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CURRENT TRENDS IN THE WORLD SUPPLY AND DEMAND OF PEANUTS.

Perry Russ, President

National Peanut Council

Good Morning:

Thank you for allowing me to be part of your program. The Agenda is tight and the presentations to be made will greatly impact on the entire peanut industry. This is my fourth APRES Annual Meeting. Since attending my first meeting in Richmond, Virginia, I concluded at that time that this body represents the future of the United States Peanut Industry...we who are intimately involved with *Arachis Hypogaea* cannot under any circumstances allow our worldwide competitors to gain a strong foothold in basic or applied research. The entire ballgame rests with you...a litany of concerned areas could follow at this juncture; however, you, better than I, are acutely aware of our mission...our goal.

In fulfilling our role as the world's most reliable source of good quality peanuts at a price, the United States must maintain its leadership in the laboratory and in the field through basic and applied research.

The National Peanut Council is prepared to serve you as a vehicle to inform the industry of your findings. We have the facility to reproduce, in shirt sleeve language, your latest technological innovations. All we ask is that a summary suitable for reproduction accompany the work to be published. The Council reaches the large United States based peanut industry. Getting the message across as to what is occurring in your realm of endeavor is a key to the future and we are most assuredly prepared to fulfill this role.

When Fred Cox called me and asked that I participate on your program... frankly, I was somewhat perplexed...what can I tell you about peanuts in a substantive manner...among you sit experts in virtually every research and academic discipline involving groundnuts. The topic...Current Trends in World Supply and Demand of Peanuts, sounded intriguing, and...by capitalizing the situation, I will bring some key points home.

The work being done by those of you involved with the United States Agency for International Development -- Peanut CRSP -- know far more about peanut production and the future role these isolated countries will play on the world's market than I. Most assuredly, were it not for you, many in our industry would have found this type of research project most repugnant and detrimental to the United States Peanut Industry. For as we compete on the larger stage...Europe, the Middle East, Asia, etc, the results of the work being done under the AID/CRSP may provide us with a yet to be recognized competitor...Now a little competition is good...it keeps you alert...it hones your instincts...but to be at a competitive disadvantage is most unrewarding and unfulfilling...playing catch-up ball is tough...internationally, we have not fully recovered from the 1980 crop disaster. You who are participants in the AID/CRSP have a dual responsibility...first to your mission...secondly and just as important, to the United States peanut industry and taxpayers.

In speaking with Dave Cummins, Loren Schulze and others, we find that our industry can be the beneficiary of most of the work being undertaken. With our tremendous ability to transmit the word, through the county extension service network, and the adaptability of the domestic industry, positive results can be and will be realized.

The pressure to produce quality and grades at a price was never greater than it is today...we can chuckle to ourselves over the quality, or lack thereof, of those peanuts imported into the United States in 1980 and 1981, but the United States is looked to as the top producer of high quality groundnuts. It appears with some justification that we are held to a higher standard.

The world marketplace is one in which trading occurs virtually year

round...during our planting season, the Southern Hemisphere is harvesting...when we harvest, they plant, and the People's Republic of China virtually has a triple crop...two in the South and one in the North...Generally, peanuts are available twelve months during the year with as many variables as there are grades and varieties of peanuts.

Quality, grade, price, and availability, are the basic criteria...where do we fit in?...ideally on all levels...but more realistically we are purveyors of quality grades which are in good supply and readily available.

Although third in terms of world peanut production, the trading medium in the world market is the J.S. Dollar, and we export about one-third of all peanuts traded on foreign markets.

In addition, other factors such as former colonial ties...pound-sterling trading agreements...franc trading agreements...preferential exchange rates...all play a vital role.

Global peanut production figures for 1983, while not officially confirmed, are expected to be 2 million tons less than 1982 (with the latest estimate set at 17.6 million tons). In Africa some peanut producing countries such as the Gambia, Senegal and Niger, have produced a crop larger than anticipated, but these increases have been more than offset by the drought-reduced crop prospects in the Republic of South Africa and Nigeria.

Planted acreage in the U.S. is up marginally from last year but USDA officials predict that the 1983 crop will be about the same as it was in 1982 or 1.55 million metric tons total production with approximately 200,000 metric tons available for the export market.

