. Results of laboratory and field tests conducted by Ciba-Geigy personnel and University researchers indicate contact as well as therapeutic activities against these pathogens. Evidence will be presented which indicates the importance of sublimation and vascular transport in redistribution of the active ingredient through the plant.

Effects of Certain Fungicide Formulations on Sclerotinia sclerotiorum.

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Sclerotinia blight caused by the fungus Sclerotinia sclerotiorum var. minor can be a very destructive disease on peanuts in Oklahoma. Yield losses of 10 to 65% due to the Sclerotinia fungus have been reported. High temperatures and dry conditions restrict disease development, however, cool-moist condition created by a dense leaf canopy and overhead irrigation encourages disease build up. Hence, Sclerotinia blight usually is not a problem until the rows are lapped or canopy is formed. DCNA (Botran 75W) has been more effective when applied after disease appears as a "Curative" control than as a "Preventive", and under conditions favorable for the disease, repeated applications are needed.

Fungicide formulations of DCNA (Botran, Upjohn) 1681g and 3362g a.i./ha; vinclozolin (Ronilan, BASF) 841g and 1120g a.i./ha; CGA 64250 (Tilt, Ciba-Geigy), 560g a.i./ha; bitertanol (Baycor 50W, Mobay) 560 a.i./ha; thiabendazole (Mertect, Merk), 953g a.i./ha, and PCNB (Terraclor, Olin), 8406g a.i./ha, were evaluated for control of S. sclerotiorum. Plots were artificially inoculated with S. sclerotiorum grown on oat seed, applied as leaf canopy began to shade the row. Fungicide treatments were applied prior to inoculation and following first sign of disease. Treatments were evaluated on basis of preventive and curative response.

Botran 75W at 1681g and 3362g a.i./ha and Ronilan at 841g and 1120g a.i./ha provided good curative control, however, Ronilan provided a longer lasting protection. Terraclor 75W at 8406g a.i./ha basal spray reduced the number of infected plants, yet level of control was not great enough to warrant recommendation of use.

Disease control in plots receiving Baycor 50W, 560g a.i./ha; Mertect 340F, 953g a.i./ha; Tilt 2.5g, 560g a.i./ha and Tilt 3.6EC, 560g a.i./ha, were not significantly different than plots receiving no chemical treatments.

Effect of Foliar Fungicides on Incidence of Sclerotinia Blight in Oklahoma Peanut Fields.

Roger R. Musick*, Crop Guard, Inc., Eakly, Oklahoma 73033 and R. V. Sturgeon, Jr., Plant Pathology Department, Oklahoma State University 74078.

A disease survey of 236 peanut fields in Caddo County, Oklahoma during the 1981 season revealed 24% (58) of the fields monitored were affected by Sclerotinia blight caused by Sclerotinia sclerotiorum var minor. Previous research has indicated a relationship may exist between the use of certain fungicides and the severity of Sclerotinia blight. For purpose of evaluation the fields were grouped into the following classifications: (1) Bravo 500 only (2) Fungicide combinations that included Bravo 500 (3) Fungicide programs consisting of Dithane M45, Manzate 200, Liquid Sulphur, Duter and Benlate (no Bravo 500). No relationship was found between the incidence of Sclerotinia and fungicide program used. The data collected from 236 fields of 8400 total acres showed that 24% of the fields were infected with Sclerotinia. The incidence of disease was randomly assorted among fields sprayed with Bravo 500 alone, fungicide combinations with Bravo 500, and fields sprayed with no Bravo. These data indicate that the fungicides or foliar disease control program did not differ in their effects on occurrence of Sclerotinia blight. The independence was determined for the data by the chi-square method of analysis.

Preservation of Cercosporidium Personatum Conidia and a Method for Laboratory and Greenhouse Studies. Robert H. Littrell, Department of Plant Pathology, University of Georgia, Coastal Plain Station, Tifton, Georgia 31793.

Growth of Cercosporidium personatum in culture is slow and often an unreliable method of producing inoculum. An alternative method was developed. Peanut foliage heavily diseased by Cercosporidium personatum was collected from fields that had not received fungicide sprays. Conidia from heavily sporulating lesions were harvested using a cyclone spore collector. Masses of conidia were placed on small plastic strips (3 x 4 cm) and strips were placed into a zip-lock plastic bag (9 x 9 cm). The plastic bags were placed immediately into a deep freeze at -75 C. When plastic bags were removed from the deep freeze, no special care was needed in thawing contents before use. Germination of stored conidia (>80%) was comparable to freshly collected conidia. Inoculations were made by brushing conidia directly onto peanut leaflets or preparing standard conidial suspensions. Inoculum from stored conidia is superior to that produced in culture. Conidia probably can be preserved indefinitely in the frozen state.

Assessment of Disease Progress and Yield Loss in Selected Peanut Genotypes.

*Robert Neundorfer and Robert H. Littrell, Department of Plant Pathology, University of Georgia, Coastal Plain Station, Tifton, Georgia 31793.

In 1981 disease progress of peanut leaf spot (Cercosporidium personatum) on 16 genotypes of peanut was studied. Three levels of disease control were used: (1) none, (2) minimum, and (3) maximum. Chlorothalonil was applied at a dosage of 1.24 kg/ha every two weeks for maximum disease control beginning 69 days after planting (DAP). For minimum control, fungicide treatments were applied 69 and 112 DAP. Pod yields were obtained from all plots. Six disease assessments were made beginning 90 DAP based on percent defoliation and percent necrosis of leaf area on three selected nodal areas of the main stem. Disease progress curves indicated differences in genotypes during the early sampling periods. Differences in disease losses varied with genotype. UF 80202 was considered unique exhibiting 5% and 15% disease loss under minimum and no spray program, respectively. In contrast, Florunner had 48% disease loss in the minimum spray program.

Disease Occurrence and Yield Response of Three Spanish Varieties and Florunner Peanuts to Foliar Disease Control. L. Menakanit*, K. E. Jackson, and R. V. Sturgeon, Jr., Department of Plant Pathology Oklahoma State University, Stillwater, OK 74078.

Three Spanish varieties, 'Pronto', 'Tamnut' and 'Comet' and 'Florunner' peanuts were monitored under a foliar disease control and no control program. Peanuts were planted May 28 and harvested October 29 (154 days) 1981 in eight 92 cm spaced rows, 1800 cm long, and replicated five times in a split plot design. Four rows were sprayed 8 times on 7 and 14 day schedule with Chlorothalonil at 1169 g a.i./ha beginning July 15. A Kramer-Collins 7 day spore sampler was used to collect spore samples for determining inoculum present during the period of July 15 and October 25. Temperatures and relative humidity were recorded during this period.

Spores of Cercospora arachidicola, early leafspot were first found on July 15 and Cercosporidium personatum, late leafspot, August 5. The number of C. personatum and C. arachidicola spores increased to the highest level during August and September. The greatest number of C. personatum lesions were found on the older leaves on lower part of the plant, with C. arachidicola infection more prevalent on the young leaves. 'Florunner' variety seemed to be more resistant to both fungal species than Spanish varieties, regardless of the disease control level. Disease rating based on percent infection was made October 19 showed heavy infection (80-90%) on non-sprayed plots and light to moderate infection (7-29%) on sprayed plots. Yield comparison of sprayed and non-sprayed plots showed 'Pronto' having the greatest percent yield increase (27%), followed by 'Tamnut' (20%), 'Florunner' (19%) and 'Comet' (14%). 'Comet' had the highest infection level and lowest yield. 'Florunner' produced greater yields than Spanish varieties in sprayed and non-sprayed plots.

Effects of Chlorothalonil Applied for Peanut Leafspot Control on Pod Rot, Stem Rot, Seed Quality, and Yield. M. A. Crawford* and P. A. Backman, Botany, Plant Pathology and Microbiology Dept., Agr. Exp. Stn., Auburn University, AL 36849.

In a test evaluating initiation and termination dates for application of chlorothalonil for peanut leafspot control, several striking non-target effects were detected. Effects on peanut leafspot were negligible due to very low disease pressure; however, this factor allowed an excellent opportunity for evaluation of non-target effects. Four spray programs were compared; these included all possible combinations of early initiation (3 extra sprays), standard initiation, early stop (2 fewer sprays), and standard stop. At all spray dates, chlorothalonil was applied broadcast at 328 g/ha. Significant suppression of Rhizoctonia solani-induced pod rot and arm rot was detected with all early initiation programs as compared to normal starting date (40 days after planting) programs. Termination date had no effect on this disease. Sclerotium rolfsii-induced stem rot was not significantly affected by any program. Yields were significantly increased in all early initiation date programs, probably due to control of Rhizoctonia solani. No effects on kernel quality were detected.

Insertion of Systemic Fungicides into a Contact Fungicide Program for Control of Peanut Leafspot. P. A. Backman*, and M. A. Crawford, Botany, Plant Pathology and Microbiology Dept., Agr. Exp. Stn., Auburn University, AL 36849.

Low prices for peanuts will require that peanut leafspot control programs be as economical as possible. Methods to achieve this result might be the use of lower cost contact fungicides, and/or elongation of spray intervals and insertion of systemic fungicides into the schedule in order to prevent or delay progress of the epidemic. Evaluation of this hypothesis was conducted at Headland, AL during 1981, a year characterized as one with low leafspot pressure. Fourteen-day interval spray programs were initiated 40 days after planting and continued until 14-days before harvest (140 days). Bravo 500 (2 1/8 pts), Manzate 200 (1 1/2 lbs) and Du-Ter 47 WP (8 oz) were compared when used alone, and each was compared to treatments in which Benlate was inserted as a tank mix (8 oz/acre) at early bloom (primary inoculum control), pegging (inflection point), and/or at pod fill (epidemic in progress). Application of tank mixes of Benlate were most effective in preventing disease build-up if applied at early bloom in order to control primary inoculum. Tank mixes at pod-fill were much less effective. In all cases, Du-Ter and Manzate applied as tank mixes with Benlate did not control leafspot as well as Bravo used alone. However, there was consistent improvement in performance in all products when Benlate was inserted into the spray schedule. Control of primary inoculum appears to be critical to the success of the spray schedule, and any shifts to less effective schedules should come later in the season.

PROCESS AND UTILIZATION

Quality Characteristics of Cake-type Doughnuts Containing Peanut, Cowpea, and Soybean Flours. S. Kay McWatters, Department of Food Science, Georgia Station, Experiment, Georgia 30212.

Ten percent of the wheat flour in cake-type doughnuts was replaced with flours processed from A - prepress, solvent-extracted peanuts; B - partially defatted, untoasted peanuts; C - partially defatted, toasted peanuts; and D - full-fat, dry cowpeas. The legume-supplemented doughnuts were prepared with and without soybean flour, which is frequently added to doughnut formulations to control fat absorption during frying. The quality of test doughnuts was assessed by comparison to wheat flour reference doughnuts. Good machinability and frying characteristics were observed in reference and test batters. Legume-supplemented doughnuts scored favorably in sensory comparisons with reference doughnuts. A "slightly beany" aroma noted by the sensory panelists was not apparent in the flavor of the test doughnuts. Moisture and oil levels of legume-supplemented doughnuts were similar to those of reference doughnuts and were more acceptable than levels reported in an earlier study which utilized the legumes in the form of meal.

Changes in Peanut Quality Related to Moisture Content and Storage Time.

H. E. Pattee*, C. T. Young, J. L. Pearson, J. A. Singleton and F. G. Giesbrecht, USDA, ARS, Raleigh; Food Science Department, N. C. State University, Raleigh, NC; USDA, ARS, Dawson, GA; USDA, ARS, Raleigh, NC; and Statistics Department, N. C. State University, Raleigh, NC.

The effects of seed moisture content during storage on selected quality parameters have been evaluated in a 2-year study. During 1978-79 the storage period was from December, 1978 through August, 1979. The 1979-80 period was from October, 1979 through March, 1980. The moisture contents were 6.2-6.3% and 8.7-9.2%, respectively. Peanuts with high moisture contents produced darker peanut butter with reduced flavor quality. This flavor quality may be related to changes in arginine and lysine contents which are precursors of atypical roasted flavor. Hunter reflectance values indicated that the skins of raw peanuts with high moisture contents were also darker. Evaluation of the lipid fractions suggested that only the phospholipid fraction from the high moisture peanuts was being significantly changed. Iodine values and oxidative stability values were not significantly affected and approximated values already published in the literature for stored peanuts.

Composition and Characteristics of Basic Proteins from Peanut Seed.

Shaik-M. M. Basha* and Sunil K. Pancholy, Division of Agricultural Sciences, Florida A&M University, Tallahassee, Florida 32307

Basic proteins from peanut (*Arachis hypogaea* L.) seed were isolated from total protein extract using Carboxymethyl Cellulose (CMC) at pH 8.2. The basic proteins constituted about 1% of the total seed proteins. Gel filtration of basic proteins on Sephadex G-200 showed the presence of two protein peaks. Peak I had an apparent molecular weight of 70,000(\pm 5,000) and peak II eluted in the salt volume from the column. Ion-exchange chromatography of the basic proteins on a CMC column resulted in one major and five minor protein peaks. The major and minor protein peaks eluted at ionic strengths of 0.12 M, 0.17 M, 0.2 M, 0.22 M, 0.24 M, 0.26 M, respectively. The basic protein fraction was rich in lysine (8.5%), glycine (27.9%) and methionine (1%) but was low in acidic amino acids like aspartic acid (5.3%) and glutamic acid (5.6%). The basic proteins were found to be glycoproteins and contained both the neutral (3.5%, glucose and mannose) and amino sugars (0.2%, glucosamine). One-dimensional gel electrophoresis towards the cathode at pH 4.5, showed four protein bands. However, electrophoresis towards the anode caused no mobility of proteins into the gel. Sodium dodecyl sulfate gel electrophoresis revealed six major and seven minor polypeptide bands. Two-dimensional gel electrophoresis improved resolution between two sets of polypeptides with close mobility and enabled calculation of their molecular weights. The apparent molecular weights of the six major polypeptides were 55,000, 30,000, 27,000, 22,500, 22,500, and 20,000, respectively.

The Production of a Homologous Series of Hydrocarbons in Ground Raw

Peanuts During Storage. N. V. Lovegren* and A. J. St. Angelo, USDA, ARS, Southern Regional Research Center, P. O. Box 19687, New Orleans, LA.

The volatile profiles of some peanuts (not of the best quality) contained, among other compounds, what appeared to be a homologous series of saturated hydrocarbons. An obvious explanation would be contamination with a petroleum product during harvesting or storage. Experiments show that this series of hydrocarbons (C_{10} to C_{16}) is produced in the peanuts under certain conditions. Blender ground peanuts stored at 40°C in an open container for two weeks produced this series of hydrocarbons when the sample volatile profile was determined by heating the sample at 130°C in the injection port of the gas chromatograph. Examples with volatile profiles of commercial peanuts, some related literature references, and significance of this homologous series are given.