With regard to competitive sources, the following is a brief analysis of the three major peanut producing countries which vie for the same markets as we do. The principle competitors are: The Republic of South Africa, Argentina and the People's Republic of China. The world's largest producer of peanuts, India with 5.5 million metric tons produced in 1982, exported approximately 50,000 metric tons of peanuts. Their exports are primarily destined for the Soviet Union and the Eastern-bloc countries which have a Rupee agreement with the Government of India.

BEGINNING IN OUR OWN HEMISPHERE...Down South...way down South

Argentina harvested its 1983 crop in March and the production was estimated to be about 135,000 metric tons, a substantial drop from the 215,000 metric tons produced in 1982. Argentine exports during 1983 are estimated to be 48,000 metric tons and are traditionally targeted for western Europe.

The Argentines have been successful in their exports because prices have been sufficiently lower than other origins. In many markets, where bulk buying is stressed, the Argentines have been able to maintain a steady demand in their product world-wide.

MOVING FROM THE WESTERN HEMISPHERE TO AFRICA...

For the second year in succession, a majority of the countries in the Sub-Saharan region of the continent have experienced record droughts which not only have threatened cash crops but have pushed some developing countries on the brink of starvation. In previous years only one southern African country has been able to withstand the economic disaster thrust upon its neighbors. That country, the Republic of South Africa, is now experiencing the same fate as its neighbors, and in the case of peanuts, they have become a net importer for the second consecutive year. 1983 will no doubt be South Africa's worst year for agriculture. The total peanut crop is estimated to be only 83,000 metric tons, compared to 309,000 metric tons in 1981. The indigenous peanut to South Africa, the NATAL, is similar to the U.S. Spanish peanut and is highly competitive with U.S. kernels in Europe, especially West Germany. In addition to high quality, the NATAL is usually priced somewhat lower than U.S. peanuts which gives the South African nut an even greater competitive advantage. At this juncture, South-Africa

has purchased large quantities of Argentine kernels to supplement their domestic production. Some quantities of U.S. kernels have been purchased but clearly more purchases will be required to meet their domestic edible demand. In the absence of the South African NATAL, the U.S. industry hopes to induce buyers to switch to U.S. grades not as a one-time only substitute but as a permanent, stable supplier of quality kernels. Total imports expected by South Africa during 1983 are estimated to be 34,000 metric tons.

FROM AFRICA WE MOVE TO ASIA AND THE PEOPLE'S REPUBLIC OF CHINA

On mainland China, the marketing and crop production techniques for peanuts remain shrouded in secrecy known to only a few, but trade analysts report that the delivery of the first of the late 1982 crop in Europe is good. No further offers are expected until the opening of the 1983 season, which is scheduled in Autumn at the annual trade fair in Canton which coincides with U.S. harvest. The peanut crop in China has been increasing in recent years and there is the distinct possibility that good quantities of edible peanuts will be offered in 1983. One of the problems with Chinese kernels is that their shelf life is very short and European manufacturers have complained about rancidity after processing.

China is most competitive with the U.S. in Japan where an aggressive marketing campaign has been waged. The Chinese have a marketing manager, based in Tokyo, who speaks fluent Japanese, cheaper transportation costs, and effective marketing, the Chinese have been able to penetrate the Japanese market quite successfully.

WHILE THE THREE ABOVE MENTIONED COUNTRIES, THE PEOPLE'S REPUBLIC OF CHINA, the Republic of South Africa and Argentina, provide the most consistent competition for the U.S., these suppliers alone are by no means the only ones pursuing our international markets.

MANY PEANUT PRODUCING AREAS ARE THIRD WORLD DEVELOPING COUNTRIES, where the economy is highly controlled and peanut supplies may vary from year to year. In 1983, the Gambia, whose main foreign exchange earner is peanuts, is anticipating one of its best peanut crops in several years -- set at 128,000 metric tons with 87,500 designated for export. The Senegalese crop is reported to be higher this year also, and of the 955,000 metric tons expected from that Western African nation, 50,000 will enter the export market, primarily designated for France which under the Mitterand Government has stressed trade with French-speaking countries.