Microflora of Peanuts Stored Under Modified Atmospheres. D. M. Wilson*¹, Ed Jay², and R. A. Hill¹, University of Georgia, Coastal Plain Station, Tifton, Georgia¹ 31793 and USDA-SEA-AR, Stored Products Insects Research Laboratory, Savannah, Georgia² 31403.

These experiments were designed to find if non-refrigerated long-term storage of U.S. #1 peanuts is possible by storage under modified atmospheres while maintaining the quality and at the same time eliminate molding, aflatoxin contamination and insect infestations without further use of pesticides. In two different years U.S. #1 peanuts were stored for one year under 60% CO₂, simulated burner gas, 99% N₂ and refrigerated or non-refrigerated ambient atmosphere storage. In two outside tests the CO₂ atmosphere was used with 1996 kg and 6451 kg of peanuts in different non-refrigerated bins. The CO₂ was not recirculated and moisture migration occurred in the 1996 kg test. The peanuts at the top molded and the dominant microflora included a yeast and Penicillium roqueforti. Members of the Aspergillus glaucus group, the A. flavus group and Penicillium spp. were also isolated. In the 6451 kg bin with CO₂ recirculation and humidity control, no molding or other major change was observed. No major changes in the microflora occurred in any of the other treatments in either year.

PRODUCTION TECHNOLOGY

Using On-Farm Tests in Peanut Educational Programs. Gene A. Sullivan*, North Carolina Agricultural Extension Service, N. C. State University, Raleigh, N.C.

A successful Extension education program on peanuts must meet the perceived needs of the target audience. The program should generate changes in the peanut grower's attitude, knowledge and/or skills. The peanut farmer of today is highly motivated and trained and demands specific technical information in his production program. The on-farm test adds scientific methodology to the traditional field demonstration teaching concept. The on-farm test is a replicated field test conducted on a cooperating grower's farm. The on-farm test helps bridge the gap between the researcher and the farmer and permits testing of new practices over a range of environmental conditions. Successful use of on-farm tests in peanut programs requires strong commitment by the extension worker, both at the county and state level. The county extension worker helps determine the purpose or desired results of each test and coordinates implementation of the test. The extension agent working with on-farm tests develops confidence in himself and establishes credibility with extension clientele. The on-farm testing program should be coupled with a plan for effective use of the test in the overall educational program. Farm tours and field visits are effective teaching methods during the growing season. Data collected from a test can be used in winter meetings. Mass media can be used to disseminate test results. A well-planned on-farm peanut testing program can help the extension worker to gain personal knowledge about crop conditions, to speak with more authority, and to be more competent about peanut production practices.

Peanut Growth Model Predictions vs Historical Yields in Virginia. J. L. Steele* and J. H. Young, USDA ARS, Tidewater Research and Continuing Education Center, Suffolk, VA, and Biological and Agricultural Engineering Department, North Carolina State University, Raleigh, NC, respectively.

Peanut growth model development and objectives were reviewed. A BASIC language version of a peanut growth model was selected and implemented at the Tidewater Research and Continuing Education Center. The implementation was verified by comparing simulated yields produced by other researchers on another computer. Ten years of yield and environmental data were then assembled for historical model evaluation for Virginia conditions. Soil moisture and radiation data were not available for some years. Methods of overcoming these deficiencies were presented. Simulated and actual peanut yields for two harvest dates and ten years were presented. The correlation coefficient ($r=0.49^*$) for simulated vs actual yields was determined as an index of model performance. The simulated yields were within 20 percent of the observed yields except for two years, 1977 and 1976. Yields for these two years were under estimated by about 25 percent. Further verification of the model for Virginia conditions prior to the development and incorporation of disease and insect models for Virginia conditions was considered essential.

Techniques for Reducing Energy Consumption in Peanut Drying.

J. H. Young*, J. W. Dickens, and J. W. Glover, North Carolina State University, USDA-ARS-SR, and North Carolina State University, Raleigh, NC.

During the 1980 and 1981 peanut harvest seasons, curing experiments were conducted to determine the energy consumption for drying peanuts using conventional procedures, partial air recirculation procedures, and intermittent fan and heater operation procedures. These tests indicated that energy requirements for the present drying systems vary greatly with ambient air conditions. It was also found that energy requirements for drying may be reduced considerably by recirculating some of the drying air. Tests in 1980 resulted in an average 36% reduction in energy consumption for recirculating-type dryers in a year in which ambient drying conditions were poor. Tests in 1981 resulted in an average 13% reduction in energy consumption for recirculating-type dryers in a year when ambient drying conditions were good. Operation of the model dryers has suggested simplified control systems which may be more practical for full-scale wagon drying systems.

Effects of Drought and Soil Temperature Modification on Florunner Peanut Properties.

P. D. Blankenship*, J. I. Davidson, Jr., T. H. Sanders, R. J. Cole, and R. A. Hill, USDA-S&E-ARS, National Peanut Research Laboratory, Dawson, GA 31742, and Richard C. Layton, GA Coastal Plain Experiment Station Computer Center, Tifton, GA 31793

Peanuts grown conventionally and under induced drought and modified soil temperatures were evaluated. Pod size distributions were skewed toward smaller sizes under drought conditions. Pod shape classifications were not influenced by soil temperature or late season drought. Pods from the irrigated plots were longer than pods from the drought plots. Hull thickness and total weight of seed yield per unit weight of pods were not influenced by treatment conditions.

Rope-wick Treatments for Controlling Tall Weeds in Peanuts. Ellis W. Hauser*, USDA-ARS, Coastal Plain Experiment Station, Tifton, GA; Gale A. Buchanan, Mike Patterson, and R. H. Walker, Auburn University, Auburn, AL.

Florida beggarweed and sicklepod are the two worst weeds in the Southeastern peanut belt. In research at Headland, AL and Plains, GA, we evaluated several factors affecting the activity of glyphosate (when delivered through rope-wick applicators) for control of these weeds. The variables included tractor speed (1, 2, 4 MPH); water: glyphosate ratio (2:1, 4:1, 8:1); and time and direction of the treatments (1 treatment, 1 way; 2 treatments in opposite directions at 0, 7 or 14 days). When applications were initiated, the weeds to be treated were at least 12 inches taller than the peanuts.

Tractor speed did not significantly affect control of sicklepod. Glyphosate in an 8:1 ratio was only marginally effective. Glyphosate controlled sicklepod best when applied with two parts of water. Unidirectional treatment was inferior to bidirectional applications. Timing of the two treatments was not critical if the water:glyphosate ratio was 2:1. The 4:1 ratio was effective only if treatments were spaced seven days apart. Results with Florida beggarweed were similar to those obtained with sicklepod.

Trace Mineral Contents of Selected Tissues from Bioregulator-Treated Peanut Plants. R. L. Ory* and E. J. Conkerton, Southern Regional Research Center, P.O. Box 19687, New Orleans, LA 70179, and F. R. Rittig, M. Schroeder and T. O. Ware, BASF Agricultural Research Station, 103 BASF Road, Greenville, MS 38701.

The bioregulator, 1,1-dimethyl-piperidinium-chloride (PIX), was applied, at three concentrations, to peanut plants at several stages of growth. Roots, stems, and hulls from treated and untreated mature plants were collected, hand cleaned of foreign matter, and ground to 20-40 mesh size. Peanuts were blanched by hand and extracted with hexane to produce defatted white flours. All samples were analyzed for calcium, iron, copper, zinc, and selenium by X-ray fluorescence. Although PIX increases the calcium contents in citrus and cotton plants, these tissues from treated peanut plants did not show an increase in calcium nor any of the other four minerals, when compared to tissues from untreated plants. The response of legumes to this chemical is apparently different from that of citrus and cotton plants.

A Once-Over Peanut Harvester. P.H. White* and R.C. Roy, Agriculture Canada, Delhi Research Station, Delhi, Ontario, Canada

Conventional digging and combine harvesting as done in the southern United States is not feasible for Canadian peanut growers due to the cool wet weather conditions at harvest.

A once-over harvester for Valencia bunch peanuts has been developed at the Delhi Research Station. The harvester undercuts the peanuts, bunches the leaves and stems to allow pinch chains to grip the top part of the plants and lift them from the soil. As the peanuts are being elevated, mechanical strippers remove the peanuts from the root mass and drop them onto a collection belt. The material on the collection belt is subjected to fan suction to lift out any leaves and stems before being carried to a hopper.

Yields obtained with the once-over harvester are over 50% higher than obtained with conventional equipment. Loose shelled kernels with the once-over harvester are about 1% while they were over 10% with a conventional combine; the foreign material content was also greatly reduced with the once-over harvester. Seed germination with the new harvester averaged 86% while the combine harvested seed germinated 45%.

Two machinery companies in Ontario using this harvesting concept are developing commercial multiple row harvesters.

Peanut Performance in Early or Late Yearly Sequence with Other Crops.
A. C. Nixon* and C. C. Dowler, USDA-ARS-AR, Coastal Plain Station,
Tifton, GA

In 1981 'Comet', 'Pronto' and 'Florunner' peanuts were grown with supplemental irrigation on Bonifay sand near Tifton, Georgia. An early planting (4-3-81) dug after a 115-day growth period produced 2967, 2450, and 2396 pounds of pods, and had a calculated average value of \$684, \$579, and \$483 per acre for the three respective varieties. A similar late planting (7-27-81) grown for 112 days on the deep sand yielded 1833, 1842, and 1529 pounds with a calculated average value of \$363, \$383, and \$267 per acre, respectively. Also, in 1981 Pronto peanuts were grown in early and late plantings with irrigation on Tifton loamy sandy soil. For the early planting (4-9-81) grown for 106 days, pod yield and value per acre were 2883 pounds and \$575, respectively. For the late planting (6-1-81) grown for 102 days, pod yield and value per acre were 2998 pounds and \$559. These results from short-season tests indicated the potential for using peanuts as a crop grown prior to grain sorghum or following early vegetables or small grain each year. Also, two crops of short-season peanuts may be produced.

Effects of Crop Rotation Involving Peanuts on the Production of Flue-Cured Tobacco in Southern Ontario. J.M. Elliot and R.C. Roy*, Agriculture Canada, Research Station, Delhi, Ontario

The standard crop rotation in the flue-cured tobacco producing area of Ontario is tobacco-rye. The rye crop is used primarily to build the organic matter content of the sandy soils in the area. With the introduction of peanuts as a cash crop in the tobacco growing area, a crop rotation study was initiated to investigate if growing peanuts (a legume) in rotation would have any adverse effect on producing tobacco. The rotation experiment consisted of a tobacco-rye, a tobacco-peanut and a tobacco-peanut-rye rotation. Tobacco yield and grade price were not affected after one year of peanuts in rotation, however, increasing the number of years of peanuts resulted in a decrease in yield and grade price of tobacco. The three-year rotation of tobacco-peanuts-rye resulted in a yield increase of tobacco, however, the grade price was no better than the tobacco-rye rotation. The four-year average gross return to tobacco was \$513/hectare lower for the tobacco-peanut rotation compared to the tobacco-rye rotation and \$742/hectare lower than the three-year tobacco-peanut-rye rotation. In conclusion the production of tobacco and peanuts in a two-year rotation results in a reduction in yield and gross return of tobacco, however, a three-year rotation (tobacco-peanuts-rye) will result in a yield increase of tobacco.

Applied Nutrient Effects on Suppression of *Cylindrocladium* Black Rot Disease. D. L. Hallock. VPI & SU, Tidewater Research and Continuing Education Center, Suffolk, Va. 23437.

In 1980 and 1981, 11 plant nutrients were applied to 'Florigiant' peanuts grown in fields severely infested with *Cylindrocladium* *crotonariae*, causal agent of *Cylindrocladium* black rot (CBR). The objective of these experiments was to search for possible effects of applied nutrients on CBR suppression. All soil-applied materials were incorporated shallowly. Considerably less disease developed where N (225 kg/ha) was sidedressed soon after emergence. Ammonium nitrate appeared less effective than urea. Considerable phytotoxicity occurred, particularly where urea was applied. Results with several materials were inconsistent between years, possibly due to the very dry growing season in 1980. Somewhat less CBR occurred where triple super P (1,112 kg/ha) was applied, especially in 1981. Flowable S (20 kg/ha) decreased CBR in 1980 but appeared ineffective in 1981. Other nutrients applied were lime and common fertilizer materials (mostly sulfates) containing K, Ca, Mg, Mn, Zn, Cu, Fe or B. Both soil and foliar applications of Mn, Zn and Cu were included.

DISCUSSION GROUPS

Peanut Breeding And Germplasm Discussion Group.

The Peanut Breeding and Germplasm discussion session was held Tuesday, July 13, 1982 in the Riviera North room from 4:30 to 6:00 pm, with C.E. Simpson presiding. There were 25 persons present.

J. C. Wynne gave a report on the activity of the Crops Advisory Committee (CAC). The CAC recognizes that the most pressing germplasm concern is maintaining the materials, thus the committee has recommended that the USDA employ a full time Curator for the Arachis germplasm and place him at Experiment, GA. The CAC is preparing a Descriptor List to be applied to Arachis germplasm. The CAC is also preparing a proposal to be submitted to the USDA for Arachis germplasm evaluation and an additional proposal to cover germplasm enhancement.

R.O. Hammons suggested that peanut breeders adopt a pest resistance rating system of 0 to 9:

- 0 = immune
- 1 = very low susceptibility
- 9 = very high susceptibility

All the breeders present concurred, and encouraged the plant pathologists to respond to this rating system. We suggest that the plant pathologists include this topic in their discussions in Charlotte, NC in 1983.

A discussion was conducted on determination of maturity, and establishing standard cultivars for grouping germplasm into maturity categories. R.O. Hammons and O.D. Smith are growing 16 cultivars (8 US, 8 African) in 1982. If any breeder is interested in participating in this effort in 1983, seed may be obtained from Hammons or Smith.

There was some discussion on submitting a proposal to USDA for conducting quality analyses on the NRT entries. Your thoughts on this could be topic for discussion at Charlotte.

Respectfully submitted,

C. E. Simpson

DISCUSSION GROUP - INTEGRATED PEST MANAGEMENT

R. L. Robertson - Moderator

David McNeal, Extension Services, USDA Washington, D.C. discussed the future of Extension IPM programs. He stressed the importance of interdisciplinary cooperation, cooperation and coordination between states, and the development of training programs for independent consultants. Evaluation and accountability in the use of Federal and State funds was also stressed. Future support of IPM should not be considered automatic since the proposed FY 83 budget reflects a slight decrease for support of these programs.

Another discussion by Dr. John Smith emphasized the interdisciplinary approach in IPM peanut programs in Virginia. Components include scouting for insects, a leafspot advisory, weed mapping and nematode assays.

Dr. Jack Bailey of North Carolina State University discussed an electronic method of leafspot forecasting based on local conditions. The electronic monitoring device developed for pilot programs is portable, simple to use and relatively inexpensive. Problems that could occur are inability to rapidly deliver the information to the cooperators and the accuracy of the forecast under certain localized weather conditions.

The Alabama peanut IPM program started with the pilot Tri-State program in 1975. Since then four county peanut IPM programs have been formed. Private consultants are increasing in areas where large averages are present. Training programs are being conducted to encourage scouting by smaller growers and members of their families.

Subsequent discussions revolved around research on economic threshold of various peanut pests and improved methods of sampling and forecasting.

POD ROT DISCUSSION GROUP

D. Morris Porter, Chairman
USDA - ARS - SR
Tidewater Research Center
Suffolk, VA 23437

Twenty-one scientists, including Dr. S. W. Baard from the Republic of South Africa met to discuss pod rot of peanuts. The meeting was most informative and much information on the current state-of-the-art of the peanut pod rot problem was exchanged. Representatives from each major peanut producing state and/or country related to the group the status of pod rot in their respective states.

Several topics including the following were discussed:

1. The causal agents of pod rot.
2. The relationship of gypsum to the severity of pod rot.
3. The role of gypsum in pod rot suppression.
4. Isolation procedures for Pythium myrioxylum.
5. "Pod rot" vs. "pod breakdown" as the appropriate name for an in-soil rot of pods on otherwise healthy plants.
6. Relationship of Fusarium spp. to the pod rot complex.
7. Relationship of soil fauna to the pod rot complex.
8. Fungicides and pod rot control.
9. Resistant varieties and pod rot control.

TISSUE CULTURE DISCUSSION GROUP
by Gregory C. Phillips

We had more than twelve participants in the session, one-half of whom actively pursue peanut tissue culture while others attending were interested breeders and geneticists. Tissue culture workers represented Oklahoma State University, University of Georgia, ICRISAT (India), and North Carolina State University.

In the opening remarks, it was emphasized that plant tissue and cell culture research has demonstrated both realized and highly potent future applications to breeding and genetics. It was noted that tissue culture scientists and plant breeders need to work closely to make useful progress, and the attendance indicated that peanut breeders and tissue culture researchers are working together in a number of programs.

A summary of work and progress in tissue culture research was presented by each of the four groups represented. Research in Oklahoma has attempted to define procedures for embryo culture and plant regeneration from callus of both wild and cultivated species. Explant source, genotype, and cultivar variables for callus production and plant regeneration have been investigated, and regenerated plants are being evaluated in the field. Biochemistry of tissue cultures is being related to genotype.

In Georgia, callus cultures are used in screening for disease resistance against *Sclerotia* toxins. In India, embryo and ovule culture methods for overcoming sexual incompatibility barriers are being studied. Also, tissue culture propagation methods and haploid production via anther culture are being investigated among wild and cultivated species. Efforts at North Carolina have focussed on the use of tissue culture methods in basic photosynthesis studies. Callus from varying explant sources, cell suspension cultures and protoplast isolations have been evaluated.

Potential applications of tissue culture methods to peanut breeding and genetics discussed included: disease elimination from elite or rare clones, clonal propagation of difficult-to-propagate lines, facilitation of inter-specific hybridization, germplasm maintenance and exchange, haploid production en route to homozygous line development, and somatic cell selection for specific kinds of improved characteristics. Tissue and cell culture procedures also offer opportunities for basic developmental, biochemical, physiological and genetical studies.

Among the top priorities identified for future research in this area were 1) the development of complete *in vitro* culture systems for both cultivated and wild species embracing all organ, tissue and cell culture methodologies to regenerate plants from single cells; and 2) the need for screening germplasms for *in vitro* characteristics. It was lamented that there is, in general, very low reproducibility of peanut tissue culture results, a traditional problem with tissue culture technologies still in their infancy. A "critical mass" is needed for such technologies to mature, and fortunately we are approaching that status in terms of numbers of laboratories researching peanut tissue culture. More complete information and good science needs to be reported.

The session closed following a good discussion. Considerable interest in this field of investigation was apparent. The group requested a tissue culture session for presentation of papers at the next APRES meeting, and all researchers in this area were encouraged to submit an abstract and make presentations. Investigators were encouraged to persist in their efforts in developing useful tissue culture technologies for peanut. Grain legumes in general have been recalcitrant to tissue culture, especially plant regeneration from cells, and continued research and progress with peanut may well place this crop in a prime position as a model system for other grain legumes.

REPORT OF THE APRES DELEGATION TO CHINA

A. H. Allison, Delegation Leader

Nineteen professional U.S. Agricultural Scientists and members of the American Peanut Research and Education Society were invited by the Central Government of the Peoples Republic of China, via People-to-People International, to visit, travel extensively and give seminars in China beginning in Peking on August 24, 1981 and ending in Canton on September 9, 1981. The itinerary which was structured by the Central Government (PRC) was extremely rigorous, but was meaningful and enjoyable. Sixty percent of the time was devoted to travel and observations of agriculture--especially of peanut culture in China. Forty percent of the time was devoted to cultural events. APRES' members making the tour are:

Allen H. Allison
Virginia Polytechnic Institute
& State University

Calvin R. Andress
Stauffer Chemical Company

Paul W. Becker
Texasgulf, Inc.

James R. Bone, Jr.
ICI Americas, Inc.

William H. Bordt
CPC International

Clarence J. Crowell
Hershey Chocolate Company

Don W. Dickson
University of Florida

Frank G. Dolllear
Retired USDA

Dallas L. Hartzog
Auburn University

Edwin T. Hibbs
Georgia Southern College

Rufus V. Keel
Keel Peanut Company, Inc.

Theodore V. Marolla
Snack Master Division of Mars, Inc.

Chester D. Melton
FMC Corporation

Leonard M. Redlinger
USDA

James J. Spadaro
USDA

John D. Taylor
J & S Plant Consultants, Inc.

Samuel S. Thompson
University of Georgia

Gerry C. Zekert
Planters Peanuts

Roberta Dow
Bermuda Dept. of Agriculture

Dallas Hartzog, a member of the delegation gave a one hour slide presentation of the tour at the 1982 APRES Convention on Wednesday evening, July 14.

The tour itinerary beginning with the first briefing in San Francisco, California follows:

ITINERARY

Saturday
August 22

Convened in San Francisco, California. Briefing by Andy Hoyer from

People-to-People International and Dr. Joyce Kallgren, University of California at Davis.

Sunday/Monday
August 23/24

Departed San Francisco to Beijing (Peking) via Toyko via Pan American. Met with former President Jimmy Carter and wife on flight to China. Total flight time including stopover in Toyko was 20.5 hours, overnight at Beijing Hotel.

Tuesday
August 25

Sight-seeing: Great Wall, Ming Tombs. Evening - 15 course banquet dinner, Beijing Quan Ju De Roast Duck.

Wednesday
August 26

Sight-seeing in Peking: Museum of Chinese History on the Tian An Men Square, Great Hall of the People, Mao Zedong Memorial Hall, Imperial Palace, Forbidden City and Temple of Heaven. Boarded train to Shandong Province.

Thursday
August 27

Shandong Province - Principle Peanut Area
Peanut Research Institute, Laixi County - Attended and gave seminar (Exchange of information).

Friday/Saturday
August 28/29

Shandong Province - Penglai County, Bus Trip

- Xugiaji Commune
- Tianjia Production Brigade
- Jewongjia Production Brigade
- Field Trip on Experimental Farm
- Yantai Prefecture (Muping County Oil Factory and Yantai Hand Embroidery Factory)
- Overnight train trip to Jinan.

Sunday/Monday
August 30/31

Jinan, capitol of Shandong Province
Visited Arts and Crafts' plant; Peanut Seminars given during afternoon and evening. Also Banquet in honor of U.S. Delegation.

Tuesday
September 1

Anhui Province - Hefei City--Capitol of Anhwei
Visited Arts and Craft factory and Ming Fai Temple
Briefed on agriculture in Province

Wednesday
September 2

Feidong County - Anhwei Province
Briefings on agriculture and field trip to several Brigades,
Communes and Teams.

Thursday/Friday
September 3/4

Traveled via air from Anhwei Province to Shanghai. Sight-seeing,
Chinese opera and shopping in friendship store. Visited food
processing factory.

Saturday/Sunday/Monday
September 5/6/7

Travel by plane from Shanghai to Guangzhou (Canton) and from Canton
to the main peanut production area in the south--Guangdong Province,
Shantaw (Swatow) Prefecture. This included a field trip to
Chenghai County.

Tuesday
September 8

Visited Guangzhou Botanical Garden, tour of the city and Pearl River
and shopping in Friendship store.

Wednesday/Thursday
September 9/10

Departed China for Hong Kong via air. Visited North American Food
Company in Hong Kong. Shopping, sight-seeing, Banquets.

Friday
September 11

Departed Hong Kong for San Francisco (11 hours non-stop).

APRES BOARD OF DIRECTORS MEETING

Hilton Inn, Albuquerque, New Mexico

13 July 1982

President J. L. Butler called the meeting to order at 7:30 P.M. The following board members were present: A. H. Allison, William Birdsong, Jr., E. B. Browne, J. L. Butler, Ron Henning, Larry Hodges, David Hsi, D. L. Ketring, Perry Russ, D. H. Smith, and G. Zekert. Others present were: Elbert Long, Kay McWatters, Dan Hallock, John French, Doyle Welch, Fred Cox, Aubrey Mixon, Rufus Keel, and H. E. Pattee.

Ron Henning moved that the minutes of the 1981 board meetings be approved as published on pages 115 and 116 of APRES PROCEEDINGS (Volume 13, 1981).

D. L. Hallock, Chairman of the ad hoc committee on "Peanut Science and Technology" presented a report on the status of the new APRES book. Larry Hodges moved that the report be accepted. Seconded by Ron Henning. Motion passed.

Elbert Long presented the Site Selection Committee report for the 1983 meeting. William Birdsong, Jr. moved that the report be accepted. Seconded by D. L. Ketring. Motion passed.

John French recommended that the 1984 meeting be held in Mobile, Alabama and that the final selection of a meeting place be delayed. Ron Henning moved that the report be accepted. Seconded by Larry Hodges. Motion passed.

Larry Hodges moved that the Site Selection Committee consist of eight members. Seconded by W. M. Birdsong, Jr. Motion passed.

David Hsi presented the Program Committee report and moved that APRES spouses be invited to the breakfast on 16 July 1982. Seconded by Larry Hodges. Motion passed.

Rufus Keel presented the report of the Public Relations Committee. Ron Henning moved that the report be accepted. Seconded by Larry Hodges. Motion passed.

Doyle Welch presented the report of the Peanut Quality Committee. Ron Henning moved that the report be approved. Seconded by David Hsi. Motion passed.

A. H. Allison presented the report of the APRES Fellows Committee. Larry Hodges moved that the report be accepted. Seconded by William Birdsong, Jr. Motion passed.

Kay McWatters presented the Bailey Award Committee report. William Birdsong, Jr. moved that the report be accepted. Seconded by Larry Hodges. Motion passed.

Olin D. Smith presented the report of the Publications and Editorial Committee. Ron Henning moved that the report be accepted. Seconded by Larry Hodges. Motion passed.

The report of the APRES Liaison representative with the American Society of Agronomy was presented for Ray Hammons by Aubrey Mixon. A. H. Allison moved that the report be accepted. Seconded by William Birdsong, Jr. Motion passed.

The report of the Golden Peanut Research and Education Award Advisory Committee was presented by J. L. Butler for Ray O. Hammons. Ron Henning moved the report be accepted. Seconded by William Birdsong, Jr. Motion passed.

A. H. Allison presented the report of the Nominating Committee. Ron Henning moved that the report be accepted. Seconded by D. L. Ketrang. Motion passed.

President Butler adjourned the meeting at 9:30 P.M.

APRES BOARD OF DIRECTORS MEETING

Hilton Inn, Albuquerque, New Mexico

14 July 1982

President J. L. Butler called the meeting to order at 7:30 P.M. The following board members were present: A. H. Allison, William Birdsong, Jr., Ron Henning, E. B. Browne, J. L. Butler, Larry Hodges, David Hsi, D. L. Ketrang, Perry Russ, and D. H. Smith. Others present were: Gerald Harrison, Aubrey Mixon, and Dallas Wadsworth.

D. L. Ketrang presented the report of the Finance Committee. Ron Henning moved that the report be accepted. Seconded by David Hsi. Motion passed.

William Birdsong, Jr. moved that the registration fee for the annual meeting be increased to thirty dollars for members and thirty-five dollars for non-members. Seconded by David Hsi. Motion passed.

Ron Henning moved that dues for Individual and Institutional members of APRES be increased to fifteen dollars. Seconded by Larry Hodges. Motion passed.

D. H. Smith presented the report of the Executive Secretary-Treasurer. Larry Hodges moved that the report be accepted. Seconded by David Hsi. Motion passed.

President Butler will appoint an ad hoc committee to study the APRES By-Laws and recommend appropriate changes. In addition, President Butler will appoint a committee to study the possibility of employing a paid executive officer of APRES.

David Hsi presented a report on committee assignments. Ron Henning moved that committee assignments be approved. Seconded by A. H. Allison. Motion passed.

The meeting was adjourned at 8:20 P.M. by President Butler.

Minutes of the Regular Business Meeting of the
AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY
Hilton Inn, Albuquerque, New Mexico, 16 July 1982

The meeting was called to order by President J. L. Butler at 7:30 A.M.

The invocation was given by Ray O. Hammons.

Olin D. Smith presented the report of the Publication and Editorial Committee. Robert E. Pettit moved that the report be accepted. Seconded by Clyde T. Young. Motion passed.

Darold Ketring presented the report of the Finance Committee. Robert Ory moved that the report be accepted. Seconded by William Birdsong, Jr. Motion passed.

John French presented the report of the Site Selection Committee. Robert E. Pettit moved that the report be accepted. Seconded H. A. Melouk. Motion passed.

A. H. Allison presented the Nominating Committee report. James S. Kirby moved that the report be accepted. Seconded by Gene Sullivan. Motion passed.

D. M. Porter presented the report of the Public Relations Committee. James S. Kirby moved that the report be accepted. Seconded by William Birdsong, Jr. Motion passed.

Ray O. Hammons presented the report of the Golden Peanut Research and Education Award Advisory Committee. Harold Pattee moved that the report be accepted. Seconded by Perry Russ. Motion passed.

Ruth Ann Taber presented the report of the Peanut Quality Committee. Perry Russ moved that the report be accepted. Seconded by James S. Kirby. Motion passed.

David Hsi presented the Program Committee report. Dallas Wadsworth moved that the report be accepted. Seconded by Gene Sullivan. Motion passed.

President Butler announced that Kenneth H. Garren, Ray O. Hammons, and Astor Perry were selected as APRES Fellows.

A. H. Allison presented the report of the APRES Fellows Committee. Perry Russ moved that the report be accepted. Seconded by Fred Cox. Motion passed.

President Butler announced that the recipients of the Bailey Award are Jay Williams and Stanley Drexler. Their award winning paper is "A Distributional Concept of Peanut Pod Maturation".

Kay McWatters presented the Bailey Award Committee report. H. A. Melouk moved that the report be accepted. Seconded by C. E. Simpson. Motion passed.

President Butler presented the Past President's Certificate to A. H. Allison.

David Hsi announced the committee appointments for 1982-1983. Robert E. Pettit moved that the appointments be accepted. Seconded by Gene Sullivan. Motion passed.

President Butler adjourned the meeting at 8:45 A.M.

AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY

Financial Statement

July 1, 1981 to June 30, 1982

ASSETS & INCOME

I. Assets

A. Certificates of Deposit

| | |
|--|-------------|
| 1. Cuero Federal Savings & Loan Association, Cuero, TX | \$10,000.00 |
| 2. Yoakum National Bank, Yoakum, TX | 10,000.00 |

B. Savings Accounts

| | |
|---|----------|
| 1. Wallace K. Bailey Fund, Yoakum National Bank, Yoakum, TX | 946.97 |
| 2. Yoakum National Bank, Yoakum, TX | 2,281.02 |

II. Income

| | |
|--|-----------|
| A. Balance, July 1, 1981 | 9,416.26 |
| B. Membership & Registration (Annual Meeting) | 16,394.00 |
| C. Proceedings & Reprint Sales | 314.25 |
| D. Special Contributions | 1,350.00 |
| E. The Peanut | 20.00 |
| F. Peanut Science Page Charges & Reprints | 10,090.00 |
| G. Institutional Membership | 1,026.00 |
| H. Differential Postage Assessment-Foreign Members | 1,765.57 |
| I. Checking Account Interest | 739.78 |
| J. Saving Account, Wallace K. Bailey Fund | - |
| K. Ladies Activities | 80.00 |
| L. Certificates (Principal & Interest) | 19,989.00 |
| M. Bank Charge Refund | 2.23 |
| N. Peanut Science & Technology | 40.00 |

Total: \$84,455.08

LIABILITIES & EXPENDITURES

III. Expenditures

| | |
|---|-------------|
| 1. Proceedings - Printing & Reprints | \$ 4,613.91 |
| 2. Annual Meeting - Printing | 3,375.78 |
| 3. Secretarial | 2,500.00 |
| 4. Postage | 854.68 |
| 5. Office Supplies | 551.51 |
| 6. Position Bond for \$5,000 (Exec.Sec.Treas) | 54.00 |
| 7. Travel - President | - |
| 8. Travel - Executive Sec. Treas. | - |
| 9. Registration - State of Georgia | 35.00 |
| 10. Miscellaneous | 340.31 |
| 11. Peanut Science | 11,000.00 |
| 12. The Peanut | 20.00 |
| 13. Bank Charges | 15.14 |
| 14. Peanut Research | 2,301.67 |
| 15. Certificate of Deposit | - |
| 16. Membership | - |
| 17. Secretary-Self Employment Tax | 191.33 |
| 18. Legal Fees | - |
| 19. Saving Account | - |
| 20. APRES Methods Book | 261.00 |
| 21. Peanut Science & Technology | 20,000.00 |

Total: \$46,114.33

AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY

Financial Statement

July 1, 1981 to June 30, 1982

| | |
|--|--------------------|
| I. Assets | |
| A. Certificates | \$20,000.00 |
| B. Saving Accounts | 3,227.99 |
| II. Balance | |
| A. Checking Account - July 1, 1981 | 9,416.26 |
| III. Income | |
| B,C,D,E,F,G,H,I,J,K,L,M, & N - July 1, 1981 to June 30, 1982 | \$51,810.83 |
| | |
| Total | <u>\$84,455.08</u> |
| IV. Liabilities | |
| July 1, 1981 to June 30, 1982 | \$46,114.33 |
| | |
| V. Balance, June 30, 1982 | <u>\$38,340.75</u> |
| Total Funds, June 30, 1982 | |
| Certificates: | \$20,000.00 |
| Saving Accounts: | 3,227.99 |
| Checking Account Balance: | 15,112.76 |
| | |
| Total | <u>\$38,340.75</u> |

PRESIDENT'S REPORT

J. L. Butler

To paraphrase a popular commercial, we have come a long way in 14 years. We now have about 700 members in 37 countries. We have published 19 volumes of Peanut Research. We publish the peer reviewed journal Peanut Science twice per year. We publish the Proceedings of each annual meeting. With the publication of Peanut Science and Technology in October, we will have published two outstanding technical books covering all aspects of peanuts - and let me urge each of you to take advantage of the pre-publication price and order your personal copy now. In addition to the foregoing information sources, we also serve as a clearinghouse for technical questions related to all aspects of peanuts.

While we have accomplished much, we cannot rest on these accomplishments. We must recognize that our total agri-business structure is in a precarious financial position. As peanut production in the U.S. is reduced, there will be less income from peanuts and there may be a tendency to reduce research and education efforts for this crop. We must determine the needs and the potential returns of these research and educational efforts and advise research administrators of the facts. With this information in hand, they will be able to make more educated decisions on the spending of money and effort.

We, as researchers and educators must be sure that we are getting maximum value for each research and education dollar entrusted to us. For example, we can no longer collect data in the time honored manner. Just as the computer has replaced the calculator for analysis, automated data collection has replaced the pencil and clipboard. We cannot expect our administrators to subsidize research using antiquated methods and techniques any more than we would expect to subsidize a peanut producer using decades old practices and technology.

We must maximize the use of computers for modeling. But we must also recognize the limitations of these models. An unverified model is still in the same category as an untested theory. We occasionally see people ready to make recommendations on unverified models. Within the last month, I rejected a manuscript which contained design data and an economic analysis all based on an unverified computer model.

From the 1940's to the present, the utilization of research findings and mechanization have made it possible for the American farmer to rapidly increase his productive capacity. This increase has relied heavily upon machines and chemicals, both of which require significant amounts of energy. Now, the age of electronics has come to agriculture. We must use this new servant to monitor, control, record, assist in decision making and as a means of disseminating information.

We must explore other uses for peanuts besides the traditional edible and vegetable oil market. What will be their true value for diesel oil substitutes if the by-products can be utilized on the farm and their value is considered in

crop rotations? How many economists do we have working with us as we seek to develop systems of production and utilization? The potential for peanuts is limited only by our imagination.

How can we make APRES more viable? Growth in numbers is synergistic in both ideas and doing capacity. We, as individual members are the best sales device for increasing our membership and increasing our effectiveness as a society. Will each of you try to recruit one new member this year? We are now making a conscious effort through our Public Relations Committee to better inform the public about peanuts and agriculture. We as a society, however, can only be as effective as you, the individual make us.

In serving as president this year, I have come to realize the effort that Don Smith puts into this organization. Of course, he has the assistance of Bobbie, Donna, Debbie and Scott - and Sally Keel for the past six years at registration time. Even with this help, he is heavily taxed and spends untold hours doing things to make our society tick. The effort of the people working on each of the committees is also recognized and I sincerely thank each of you for making this a very rewarding year for me. A note of thanks is also due to my secretary, Mildred Benson, for the additional work which she has done to help me serve you this year. I cannot close without recognizing the encouragement and assistance that my wife, Jane, has given me through the years.

It is indeed an honor to have had the opportunity to serve you as your president.

Now it is my pleasure to turn the control of the office of President to David Hsi who will serve you during the coming year. I know that he, as I did, will cherish your cooperation and support.

PROGRAM COMMITTEE REPORT
David C. H. Hsi, Chairman

As part of my report, I want to present to you, President Butler, this corrected printed program of the 14th Annual Meeting of American Peanut Research and Education Society and the realization of our planned program.

I want to thank the following people: Dr. Dallas Wadsworth, Technical Program Chairman; Dr. Ronald Hooks, Dr. Darrell Baker, Co-Chairman of Local Arrangements; Mrs. Judy Hooks, Chairman of Ladies Program; and, Mrs. Bobbi Smith and Mrs. Sally Keel, Co-Chairmen of Registration.

In addition, I want to thank Donna, Debbie and Scot Smith and the two ladies from the Albuquerque Convention and Visitors Bureau for their assistance in registration. I also want to thank our sponsors for special events, coffee breaks and refreshments.

On behalf of the Program Committee, I want to thank all of you for coming. Without your coming and your participation, our program planning would be meaningless and unfulfilled.

Last, but certainly not least, I want to thank someone to whom all of us are indebted. As we stood on the crest of the majestic mountain, we could see at one glance the big metropolitan city of Albuquerque, and the big river, Rio Grande, almost the size of a ribbon. In harmonizing with the time and the space, and the heaven and the earth, we realized how insignificant we human beings really are and we appreciate even more our creator for His mighty power, His infinite blessings and bountiful provisions. So let us, individually and collectively, thank our good Lord for having made all things possible, including the entirety of our 14th annual meeting.

The following organizations contributed financial support for coffee breaks, ladies' hospitality, and other incidental expenses for this year's APRES meeting. We are most grateful for their support of this meeting and for their support of the peanut industry.

SPONSORS OF MEALS AND SPECIAL EVENTS

Diamond Shamrock
Uniroyal
New Mexico Crop Improvement Association

SPONSORS WITH EXHIBITS

Ciba-Geigy
Monsanto
Olin
Diamond Shamrock
New Mexico Crop Improvement Association

SPONSORS WITHOUT EXHIBITS

Gustafson
Stauffer
American Cyanamid
Borden Peanut Company
Portales Valley Mills
New Mexico Peanut Commission

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

Tuesday, July 13

1:00-8:00 APRES Registration - East Promenade

COMMITTEE MEETINGS AND DISCUSSION GROUPS

1:30 Ad Hoc - Peanut Book - Riviera North
1:30 Peanut Disease Compendium - Riviera South
1:30 Quality - Granada
3:00 Finance - Riviera North
3:00 Publication and Editorial (Peanut Science and Peanut Research)
- Riviera South
3:00 Site Selection - Granada
4:30 Plant Breeding and Germplasm - Riviera North
4:30 Public Relations - Riviera South
4:30 Bailey Award - Granada
7:30 Board of Directors - Civic
7:30 Pod Rots - Riviera North
7:30 Tissue Culture - Riviera South
7:30 Integrated Pest Management - Granada

Wednesday, July 14

8:00-5:00 APRES Registration - East Promenade

8:00-5:00 Exhibits - Florentine

GENERAL SESSION - J. L. Butler, presiding - Granada & Lisbon

8:30 Invocation, G. Chandler
8:35 Grower Welcome and Introduction of Guest Speaker, W. Baker
8:45 Welcome to New Mexico, L. S. Pope
9:15 Announcements
D. Hsi, Program Chairman
R. F. Hooks, Local Arrangements Committee
D. F. Wadsworth, Technical Prog. Committee
9:20 Mayor's Welcome and Proclamation, H. E. Kinney, Mayor of
Albuquerque
9:30 Break - East Promenade

SYMPOSIUM - NITROGEN FIXATION - R. K. Howell, presiding - Granada & Lisbon

- 10:00 Nitrogen and Other Peanut Foliar Nutrients as Influenced by Cultivar and Effective Strains of Nitrogen Fixing Rhizobium, R. K. Howell* and T. A. Coffelt.
- 10:15 Nitrogen Fixation and Translocation in the peanut, C. S. Kvien*, J. E. Pallas, D. W. Maxey, and J. Evans.
- 10:30 Biological Nitrogen Fixation in Peanuts: Relative Importance of Genetic Components of Symbiotic Variability, J. C. Wynne*, T. G. Isleib, G. H. Elkan, and T. J. Schneeweis.
- 10:45 Interactions Between Rhizobium Strains and Peanut Cultivars, G. H. Elkan*, J. C. Wynne, and T. J. Schneeweis.
- 11:00 Studies on Peanut Bacteroids, Dipankar Sen and R. W. Weaver*.
- 11:15 Discussion
- 11:30 Lunch

THREE CONCURRENT SESSIONS:

1. Session (A) - Plant Pathology - Riveria
2. Session (B) - Extension and Industry - Granada
3. Session (C) - Processing and Utilization - Civic

SESSION A Plant Pathology - J. L. Sherwood, presiding

- 1:00 Feasibility of Peanut Leafspot Forecasting in North Carolina, Jack E. Bailey* and Suzanne Spencer.
- 1:15 Resistance in Peanut Germplasm to Cercospora arachidicola, H. A. Melouk* and D. J. Banks.
- 1:30 Additional Studies on Biological Control of Late Leafspot with Dicyma, Donald H. Smith*, Ruth Ann Taber, James K. Mitchell, and Suzan H. Woodhead.
- 1:45 Effects of Irrigation on Peanut Diseases in Virginia, D. M. Porter* and F. S. Wright.
- 2:00 A Field Selection Procedure for Resistance in Peanuts to Verticillium Wilt, D. F. Wadsworth*, H. A. Melouk, and J. L. Sherwood.
- 2:15 Discussion
- 2:45 Break - East Promenade

SESSION B Extension and Industry - Ray Smith, presiding

- 1:00 New Developments in CDA, Mark Wiltse.
- 1:15 Results from CDA Application, Thomas A. Lee*, Robert Littrell, and Fred Shokes.
- 1:45 Chlorothalonil Deposition Studies via CDA, Bill Odle.
- 2:00 Electrostatic Application, Jim Bone.
- 2:15 Peanut Disease Loss Estimates, R. V. Sturgeon.
- 2:30 Aerial & Soil Rhizoctonia in Peanuts, Sam Thompson.
- 2:45 Nematicide Application Techniques, R. Rodriguez-Kabana.

3:00 Break - East Promenade

SESSION C Processing and Utilization - C. T. Young, presiding

- 1:00 Quality Characteristics of Cake-type Doughnuts Containing Peanut, Cowpea, and Soybean Flours, S. Kay McWatters.
- 1:15 Changes in Peanut Quality Related to Moisture Content and Storage Time, H. E. Pattee*, C. T. Young, J. L. Pearson, J. A. Singleton, and F. G. Giesbrecht.
- 1:30 Composition and Characteristics of Basic Proteins from Peanut Seed, Shaik-M. M. Basha* and Sunil K. Pancholy.
- 1:45 Fatty Acid Composition of Peanut Genotypes in the Virginia-Carolina Production Area, R. W. Mozingo* and J. L. Steele.
- 2:00 The Production of a Homologous Series of Hydrocarbons in Ground Raw Peanuts During Storage, N. V. Lovegren* and A. J. St. Angelo.
- 2:15 Microflora of Peanuts Stored Under Modified Atmospheres, D. M. Wilson*, Ed Jay, and R. A. Hill.
- 2:30 Pressing Peanuts: New Procedures for Removing Oil, J. Pominski*, H. M. Pearce, Jr. and J. J. Spadaro.
- 2:45 Discussion
- 3:00 Break - East Promenade

THREE CONCURRENT SESSIONS

1. Session (A) - Plant Pathology - Riviera
2. Session (B) - Extension and Industry - Granada
3. Session (C) - Breeding and Genetics - Civic

SESSION A Plant Pathology - D. Lindsey, presiding

- 3:15 The Severity of Peanut Blackhull in South Africa and Studies on the Survival of the Pathogen, Christa Laubscher, S. W. Baard* and G. D. C. Pauer.
- 3:30 Thermal Inactivation of Fungi Associated with Pod Rot of Peanuts, J. L. Sherwood*, H. A. Melouk, and D. F. Wadsworth.
- 3:45 Evaluation of Pythium Pod Rot Resistance in Peanuts as a Source of Resistance Against Early Season Pythium myriotylum infection, B. L. Jones*.
- 4:00 Influence of Calcium Source on Peanut Peg and Pod Rot Complex, A. S. Csinos*, T. P. Gaines, and M. E. Walker.
- 4:15 Vesicular-arbuscular Endomycorrhizal Fungi in Weed Seeds in Peanut Soils, Ruth Ann Taber*.
- 4:30 Yield and Vigor Improvements in Florunner Peanuts Following Root Bacterization with Bacillus subtilis, R. P. Clay*, A. Backman, and M. A. Crawford.
- 4:45 Discussion
- 5:00 Break

SESSION B Extension and Industry Continued - Ray Smith, presiding

- 3:15 The Consultant's Responsibility to Peanut Growers, Roger Musick*.
- 3:30 Should Product Formulations Compliment Delivery Systems or Vice Versa? Richard Lankow*, Mark Wiltse, Roy Sturgeon, and Reid Faulkner.
- 4:30 New Developments from Industry, Industry Representatives
- 5:00 Business Meeting - Election of Officers for 1983
- 5:30 End of Session
- 7:30 Board of Directors, J. L. Butler, presiding - Civic

SESSION C Breeding and Genetics - J. S. Kirby, presiding

- 3:15 Collections of Arachis Germplasm in South America, C. E. Simpson*, D. J. Banks, W. C. Gregory, A. Krapovickas, J. Pietrarello, H. Zurita O., and A. Schinini.
- 3:30 Peanut Germplasm Development, D. J. Banks*, H. A. Melouk, and D. L. Ketrung.
- 3:45 Improvement of A. hypogaea by Combining Ancestral and Other Wild Species Genomes, A. K. Singh* and J. P. Moss
- 4:00 Screening for Field Resistance to Peanut Leafspot in Virginia, T. A. Coffelt* and D. M. Porter.
- 4:15 Evaluation of Peanut Genotypes for Resistance to Leafspot and for Agronomic Performance, D. W. Gorbet*, A. J. Norden, and F. M. Shokes.
- 4:30 Parent - Progeny Relationship for the Flat Seed Trait in the Florunner Cultivar, A. J. Norden*, J. I. Davidson, Jr., D. W. Gorbet, and D. A. Knauff.
- 4:45 Discussion
- 5:00 Break
- 6:00 Reception - Diamond Shamrock - Cabaret

Thursday, July 15

THREE CONCURRENT SESSIONS

1. Session (A) - Plant Pathology - Riviera
2. Session (B) - Production Technology - Lisbon
3. Session (C) - Breeding and Genetics - Civic

SESSION A Plant Pathology - B. L. Jones, presiding

- 8:00 Application Time and Effectiveness of Four Systemic Nematicides Against Meloidogyne arenaria on Florunner Peanuts, R. Rodriguez-Kabana*, R. A. Shelby, P. S. King, and M. H. Pope.
- 8:15 Comparison of In-Furrow, Banded, and Combination Banded + In-Furrow Treatments for Control of the Peanut Root-Knot Nematode, R. Rodriguez-Kabana*, R. A. Shelby, P. S. King, and M. H. Pope.

- 8:30 The Incidence of Southern Stem Rot in Tractor Tire and Non-Tractor Tire Rows in North Florida Peanut Fields, F. M. Shokes* and J. A. Arnold.
- 8:45 The Use of CGA-64250 in Managing Fungal Pathogens of Peanuts, J. M. Hammond*, G. H. Hancock, and C. C. Abbott.
- 9:00 Effects of Certain Fungicide Formulations on Sclerotinia sclerotiorum, R. V. Sturgeon, Jr.* and Kenneth E. Jackson.
- 9:15 Effect of Foliar Fungicides on Incidence of Sclerotinia Blight in Oklahoma Peanut Fields, Rober R. Musick.
- 9:30 Discussion
- 10:00 Break - East Promenade

SESSION B Production Technology - A. C. Mixon, presiding

- 8:00 Using On-Farm Tests in Peanut Educational Programs, Gene A. Sullivan.
- 8:15 Peanut Growth Model Predictions vs. Historical Yields in Virginia, J. L. Steele* and J. H. Young.
- 8:30 Techniques for Reducing Energy Consumption in Peanut Drying, J. H. Young*, J. W. Dickens, and J. W. Glover.
- 8:45 Effects of Drought and Soil Temperature Modification on Florunner Peanut Properties, P. D. Blankenship*, J. I. Davidson, Jr., T. H. Sanders, R. J. Cole, and R. A. Hill.
- 9:00 Rope-wick Treatments for Controlling Tall Weeds in Peanuts, Ellis W. Hauser*, Gale A. Buchanan, Mike Patterson, and R. H. Walker.
- 9:15 Trace Mineral Contents of Selected Tissues from Bioregulator - Treated Peanut Plants, R. L. Ory*, E. J. Conkerton, F. R. Rittig, M. Schroeder, and T. O. Ware.
- 9:45 Discussion
- 10:00 Break - East Promenade

SESSION C Breeding and Genetics - C. E. Simpson, presiding

- 8:00 Field Performance of Two Cultivars Relative to Resistance to Invasion by Aspergillus flavus and Subsequent Aflatoxin Contamination, J. I. Davidson, Jr., R. A. Hill, R. J. Cole, A. C. Mixon and R. J. Henning*.
- 8:15 Genetic Study of a Miniature Phenotype in Arachis hypogaea L., W. D. Branch* and R. O. Hammons.
- 8:30 Cytological Relationships Among Varieties of Arachis hypogaea L., H. T. Stalker.
- 8:45 Linkage Between Genes for Non-nodulation and Variegated Testa Color in Peanuts, K. E. Dashiell* and D. W. Gorbet.
- 9:00 Pedigreed Natural Crossing to Identify Peanut Testa Genotypes, Ray O. Hammons* and W. D. Branch.
- 9:15 Classification of White Testa Peanuts by Flavonoid Analysis, D. J. Daigle*, E. J. Conkerton, and R. O. Hammons.

- 9:30 Response of Resistant and Susceptible Genotypes to Chemical Soil-Borne Disease Controls, O. D. Smith*, T. E. Boswell, and W. J. Grichar.
- 9:45 Discussion
- 10:00 Break - East Promenade
THREE CONCURRENT SESSIONS
1. Session (A) - Plant Pathology - Riviera
2. Session (B) - Plant Nutrition and Physiology - Lisbon
3. Session (C) - Entomology - Civic
- SESSION A Plant Pathology - H. A. Melouk, presiding
- 10:15 Preservation of Cercosporidium personatum Conidia and a Method for Laboratory and Greenhouse Studies, Robert H. Littrell.
- 10:30 Assessment of Disease Progress and Yield Loss in Selected Peanut Genotypes, Robert Neundorfer* and Robert H. Littrell.
- 10:45 Disease Occurrence and Yield Response of Three Spanish Varieties and Florunner Peanuts to Foliar Disease Control, L. Menakanit*, K. E. Jackson, and R. V. Sturgeon, Jr.
- 11:00 Effects of Chlorothalonil Applied for Peanut Leafspot Control on Pod Rot, Stem Rot, Seed Quality, and Yield, M. A. Crawford* and P. A. Backman.
- 11:15 Insertion of Systemic Fungicides into a Contract Fungicide Program for Control of Peanut Leafspot, P. A. Backman* and M. A. Crawford.
- 11:30 Discussion
- 12:00 Break
- SESSION B Plant Nutrition and Physiology - A. M. Schubert, presiding
- 10:15 Effects of Salinity on Nodulation in Peanuts [Arachis hypogaea L.], J. S. Calahan, Jr.
- 10:30 Response of Nodulating and Non-nodulating Peanut Lines to N Application, S. K. Pancholy* and S. M. M. Basha.
- 10:45 Potato Leaf Hopper Inhibits Peanut Leaf Photosynthesis, J. E. Pallas, Jr.* and Edwin T. Hibbs.
- 11:00 Effect of Drought and Soil Temperature on Peanut Canopy, Stem, and Pod Temperatures, T. H. Sanders*, P. D. Blankenship, R. J. Cole, and R. A. Hill.
- 11:15 Effects of Trickle Irrigation Rate and Interval and of Fertilization Level on Rhizobium-Inoculated Peanuts. I.S. Wallerstein*, B. Sagiv, Rina Lobel, and J. Schiffmann.
- 11:30 Discussion
- 12:00 Break
- SESSION C Entomology - R. L. Robertson, presiding
- 10:15 Evaluation of Peanut Pest Management in Georgia 1981, H. Womack*, G. K. Douce, C. Sivasailam, and D. Linder.
- 10:30 Absolute and Relative Density Studies on the Tobacco Wireworm and Southern Corn Rootworm, P. F. Lummus* and J. C. Smith.

- 10:45 Fecundity of the Lesser Cornstalk Borer, Elasmopalpus lignosellus, from "Florunner" and "Spanhoma" Peanut Varieties, R. C. Berberet* and D. A. Sander.
- 11:00 Oviposition of the Potato Leafhopper, Empoasca fabae (Harris) in Peanut Plants, Edwin T. Hibbs*, Loy W. Morgan, and H. Joel Hutcheson.
- 11:15 Control of Peanut Insects in Research/Demonstration Tests in Virginia, J. C. Smith.
- 11:30 Influence of Systemic Insecticides on Thrips Damage, Plant Growth, and Yield of Florunner Peanuts, R. E. Lynch*, J. W. Garner, and L. W. Morgan.
- 11:45 Discussion
- 12:00 Break

THREE CONCURRENT SESSIONS

1. Session (A) - Production Technology - Riviera
2. Session (B) - Plant Nutrition and Physiology - Lisbon
3. Session (C) - Entomology - Civic

SESSION A Production Technology - G. A. Sullivan, presiding

- 1:00 A Once-over Peanut Harvester, P. H. White* and R. C. Roy.
- 1:15 Peanut Performance in Early or Late Yearly Sequence with Other Crops, A. C. Mixon* and C. C. Dowler.
- 1:30 Effects of Crop Rotation Involving Peanuts on the Production of Flue-Cured Tobacco in Southern Ontario, J. M. Elliot and R. C. Roy*.
- 1:45 Applied Nutrient Effects on Suppression of *Cylindrocladium* Black Rot Disease, D. L. Hallock.
- 2:00 Discussion
- 2:30 End of Session

SESSION B Plant Nutrition and Physiology - Larry Cihacek, presiding

- 1:00 Skip-Row Culture of Peanuts in South Central Texas, A. M. Schubert*, C. L. Pohler, and D. H. Smith.
- 1:15 Influence of Humus-Containing Fertilizers and Sludge on Peanut Plant Growth, R. E. Pettit*, B. L. Jones, and C. L. Martin.
- 1:30 Evaluation of Peanut Genotypes for Root and Shoot Growth, D. L. Ketrings.
- 1:45 Physiological Basis for Yield Differences Among Peanut Cultivars, S. T. Ball*, J. C. Wynne, and L. A. Nelson.
- 2:00 Investigation of Protein-Bound Lipids from Stored Raw Peanuts and Peanut Flours, A. J. St. Angelo.
- 2:15 Discussion
- 2:30 End of Session

SESSION C Entomology - M. English, presiding

- 1:00 Application of Insecticides to Plants Through Irrigation Systems, Loy W. Morgan.
- 1:15 Modified Atmospheres: Effectiveness in Control of the Red Flour Beetle and the Almond Moth in Stored peanuts, E. G. Jay.
- 1:30 Monitoring Low-level Populations of the Two-spotted Spider Mite on Peanut Field Borders, L. S. Boykin* and W. V. Campbell.
- 1:45 Spider Fauna of Peanuts in the West Cross Timbers Area of Texas, C. W. Agnew*, D. A. Dean, and J. W. Smith, Jr.
- 2:00 Resistance of Wild Species of Peanuts to an Insect Complex, W. V. Campbell* and H. T. Stalker.
- 2:15 Discussion
- 2:30 End of Session
- 3:00-8:00 Bus ride to Sandia and back - NM Crop Improvement Association. Tram Rides and Barbecue - UNIROVAL
- 8:30 A Peanut Travelogue to China - A. H. Allison, moderating - D. Hartzog, illustrated report - Granada-Lisbon

Friday, July 16

- 7:30 Breakfast - Granada-Lisbon
- 8:30 President's Address and Business Meeting - Granada-Lisbon
- 10:30 Adjourn

FINANCE COMMITTEE REPORT

Committee members present:

Darold L. Ketring, Chairman
Marvin Beute, Vice-Chairman
David T. Bateman
Max Grice (for T.H. Birdsong III)
William V. Campbell
William E. Dykes
Lional A. Felts

The Finance Committee met at 3:00 p.m. on July 13, 1982. A limited audit of the financial statements submitted by the Secretary-Treasurer and Peanut Science Editor was conducted and they were found to be in order.

The committee prepared a proposed budget for fiscal year July 1, 1982 to June 30, 1983 and submitted the following recommendations to the Board of Directors

- (1) That the financial statements submitted by the secretary-treasurer and Peanut Science Editor be accepted.
- (2) That the assistants to the Secretary-Treasurer and Peanut Science Editor both be paid \$3000 for work done for APRES and Peanut Science during fiscal year July 1, 1982 to June 30, 1983 based on submitted job descriptions and an estimated 500 to 600 hours of work per year.
- (3) That the registration fee for the annual APRES meeting be increased from \$20.00 to \$30.00 for members and \$25.00 to \$35.00 for nonmembers.
- (4) That Individual membership dues be increased from \$10.00 to \$15.00 and that Institutional memberships be increased from \$12.00 to \$15.00

JOB DESCRIPTIONS AND DUTIES

Assistant to Peanut Science Editor

1. Handles all correspondence regarding Peanut Science.
2. Upon receipt of manuscript it is checked for conformity to journal style, a journal number assigned, and a document file created. This file includes a labeled manila folder and a reference card is kept current as to the status of each manuscript. After assignment of an Associate Editor an acknowledgment letter is sent to the author and forms are prepared for the Associate Editor who is handling the manuscript. Types and files all subsequent correspondence on the manuscript.
3. Upon receipt of page proofs for journal, stamps proofs for author's initials and time limit, and mails proofs to authors.
4. Keeps file current on progress of proofs and returns proofs to printer.
5. Proofreads final blue-line proof of journal.
6. Handles preparation and bulk mailing of Peanut Science and Proceedings.
7. Fills requests for lost issues and purchase of back issues.
8. Prepares invoices for page charges and reprint order.
9. Maintains file on status of invoice payment and sends payments to Society Secretary.

Assistant to Secretary-Treasurer

1. Mail dues notices to APRES members, i.e., first, second, and final dues notices.
2. Deposit checks for dues, page charges, registration fees, special contributions, and page charges.
3. Work at registration desk during the annual meeting.
4. Prepare quarterly and annual financial reports.
5. File IRS return for APRES.
6. Prepare minutes of annual business meeting and directors meeting.
7. Maintain APRES membership list.
8. Send annual meeting programs to APRES members.
9. Type name tags for annual meeting when pre-registration cards are received.
10. Reply to persons who request information about APRES or other information relevant to the peanut industry.
11. Mail certificates to Sustaining and Organization Members of APRES each year.

AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY

Proposed Budget July 1, 1982 to June 30, 1983

I. Assets

A. Certificates of Deposit

| | |
|---|--------------|
| 1. Yoakum Federal Savings & Loan Association, Yoakum, TX | \$ 10,000.00 |
| 2. Cuero Federal Savings & Loan Association, Cuero, TX | 10,000.00 |

| | |
|--|----------|
| B. 1. Wallace K. Baily Fund, Yoakum National Bank, Yoakum, TX | 946.97 |
| 2. Savings at Yoakum National Bank, Yoakum, TX | 2,281.02 |

II. Income

| | |
|----------------------------|-----------|
| A. Balance Carried Forward | 15,112.76 |
|----------------------------|-----------|

B. Annual Meeting

| | |
|---------------------------------|-----------|
| 1. Memberships and Registration | 13,000.00 |
|---------------------------------|-----------|

C. Sale of Publications

| | |
|--|-----------|
| 1. Proceedings and Reprints | 300.00 |
| 2. Peanut Science Page and Reprint Charges | 13,000.00 |
| a. Differential Postage Assessment | 1,800.00 |
| b. Institutional Memberships & Subscriptions | 1,000.00 |
| 3. Peanut Quality - Methods Book Sales | 5,000.00 |
| 4. Peanut Science and Technology Presales | 37,500.00 |
| 5. Peanut Science and Technology Postsales | 10,000.00 |

D. Miscellaneous

| | |
|------------------------------|--------|
| 1. Checking Account Interest | 250.00 |
|------------------------------|--------|

III. Expenditures and Liabilities

A. Secretary-Treasurer

| | |
|-------------------------|----------|
| 1. Secretarial Services | 3,000.00 |
| 2. Postage | 1,000.00 |
| 3. Office Supplies | 750.00 |
| 4. Travel | 600.00 |
| 5. Self Employment Tax | 250.00 |
| 6. Miscellaneous | 500.00 |

| | |
|---|--------------|
| B. Peanut Science | |
| 1. Editorial Assistant | \$ 3,000.00 |
| 2. Postage | 2,000.00 |
| 3. Office Supplies | 750.00 |
| 4. Printing Cost - Peanut Science | 10,000.00 |
| 5. Reprint Costs - Peanut Science | 2,700.00 |
| 6. Miscellaneous | 250.00 |
| C. Other Publications | |
| 1. Annual Meeting Proceedings (Printing and Reprints) | 5,000.00 |
| 2. Peanut Research Newsletter | 2,000.00 |
| 3. Peanut Quality - Experimental Methods | 3,000.00 |
| 4. "Peanut Science and Technology" (Book) | 45,000.00 |
| a. Promotional Material | 300.00 |
| b. Labor for Handling and Packaging | 500.00 |
| c. Indexing | 650.00 |
| D. Annual Meeting Costs | 3,500.00 |
| E. Miscellaneous | |
| 1. Travel for President to Annual Meeting | 600.00 |
| Total Assets and Income | \$120,190.75 |
| Total Expenditures and Liabilities | \$ 85,350.00 |

Report of the Publications and Editorial Committee

O. D. Smith, Chairman; W. T. Mills, Vice Chairman; E. E. Browne;
T. A. Coffelt; N. L. Sugg, and L. D. Tripp

R. O. Hammons and H. E. Pattee, exofficio

The committee's activities for the past year culminated with an extended meeting on July 13. Policies, progress, publicity, and problems relative to the Society's publications were reviewed as follows:

Proceedings

The 1981 Proceedings were published and distributed. Minor changes were made in the organization of the book and an author index was added.

Publication of the 1982 Proceedings will be managed similarly to those of 1981. Abstracts, manuscripts, committee reports and other materials for the Proceedings should be given to Dallas Wadsworth or mailed to Olin Smith by August 15.

The committee accepted the recommendation of Technical Program Chairman Dallas Wadsworth that more definitive guidelines be established for abstract and manuscript preparation for the Proceedings. Terry Coffelt, Ron Henning, and Dallas Wadsworth will review the instructions regarding paper submission and will prepare guideline recommendations for the Publication & Editorial Committee. When approved, these guidelines will be included as a basis for accepting papers for presentation at Annual Meetings and for publication as abstracts or papers in the Proceedings.

Peanut Research

The report of co-editors R. O. Hammons and J. E. Cheek is as follows:

"Four quarterly issues of Peanut Research (volume 18, issues 79-82, totaling 43 pages) were compiled, edited, published, and mailed to the membership during the year.

Circulation per issue increased to an average of 703 individual members or institutions in the U.S. and abroad.

Peanut Research reported updates on people and research grants, along with several interpretive summaries.

The focus on research section reviewed on-going research and extension activities at Georgia's Agricultural Experiment Stations; North Carolina State University; ICRISAT (Cytogenetics Unit); Americus (GA) Plant Materials Center; and Florida A&M University.

Two-hundred-and-five selected references and forty-one theses and dissertations were documented.

All information issuances from APRES officers were published.

After 10 years, 1972-1982, of volunteer service as co-editor of APRES Peanut Research, Ray O. Hammons relinquished editorial responsibilities effective 15 July 1982. With Emory Cheek's assistance he wrote, compiled, edited and published 49 issues of Peanut Research, Volume 10, Number 2, September 1972 (Issue 34) to Volume 19, April-June 1982 (issue 82)."

The services of Dr. Hammons and Mr. Cheek have been greatly appreciated and the committee recommends the acceptance of Dr. Hammons' resignation with reluctance. Appropriate recognition by the Society for Dr. Hammons' service is recommended.

The committee is pleased to announce the acceptance of Dr. Aubrey Mixon to serve with Mr. Cheek as co-editor of Peanut Research and exofficio member

of the Publication and Editorial Committee and recommends his acceptance and support by the Society.

Methods Handbook

Little progress has been made during the past year toward publication of the methods manual because of the heavy responsibilities of Editor Clyde Young with Peanut Science and Technology. Publication of the handbook is anticipated within the coming year.

Peanut Science and Technology

Progress is continuing towards publication of the book with an expected completion date of October 1. A total of 3000 copies of the 800-page book will be printed at an estimated cost of \$65,000. Pre-publication sales will be made at \$40 per book including postage and handling in the U.S.A., and \$41 for foreign purchase delivered by surface mail. A price of \$45 per book plus postage and handling will become effective after October 1, 1982.

Norfleet Sugg, with co-editors Harold Pattee and Clyde Young, have prepared a news release which has been distributed to 15 society and news organizations. Additional promotions will be made through mailings, announcements in "Peanut Research" and "Peanut Science," other professional organization news letters, and personal contacts. Each of us can make vital contribution to the organization by purchasing the books that we can use at an early date and by promoting the book with colleagues, librarians, and associates. Sale of 1000 copies by October 1 is needed to meet our financial obligations. Orders should be placed with our Executive Secretary-Treasurer, Dr. Don Smith. Distribution will be made by Co-Editor Clyde Young.

The committee requested allocation of \$650 by the Finance Committee in preparation of the 1982-83 budget as payment for services to a professional indexer for proofing and indexing Peanut Science and Technology.

Peanut Science

The committee voted unanimously to endorse the current practice of page charge assignments at minimum increments of one-half page.

Editor Harold Pattee reports:

Twenty-seven manuscripts were submitted for publication in 1981-82. Thirty-two manuscripts totaling 122 pages were published. The January-June, 1982 issue has been delayed because of a deficiency in acceptable manuscripts at the appropriate time. This issue should be received by members near September 1. Eighteen manuscripts have been accepted and are under review for publication in the fall issue.

Six Associate Editor positions need to be filled this year in accord with our rotation system and recommendations for 3-year appointments include: Charles Swann, Weed Science; Hassan Melouk, Plant Pathology; Clyde Young, Food Science; James W. Smith, Jr., Entomology; Esam Ahmed, Food Science; and Leland Tripp, Crop Production. James R. Stansell is recommended to complete the unexpired term of Bobby Clary.

Certificates of Appreciation were issued to all Associate Editors who have completed two consecutive three-year terms (6 years) as Associate Editor. The certificates, signed by the President of the Society, Editor of Peanut Science, and Chairman of the Publication and Editorial Committee, were presented to: Robert L. Ory, James L. Butler, Daniel L. Hallock, Ellis W. Houser, Darold L. Ketring, Ruth Ann Taber, Johnny C. Wynne, Thurman E. Boswell, William V. Campbell, Kay H. McWatters and Lawton E. Samples.

Thank you, editors of our Society publications, authors, associate editors and reviewers, for making our publications successful.

Olin D. Smith, Chairman

AD HOC COMMITTEE REPORT

July 13, 1982

Daniel Hallock, Chairman

General plans for the publication of "Peanut Sciences and Technology" were fairly well formulated by the time of our meeting in 1981, but much was left to be implemented. The editors Dr.'s Harold Pattee and Clyde Young had hoped to meet the very tight schedule adopted previously, however, the publication date of this book had to be postponed a few months for many reasons. The latest target for publication is about October 1, 1982. Even though we are slightly behind the original schedule, certainly we must laud the editors and the authors who have and still are making special efforts to meet the commitments they made. Thanks also should be expressed to Dr. Coyt Wilson who is helping with indexing and to the Pierce Printing Company which has been very cooperative in many ways beyond expectations. It seems safe to say that we have two more experienced book editors within our Society than we had a couple of years ago.

All chapters except one, which should be in the printers hands any day now, are in or nearing the last phases of preparation for publication. The book will be about 900 pages in length and the estimated cost of 3,000 copies is \$65,000. Details about financing and promotion will be reviewed on the reports of the Finance and Publications committees.

PEANUT QUALITY COMMITTEE REPORT

Doyle Welch, Chairman

The Quality Committee met July 13, 1982 with members present as follows:

| | |
|----------------|--------------|
| Walton Mazingo | Leland Tripp |
| Wilbur Parker | Clyde Young |
| Ruth Ann Taber | Doyle Welch |

Visitors present included:

| | |
|------------------|--------------|
| Paul Blankenship | Kyle Rushing |
| Bill Hairston | Tim Sanders |
| Lakho Khatri | James Steele |
| Tom Michaels | Jerry Zekert |

The minutes from 1981 were discussed with no additions required.

Discussion covered a range of subjects including:

1. Varietal research
2. Quality goals for free fatty acid composition
3. Research on current flavor problems and their effects on domestic and foreign markets
4. Sclerotinia blight
5. Quality and economics and how they severely affect one another including methods of determining peanut quality from the farm to the consumers.

An Ad-Hoc Committee was appointed to review quality properties in our present system of grading and to give recommendations to various organizations which can be effective in bringing harmony to problem areas which affect peanut quality.

The Quality Committee solicits suggestions from Society members concerning areas in which it may be of service.

REPORT OF THE PUBLIC RELATIONS COMMITTEE

The committee was composed of the following persons: Rufus Keel, Chairman; A. J. Norden; B. Flannagan; G. M. Grice; S. Fox; and D. M. Porter.

The news release concerning our Albuquerque meeting was mailed to 22 news organizations.

The Public Relations Committee will send all industry contributors letters of thanks and appreciation for their support of this meeting.

The committee recommends that the Program Committee arrange for photographs of award presentations for forwarding by the Public Relations Committee to home and local newspapers. Copies of these photographs should also be maintained in the Archive Files.

Resolutions of necrology and services were duly submitted as follows:

RESOLUTION

Be it resolved, that the American Peanut Research and Education Society (APRES) does recognize that the death of J. L. "Cowboy" Stephens will be a loss to the entire peanut industry. Mr. Stephens was a plant explorer and germplasm collector for the Stephens-Hartley Collection.

We, therefore, recommend that the resolution be included in the official minutes of the 1982 Annual Meeting of APRES.

RESOLUTION

Be it resolved, that the American Peanut Research and Education Society (APRES) does recognize that the death of Dr. W. K. (Bill) Robertson from cancer on February 28, 1982 will be a loss to the peanut industry and especially to the growers in Florida and the southeast. Bill was a soil chemist and a dedicated researcher in the areas of peanut nutrition, crop rotation and management. He will be missed by the society and his friends.

We, therefore, recommend that this resolution be included in the minutes of the 1982 Annual Meeting of APRES and a copy be sent to his widow and daughter.

RESOLUTION

Be it resolved, that Mr. J. Frank McGill has served with distinction and dedication to the peanut farmer and industry, the American Peanut Research and Education Society (APRES) does hereby recognize his contributions to the entire peanut industry. Mr. McGill in his position at the University of Georgia was influential in increasing both the quantity and quality of the state's crop.

We, therefore, do hereby recognize and thank Mr. Frank McGill for the services rendered and wish him good luck in the future.

REPORT OF SITE SELECTION COMMITTEE

BY

Elbert J. Long, Chairman
J. E. Mobley, Vice Chairman
John French
David Hsi
Walton Mozingo
Ross Wilson

As was decided by last year's Site Selection Committee and subsequently approved by the Board of Directors, North Carolina will represent the Virginia/Carolina Region in hosting the 1983 APRES Annual Meeting. The approved location for the meeting is the Radisson Plaza Hotel Complex in Charlotte, N.C. on July 12-15, 1983. The Radisson Plaza has excellent facilities and meeting accommodations for our group. Within the hotel complex are more than twenty boutiques and specialty shops.

"Summer Package Rate" for the 1983 meeting will be in the range of \$48-\$52 (single or double). One complimentary room per 50 occupied will be provided. A total "set up charge" for meeting facilities and labor involved would be \$200.00.

Charlotte is the home of many national and international companies. It serves as a main hub and financial center in business and manufacturing.

In the downtown area, and within walking distance of the Radisson Plaza, are Discovery Place Science Museum, Spirit Square Performing Arts Center, and the historic Fourth Ward residential neighborhood, with many restored homes which were built at the turn of the century. South of Charlotte the Lance Company has a large snack food plant at which tours can be arranged. Casowinds Theme Park is located approximately six miles from Charlotte and provides an exciting adventure for young and old. Charlotte is also the home of the Charlotte Motor Speedway, one of the busiest tracks on the NASCAR circuit. The speedway promotional staff is glad to work with groups in planning social activities outside the downtown area.

Following the established tradition for regional rotation, Alabama will host the 1984 meeting. Mobile was selected as the location.

1982 APRES AWARDS COMMITTEE REPORT

The 1981 Bailey Award Recipients, E. Jay Williams and J. Stanley Drexler, were selected by the Awards Committee for their manuscript entitled "A Distributional Concept of Peanut Pod Maturation."

The following process was used to select the 1981 recipient:

- (a) The session moderators were notified of their responsibility to select a nominee for the Bailey Award from their respective sessions.
- (b) The nominees from all sessions were obtained from the session moderators at the 1981 APRES meeting at Savannah, Georgia.
- (c) All nominees (15) for the Bailey Award were informed of their selection by mail on August 7, 1981. Thirteen manuscripts were received by the December 31, 1981 deadline.
- (d) Members of the Awards Committee were sent copies of the manuscripts and score sheets on January 8, 1982.
- (e) The score sheets were returned by March 15, 1982. The scores did not produce a distinct winner; therefore, the five top manuscripts were evaluated again by the Awards Committee.
- (f) On April 29, 1982, President Jim Butler, President-Elect David Hsi, and Executive Secretary-Treasurer Don Smith were notified that the Bailey Award recipient had been selected.

On June 17, 1982, the session moderators for the 1982 APRES meeting in Albuquerque, New Mexico were notified to select nominees for the 1982 award.

The Bailey Award Committee met in Albuquerque on July 13, 1982 and recommended that in the initial selection of nominees considered for the award, which is based on oral presentations at the annual meeting, that only one nominee from each subject matter area be selected for subsequent judging by the Committee. For the subject matter areas having multiple sessions, moderators of technical sessions would be responsible for selecting in advance judges with expertise in that particular subject who would agree to hear all presentations in that area. Judges and session moderators would convene at the conclusion of the final session of a specific subject matter area and select one nominee whose manuscript would then be judged by the Committee.

Awards Committee:

Paul Blankenship
J. L. Steele (John M. Troeger, alternate)
David C. H. Hsi
Kenneth Garren
Charles Simpson
Ron Henning
Kay McWatters, Chairman

GOLDEN PEANUT AWARD ADVISORY COMMITTEE

(Report)

The Golden Peanut Research and Education Award (GPREA) advisory committee screens nominations received by the National Peanut Council, but final selection is made by the NPC.

This year marked the first time that an educational leader has been eligible to receive the award.

Presentation was made to J. Frank McGill in recognition of his service to the industry as peanut agronomy extension specialist in Georgia, his active role in interpretation of legislation for producers, and his national leadership in applying research data to practical farming situations.

The award consisted of a bronze plaque, a \$1,000 cash award, and an expense paid trip for two to the NPC convention in Virginia. This is the 22nd consecutive award and the award will be made in alternate years to researchers and to educators.

Members of the Golden Peanut Award Advisory Committee are Ray Hammons (1982), chairman, Al Norden (1982), Bill Dickens (1983), Tom Whitaker (1983), Ken Garren (1984), and Gale Buchanan (1984).

REPORT OF THE 1981-82 NOMINATING COMMITTEE

A. H. Allison, Chairman

The Nominating Committee consisting of J. I. Davidson, Doyle Welch, and A. H. Allison, nominate the following persons to fill the positions described:

| | |
|-------------------------------|---|
| President-Elect | Dr. F. R. Cox N.C. State University |
| Executive Secretary-Treasurer | Dr. D. H. Smith Texas A&M University |

Board of Directors:

- a. Mr. Gerald Harrison (3 yrs.) Private Industry, Production Farmers' Stock Peanuts.
- b. Mr. William Birdsong (1 yr.) Private Industry, Shelling, Marketing and Storage.
- c. Dr. D. S. Wadsworth (3 yrs.) State Employee Representative, Oklahoma State University.

FELLOWS COMMITTEE

J. H. Allison, Chairman

The Fellows Committee consisting of Darold Ketring, Ron Henning, S. M. Birdsong, L. L. Hodges, J. S. Kirby, and A. H. Allison, nominate the following persons for election to fellowship by the American Peanut Research and Education Society:

R. O. Hammons
Aston Perry
Kenneth H. Garren

FELLOWS - 1982
American Peanut Research and Education Society

DR. KENNETH H. GARREN, Research and Location Leader 1971-1981, USDA-ARS, Peanut Research Unit, Tidewater Center, Suffolk, Va. has been active in the study of peanut diseases and their control for 37 years. He has authored and coauthored more than 115 scientific and professional papers. He worked in research and administration on the peanut aflatoxin problem for 20 years and has served on the U.S. - Japan Panel on Toxic Micro-Organisms (UJNR). Dr. Garren's contributions have included research on pod drying to reduce A. flavus contamination, "concealed damage", "blue damage" caused by Sclerotium rolfsii, biological control of S. rolfsii stem rot, Pythium myriotylum and Rhizoctonia solani induced pod rot (pod breakdown), and Cylindrocladium black rot.

Dr. Garren has served the APRES as President (1973-74), President-elect, Board member, Nominating Committee Chairman, Local Arrangements Sub-committee Chairman, member of the Bailey Award Committee and the Golden Peanut Award Advisory Committee. He co-led the effort to fund the annual Bailey Award.

Dr. Garren is regarded as an outstanding scientist with a world-wide reputation. He is a recognized writer, speaker, and interpreter of research. Some of his ideas, concepts, and methodologies of plant pathological research on peanuts are evident today and are in common practice in many institutions.

DR. RAY O. HAMMONS, Geneticist, Research Leader and National Technical Advisor for Peanut Production Research, USDA-ARS - Southeast Area, University of Georgia Coastal Plain Experiment Station, Tifton, Ga. has been active in peanut research for 31 years. He has authored and co-authored 129 professional papers and some 151 other articles with nearly 100 collaborators. He has authored chapters on peanut history and genetics for both APRES books, a chapter on peanuts for the American Academy of Sciences, and wrote articles for four major encyclopedias. He is developer/co-developer of five peanut varieties and 23 peanut germplasm lines, and has participated in the release of three additional varieties. He is best known for studies on genetic behavior, natural crossing and genetic vulnerability, and his comprehensive knowledge of peanut literature. Dr. Hammons has served as a leader in plant exploration and in the continuous flow of foreign peanut germplasm into the U.S. germplasm system. He has served as team leader and coordinator for regional variety testing, has collaborated in chemical quality characterization of peanuts, and has provided important research information on early generation yield testing. He has served as a Working Group Appointee by the FAO/International Board of Plant Genetic Resources on descriptor terminology for international usage, was formally recognized by the Secretary of State for participation on the Panel of Experts on Vegetable Oils and Oilseeds, and was a UNCTAD/FAO consultant for revision of 19 project proposals for a global peanut program.

Dr. Hammons has served APRES as Editor of Peanut Research, organized and chaired the first Bailey Awards Committee, and has served as a committee member of the Publication and Editorial Committee, Nominating Committee, Golden Peanut Research Award Advisory Committee, Technical Program Committees, and the Committee to Develop Peanut Science.

Dr. Hammons is recognized as an outstanding and dedicated contributor to peanut and other scientific societies, and to agriculture on a global basis. He has trained scientists of widely different disciplines and is sought out by scientists and industry groups for consultation and advice.

MR. ASTOR PERRY, Peanut Specialist (1958-1981), North Carolina State University, Raleigh, N.C. has excelled in extending education to extension agents and growers. He has the ability to glean innovations and cultural modifications from volumes of research data and show its practical promise. He strives to make the county extension agents experts in peanut production through individual training and was one of the first specialists to develop tape

recorder and slide sets for this purpose. He has held over 600 production meetings, helped to introduce 20 new peanut varieties, published nearly 1000 newsletters and popular articles, authored or co-authored several scientific papers, and has trained 72 extension agents in peanut production technology. He organized the 2-Ton Yield Club which became the 5000-lb. Club and has designed contests to promote quality seed. He is one of the originators of the All-practice Demonstration Concept, initiated the first annual N.C. Peanut Field Day and works closely with agribusiness.

Mr. Perry was one of the organizers of APREA and has served the organization as: President (1977-1978), President-elect, Chairman of Nominating Committee, Co-chairman of Program and Local Arrangement Committee, Chairman of Public Relations Committee, Chairman of "The Peanut Committee," and as member of the Bylaws and Quality Committees.

Mr. Perry is recognized nationally and internationally for his ability to effect education and technology transfer and has served the peanut industry well.

LIAISON REPRESENTATIVE BETWEEN THE
AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY, INC., AND
THE AMERICAN SOCIETY OF AGRONOMY

As Liaison Representative, I attended the 73rd annual meeting of the ASA, CSSA, and SSSA at Atlanta, Georgia, 29 November to 4 December 1981.

A record attendance of 3,972 registered and participated in the sessions, a 15% increase over the previous year. "Agronomy Week" was proclaimed in both the city of Atlanta and the state of Georgia, and President Reagan sent his regards for a successful meeting.

The annual theme -- "Agronomy: Increasing Food-Conserving Resources; A Worldwide Responsibility" -- was strongly supported by 1440 papers. These papers were presented in nearly 300 traditional paper sessions and special programs. Six poster sessions were conducted.

Seventeen papers throughout the sessions were devoted to various aspects of peanut research (referenced in PEANUT RESEARCH 19(80): 10-11, 1981; 19(81): 10, 1982). At least 14 authors/coauthors of presentations were APRES members.

The Liaison Representative met with ASA officers and served as communicator between our Societies.

In general, the main function of the Liaison representative is to submit reports on activities of common interest in both organizations. Also, one should inform either Society of any action, policy, or activity of the associated society which may be of interest to the other group.

The two Societies exchanged correspondence early in 1982 extending the appointment of the Liaison Representative for another term.

Respectively submitted:

Ray O. Hammons

6 July 1982

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

ARTICLE III. MEMBERSHIP

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

- a. Individual memberships: Individuals who pay dues at the full rate as fixed by the Board of Directors.
- b. Institutional memberships: Libraries of industrial and educational groups or institutions and others that pay dues as fixed by the Board of Directors to receive the publications of the Society. Institutional members are not granted individual member rights.
- c. Organizational memberships: Industrial or education groups that pay dues as fixed by the Board of Directors. Organizational members may designate one representative who shall have individual member rights.
- d. Sustaining memberships: Industrial organizations and others that pay dues as fixed by the Board of Directors. Sustaining members are those who wish to support this Society financially to an extent beyond minimum requirements as set forth in Section 1c, Article III. Sustaining members may designate one representative who shall have individual member rights. Also, any organization may hold sustaining memberships for any or all of its divisions or sections with individual member rights accorded each sustaining membership.
- e. Student memberships: Full-time students who pay dues at a special rate as fixed by the Board of Directors. Persons presently enrolled as full-time students at any recognized college, university, or technical school are eligible for student membership. Post-doctoral students, employed persons taking refresher courses or special employee training programs are not eligible for student memberships.

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

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

ARTICLE IV. DUES AND FEES

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

- a. Individual memberships : \$ 10.00
- b. Institutional memberships : \$ 12.00
- c. Organizational memberships: \$ 25.00
- d. Sustaining memberships : \$100.00
- e. Student memberships : \$ 4.00

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

Section 3. A \$15.00 registration fee will be assessed at all regular meetings of the Society. The amount of this fee may be changed upon recommendation of the Finance Committee subject to approval by the Board of Directors.

ARTICLE V. MEETINGS

Section 1. Annual meetings of the Society shall be held for the presentation of papers and/or discussions, and for the transaction of business. At least one general business session will be held during regular annual meetings at which reports from the executive secretary-treasurer 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 secretary-treasurer shall give all members written notice of all meetings not less than 60 days in advance of annual meetings and 30 days in advance of all other special project meetings.

ARTICLE VI. QUORUM

Section 1. Until such time as the membership reaches 200 voting members, 20% of the voting members of this Society shall constitute a quorum for the transaction of business. When the membership exceeds 200, a quorum shall consist of 40 voting members.

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 organization shall be:

- a. President
- b. President-elect
- c. Executive Secretary-Treasurer

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. The president shall serve without monetary compensation.

Section 3. The officers and directors 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-elect shall serve without monetary compensation.

Section 4. The executive secretary-treasurer may serve consecutive yearly terms subject to re-election by the membership at the annual meeting. The tenure of the executive secretary may be discontinued by a two-thirds majority vote of the Board of Directors, who then shall appoint a temporary executive secretary 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 secretary-treasurer, and subject to consultation with the Board of Directors, shall carry on, transact, and supervise the interim affairs of the Society and provide leadership in the promotion of the objectives of this Society.

Section 6. The president-elect shall be program chairman, responsible for development and coordination of the overall program of the educational phase of the annual meetings.

Section 7. (a) The executive secretary-treasurer 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 secretary-treasurer 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 secretary-treasurer shall keep account for all monies, credits, debts, and property, of any and every nature, of this Society, which shall come into his hands or be disbursed 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 secretary-treasurer 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 (elected annually)
- d. State employees' representative - this director is one whose employment is state sponsored and whose relation to peanuts principally concerns research, and/or educational, and/or regulatory pursuits.
- e. United States Department of Agriculture representative - this director is one whose employment is directly sponsored by the USDA or one of its agencies and whose relation to peanuts principally concerns research, and/or educational, 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. A person oriented toward research - to be named by the chairman of the Board of Directors of the National Peanut Council.

h. The executive secretary-treasurer - non-voting member of the Board of Directors who may be compensated for his services on a part of full-time salary stipulated by the Board of Directors in consultation with the Finance Committee.

i. The president of the National Peanut Council - a non-voting member.

Section 2. The Board of Directors shall determine the time and place of regular and special meetings and may authorize or direct the president to call special meetings whenever the functions, programs, and operations of the Society shall require special attention. All members of the Board of Directors shall be given at least 10 days advance notice of all meetings; except that in emergency cases, three days advance notice shall be sufficient.

Section 3. 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 4. 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 5. Contingencies not provided for elsewhere in these By-Laws shall be handled by the Board of Directors in a manner they deem desirable.

ARTICLE IX. COMMITTEES

Section 1. Members of the committees of the Society shall be appointed by the president and shall serve 2-year terms unless otherwise stipulated. The president shall appoint a chairman of each committee from among the incumbent committeemen. The Board of Directors may, by a two-thirds vote, reject committee appointments. Appointments made to fill unexpected vacancies by incapacity of any committee member shall be only for the unexpired term of the incapacitated committeeman. Unless otherwise specified in these By-Laws, any committee member may be reappointed to succeed himself, and may serve on two or more committees concurrently but shall not hold concurrent chairmanships. Initially, one-half of the members, or the nearest (smaller) part thereto, of each committee will serve one-year terms as designated by the president.

a. **Finance Committee:** This committee shall include at least four members, one each representing State-, and USDA-, and two from Private Business - segments of the peanut industry. This committee shall be responsible for preparation of the financial budget of the Society and for promoting sound fiscal policies within the Society. They shall direct the audit of all financial records of the Society annually, and make such recommendations as they deem necessary or as requested or directed by the Board of Directors. The term of the chairman shall close with preparation of the budget for the following year, or with the close of the annual meeting at which a report is given on 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. Publications and Editorial Committee: This committee shall consist of at least three members appointed for indeterminate terms, one each representing State-, USDA-, and Private Business - segments of the peanut industry. This committee shall be responsible for the publication of the proceedings of all general meetings and such other Society sponsored publications as directed by the Board of Directors in consultation with the Finance Committee. This committee shall formulate and enforce the editorial policies for all publications of the Society subject to the directives from the Board of Directors.

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

e. Public Relations Committee: This committee shall include at least six members, one each representing the State-, USDA-, Grower-, Sheller-, Manufacturer-, and Services-, segments of the peanut industry. 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.
- (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.

ARTICLE X. DIVISIONS

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

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

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

ARTICLE XI. AMENDMENTS

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

Section 2. A By-Law or amendment to a By-Law shall take effect immediately upon its adoption, except that the Board of Directors may establish a transition

schedule when it considers that the change may best be effected over a period of time. The amendment and transition schedule, if any, shall be published in the "Proceedings of APRES".

Amended at the Annual Business Meeting of the American Peanut Research and Education Society, Inc., July 13, 1979, Tulsa, Oklahoma.

LIST OF APRES MEMBERS WITH ADDRESSES
SEPARATED BY MEMBERSHIP TYPES

MEMBERSHIP TYPE: SUSTAINING

AL PEANUT PRODUCERS ASSN

J. E. MOBLEY, PRES.
P. O. BOX 1282
DOTHAN, AL 36311
205-792-6482

ANDERSON'S PEANUTS

JAMES B. ANDERSON
P.O. BOX 619
CPP, AL 36467

BEST FOODS DIVISION

CPC INTERNATIONAL
ROBERT E. LANDERS
PO BOX 1534
UNION, NJ 07083
201-688-9100

THE BLAKELY PEANUT CO.

265 N MAIN STREET
BLAKELY, GA 31723

DIAMOND SHAMROCK CORP

GARY L. EILRICH
1100 SUPERIOR AVE.
CLEVELAND, OH 44114

DOTHAN OIL MILL COMPANY

JOE SANDERS
PO BOX 458
DOTHAN, AL 36311
205-792-4114

ELI LILLY & CO.

ELANCO PRODUCTS CO.
JOHN A. KEATON
PO BOX 628
NORCROSS, GA 30091
404-449-4921

FISHER NUT COMPANY

HAROLD FEDER
2327 WYCLIFF STREET
ST. PAUL, MN 55114

FLORIDA PEANUT PROD. ASSOC

PO BOX 447
GRACEVILLS, FL 32441

FRITO-LAY RES. LIBRARY

CLEM KUEHLER
C/O KATHY MALONE
900 NORTH LOOP 12
IRVING, TX 75061
214-579-2271

GA AGRICULTURAL COMMODITY

COMMISSION FOR PEANUTS
T. SPEARMAN
110 EAST 4TH STREET
TIFTON, GA 31794
912-386-3470

GUSTAFSON, INC.

KYLE W. RUSHING
PO BOX 22065
DALLAS, TX 75222
214-931-8899

HERSHEY CHOCOLATE COMPANY

CLARENCE J. CROWELL
PLANT QUALITY ASSURANCE
19 EAST CHOCOLATE AVE.
HERSHEY, PA 17033
717-534-4595

ICI AMERICAS INC.

B. A. HERRETT
PO BOX 258
GOLDSBORO, NC 27530
919-736-3130

INTERNATL MIN & CHEM CORP

SAM KINCHELOE
2201 PERIMETER CENT E, NE
ATLANTA, GA 30346
404-394-3660

KEEL PEANUT COMPANY INC.

RUFUS KEEL
P.O. BOX 878
GREENVILLE, NC 27834
919-752-7626

LILLISTON CORPORATION

WILLIAM T. MILLS
BOX 3930
ALBANY, GA 31702
912-883-5310

NAIL PEANUT COUNCIL

FERRY RUS
SUITE 506
1000 SIXTEENTH ST. NW
WASHINGTON, DC 20036
202-775-0450

NC PEANUT GROWERS ASSN.

NORFLEET L. SUGG
P.O. BOX 1709
ROCKY MOUNT, NC 27801
919-446-8060

NITRAGIN SALES CORPORATION

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3101 W. CUSTER AVE.
MILWAUKEE, WI 53209
414-462-7600

OKLAHOMA PEANUT COMMISSION

WILLIAM FLANAGAN
P.O. BOX D
MADILL, OK 73446
405-795-3622

PAUL HATTAWAY CO.

R. F. HUDGINS, PRESIDENT
P.O. BOX 669
CORDELE, GA 31515

PEANUT BUTTER & NUT PROD

ASSOC. - JAMES E. MACK
5101 WISCONSIN AVE.
SUITE 504
WASHINGTON, DC 20016
202-966-7888

PEANUT GROWERS COOPERATIVE

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E. E. MARKS, JR.
FRANKLIN, VA 23851

ROHM AND HAAS COMPANY

MARIE A. MAGRATH
345 WHOOPING LOOP
ALAMONTE SPRINGS
FLORIDA 32701
305-834-1844

SEABROOK BLANCHING CORP.

J.W. GARDNER, PRESIDENT
BOX 639
EDENTON, NC 27932

SNACK-MASTER

TERRY GRINSTEAD
PO BOX 3289
ALBANY, GA 31706
912-883-4000

SOUTH CAROLINA PEANUT BD

CURT EDENS
ROUTE 1, BOX 61
DALZELL, SC 29540

SPRAYING SYSTEMS CO.
STEVEN MITCHEL, JR.
NORTH AVE. AT SCHMALE RD.
WHEATON, IL 60187

STANDARD BRANDS INC.
J.J. EDELMANN
200 JOHNSON AVE.
SUFFOLK, VA 23434

STEVENS INDUSTRIES
M. P. SMITH
DANSON, GA 31742

T H AGR. & NUTRITION CO
2842 BROADWAY
SAN ANTONIO, TX 78217
512-826-2292

TEXAS PEANUT PRODUCERS BD
JOE BOSWELL
P.O. BOX 398
GORMAN, TX 76454
817-734-5853

TOM'S FOODS, LTD.
BEN SMITH
PO BOX 60
COLUMBUS, GA 31902

U. S. GYPSUM CO.
GERALDINE E. MASSOTH
101 SOUTH WACKER DRIVE
CHICAGO, IL 60606
312-321-4399

VA PEANUT GROWERS ASSN.
RUSSELL C. SCHOOLS
CAPRON, VA 23829
804-658-4573

MEMBERSHIP TYPE: ORGANIZATIONAL

A. P. D. SNACK FOODS
W. J. WENDEL
PO BOX 3943
SYDNEY, N.S.W. 2000
AUSTRALIA

A.H. CARMICHAEL CO.
BROADUS CARMICHAEL
SHELLED PEANUTS
2353 CHRISTOPHER'S AK, NW
ATLANTA, GA 30327
404-355-5817

A.H. HUMBERT SEED CO.
2746 CHOUTEAU AVENUE
ST. LOUIS, MO 63113
314-771-0646

AG REC PROJECT OFFICE
ISLAMABAD
ATTN: LIB (391-0-20102)
DEPT. OF STATE
WASHINGTON, DC 20521

AGRONOMICS ASSOCIATES
CHARLES A. DUNE
314 EAST ROGERS DRIVE
STILLWATER, OK 74074
405-372-7806

ALFORD REFRIG. WARHUS INC
BRYANT SHUMPERT, SALES
P.O. BOX 5088
DALLAS, TX 75222

ALL AMERICAN NUT CO.
WILLIAM V. RITCHIE
16901 VALLEY VIEW
CERRITOS, CA 94701

AMERICAN HOME FOODS
K. M. MILLER
FAIR RD & STATE RD 2
LA PORTE, IN 46351

AMERICAN PELLETIZING CORP.
F. G. SNEAD
PO BOX 2628
LES MCINES, IA 50322

ANHEUSER BUSCH, INC.
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STEVE GALLUZO
1 BUSCH PLACE
ST. LOUIS, MO 63118
314-577-3631

EAST WYANDOTT CORP.
EUGEN SAROJAK
100 CHERRY HILL ROAD
PO BOX 181
PARLIPANY, NJ 07654
201-263-0200

BIRDSONG PEANUTS
TOM WEST
PO BOX 1400
SUFFOLK, VA 23434
804-539-3456

BIRDSONG PEANUTS
T.H. BIRDSONG III
PO BOX 698
GORMAN, TX 76454
817-734-2266

BORDEN PEANUT CO., INC.
BOBBY BORDEN
PO BOX 28
FORTALES, NM 88130
505-356-8545

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ROBERT P. ALLEN
BOX 832
CHICAGO, IL 60690

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SIMSON CHAN
3 OVEREND ST.
TORONTO, ONTARIO
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CZARK, AL 36360
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PO BOX 768
MACON, GA 31204

GEORGE F. HARTNETT & CO.
GEORGE F. HARTNETT
540 FRONTAGE ROAD
NORTHFIELD, IL 60092

GFA PEANUT ASSOCIATES
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CAMILLA, GA 31730
912-336-5241

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H. H. GILLAM
WINDSOR, NC 27983

HARRINGTON MANF. CO., INC.
C. B. GRIFFIN JR.
LEWISTON, NC 27849

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SALISBURY 704531

HERSHEY FOOD
DR. GIOVANNI BIGALLI
HERSHEY FOODS TECH. CENTER
1025 REESE AVE.
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HOBBS-ADAMS ENG. CO.
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AUTHOR INDEX

| | | | |
|----------------------|-------------|------------------|----------------|
| Agnew, C. W. | 78 | Gregory, W. C. | 69 |
| Arnold, J. A. | 50 | Grichar, W. J. | 73 |
| Baard, S. W. | 103 | Guy, A. L. | 17 |
| Backman, P. A. | 105,109,110 | Hallock, D. L. | 118 |
| Bailey, J. E. | 101 | Hammond, J. M. | 106 |
| Ball, S. T. | 100 | Hammons, R. O. | 71,73 |
| Banks, D. J. | 69,101 | Hancock, G. H. | 106 |
| Bar-Yoseph, B. | 98 | Hauser, E. W. | 115 |
| Basha, S. M. M. | 17,96,112 | Henning, R. J. | 74 |
| Berberet, R. C. | 75 | Hibbs, E. T. | 76,97 |
| Blankenship, P. D. | 97,115 | Hill, R. A. | 74,97,113,115 |
| Bone, J. | 85 | Howell, R. K. | 93 |
| Boswell, T. E. | 73 | Hutcheson, H. J. | 76 |
| Boykin, L. S. | 78 | Isleib, T. G. | 94 |
| Branch, W. D. | 71,73 | Jackson, K. E. | 107,109 |
| Buchanan, G. A. | 115 | Jay, E. G. | 77,113 |
| Butler, J. L. | 133 | Jones, B. L. | 99,104 |
| Calahan, J. S., Jr. | 96 | Ketring, D. L. | 69,99 |
| Campbell, W. V. | 78,79 | King, P. S. | 89,106 |
| Clay, R. P. | 105 | Knaft, D. A. | 40 |
| Coffelt, T. A. | 70,93 | Krapovickas, A. | 69 |
| Cole, R. J. | 74,97,115 | Kvien, C. S. | 93 |
| Conkerton, E. J. | 73,116 | Lankow, R. | 91 |
| Crawford, M. A. | 105,109,110 | Laubscher, C. | 103 |
| Csinos, A. S. | 105 | Layton, R. C. | 115 |
| Daigle, D. J. | 73 | Lee, T. A. | 81 |
| Dashiell, K. E. | 72 | Linder, D. | 75 |
| Davidson, J. I., Jr. | 40,74,115 | Littrell, R. H. | 82,108 |
| Davis, J. | 92 | Lobel, R. | 98 |
| Dean, D. A. | 78 | Lovegren, N. V. | 112 |
| Dickens, J. W. | 115 | Lumms, P. F. | 75 |
| Douce, G. K. | 75 | Lynch, R. E. | 77 |
| Dowler, C. C. | 117 | Martin, C. L. | 99 |
| Elkan, G. H. | 94 | Maxey, D. W. | 93 |
| Elliot, J. M. | 117 | McMahon, A. | 91 |
| Evans, J. | 93 | McWatters, S. K. | 111 |
| Faulkner, R. | 91 | Melouk, H. A. | 69,101,103,104 |
| Gaines, T. P. | 105 | Menakanit, L. | 109 |
| Garner, J. W. | 77 | Mitchell, J. K. | 102 |
| Giesbrecht, F. G. | 111 | Mixon, A. C. | 74,117 |
| Glover, J. W. | 115 | Morgan, L. W. | 76,77 |
| Gorbet, D. W. | 17,40,71,72 | Moss, J. P. | 70 |

| | | | |
|----------------------|------------|----------------------|------------|
| Mozingo, R. W. | 29 | Simpson, C. E. | 69,119 |
| Musick, R. R. | 90,107 | Sivasailam, C. | 75 |
| Nelson, L. A. | 100 | Smith, D. H. | 98,102 |
| Neundorfer, R. | 108 | Smith, J. C. | 75,76 |
| Norden, A. J. | 40,71 | Smith, J. W., Jr. | 78 |
| Odle, B. | 84 | Smith, O. D. | 73 |
| Ory, R. L. | 116 | Spadaro, J. J. | 60 |
| Pallas, J. E., Jr. | 93,97 | Spencer, S. | 101 |
| Pancholy, S. K. | 17,96,112 | Stalker, H. T. | 72,79 |
| Pattee, H. E. | 111 | Steele, J. L. | 29,114 |
| Patterson, M. | 115 | Sturgeon, R. V., Jr. | 86,107,109 |
| Pauer, G. D. C. | 103 | Sullivan, G. A. | 114 |
| Pearce, H. M., Jr. | 60 | Taber, R. A. | 102,105 |
| Pearson, J. L. | 111 | Thompson, S. | 88 |
| Pettit, R. E. | 99 | Valls, J. F. M. | 69 |
| Phillips, G. | 122 | Wadsworth, D. F. | 103,104 |
| Pietrarelly, J. | 69 | Walker, M. E. | 105 |
| Pohler, C. L. | 98 | Walker, R. H. | 115 |
| Pominski, J. | 60 | Wallerstein, I. S. | 98 |
| Pope, L. S. | 89 | Ware, T. O. | 116 |
| Pope, M. H. | 106 | Weaver, R. W. | 95 |
| Powell, N. L. | 102 | Weete, J. D. | 106 |
| Porter, D. M. | 70,102,121 | White, P. H. | 116 |
| Rickard, D. A. | 92 | Wilson, D. M. | 113 |
| Rittig, F. R. | 116 | Wiltse, M. | 80 |
| Robertson, R. L. | 120 | Womack, H. | 75 |
| Rodriguez-Kabana, R. | 89,106 | Woodhead, S. H. | 102 |
| Roy, R. C. | 116,117 | Wright, F. S. | 102 |
| Sagiv, B. | 98 | Wynne, J. C. | 94,100 |
| St. Angelo, A. J. | 100,112 | Young, C. T. | 111 |
| Sander, D. A. | 75 | Young, J. H. | 114,115 |
| Sanders, T. H. | 97,115 | Zurita, O. H. | 69 |
| Schiffmann, J. | 98 | | |
| Schinini, A. | 69 | | |
| Schneeweis, T. J. | 94 | | |
| Schroeder, M. | 116 | | |
| Schubert, A. M. | 98 | | |
| Sen, D. | 95 | | |
| Shelby, R. A. | 106 | | |
| Sherwood, J. L. | 103,104 | | |
| Shokes, F. M. | 50,71,83 | | |
| Singh, A. K. | 70 | | |
| Singleton, J. A. | 111 | | |