IN SUDAN that country has a bilateral agreement with Saudi Arabia which is financing peanut R & D to improve Sudanese technology, yield and quality of peanuts. Sudan also competes with the U.S. in Mediterranean markets such as Italy and Spain.

MALAWI, a small land-locked country in southern Africa, had competed with the U.S., primarily in the U.K. but production has decreased because the Government was offering higher prices for other cash crops such as Tobacco and Maize. Exports from Malawi are expected to be about 9,600 metric tons, up from 5,000 in 1982.

IN SUMMARY,

The outlook for 1983 remains challenging for the U.S. industry. Distortions of the market have begun to make themselves felt with the absence of the South African Natal. Prices are firming up from some of the less expensive origins, but most producers will refrain from committing the majority of their crops until the U.S. harvest begins. The U.S. continues to be faced with an inflated dollar against other currencies, and in the developed markets of Western Europe the general sluggish condition of those economies result in a decline of SNACK FOODS in general. In the face of what might seem insurmountable odds, what is the National Peanut Council doing to stimulate international trade of U.S. peanuts??? The Council's Export committee, whose objective is to develop and expand overseas markets for U.S. grown peanuts, participates in USDA's Foreign Agricultural Service's Cooperative Market Development Program...the Export Committee utilizes

Government funds as well as contributions from industry producer and sheller organizations for export promotion activities.

The COMMITTEE is responsible for conducting overseas market surveys, for participating in cooperative promotional projects with foreign processors, for sponsoring industry trade team travel and foreign team visits to the U.S., for liaison with U.S. and foreign government agencies involved in international trade, for development of export promotion publications and newsletters and for working with overseas traders, buyers and processors of peanuts to improve the trading environment and the expansion of U.S. peanut exports.

Since 1978, the Export Committee has had full time staff to support the Council's effort. The annual export budget has increased three-fold in the past four years. In FY '83, we are participating in 16 cooperative projects in eleven markets. Processors participating in the program must agree to use exclusively U.S. grown peanuts in the product to be promoted, must identify the U.S. origin on the package and must fund at least 50% of the total cost of the activity. Projects have included salted peanuts, dry roasted peanuts, in-shell peanuts and peanut butter promoted through print and media advertising, trade and consumer promotion, point-of-purchase displays, in-store sampling and test marketing.

CURRENTLY, THE MAIN MARKETS FOR U.S. PEANUTS ARE:

Canada, the single largest importer with 46,000 metric tons, followed by the U.K. with 37,000 metric tons, and the Netherlands with 36,000 metric tons. These three markets account for nearly 60% of total U.S. exports.

The supply/demand cycle for peanuts on a world wide scale has traditionally been one of greater supplies than has been the demand. Yet, the demand for high quality peanuts within specific grades has been on the up-turn.

We must realize that each country with whom we do business has its own unique customs. Peanut butter may be thought of as not being fit for animal feed or is a highly prized staple. We must overcome the "monkey-nut" syndrome. We must become the brand-leader in supplying our customers with a product they can rely upon and readily use. Of course, great strides have been made in the area of market penetration...we know we have our major work before us...we must continuously reinforce the concept that the United States is the top producer of high quality peanuts on which the world can rely.

Thank you again...I am, indeed, honored to be a participant and stand ready to join you in our combined efforts to be the best.

ABSTRACT

Peanut germplasm evaluation by the authors and other peanut scientists for resistance or immunity to diseases has shown that there were 25 genotypes resistant to bacterial wilt, 137 to early or late leafspot, 131 to peanut rust, and two to several respective genotypes that had seed resistance to Aspergillus sp., and plant resistance to Cylindrocladium black rot, collar rot, pod breakdown, Southern blight, etc. There were several cultivated, wild and/or exotic genotypes resistant or immune to bud necrosis, clump, mottle and rosette viruses. One to many genotypes were found to be resistant or tolerant to the major insect pests or nematode diseases of peanut. Multiple resistant or tolerant reaction to some of the major peanut diseases was evident.

INTRODUCTION

Through conventional breeding programs scientists have been successful in developing cultivars with favorable yield and quality, with limited resistance to pests and other desirable traits. Better evaluation and utilization of peanut germplasm resistant or immune to peanut pests may be critical to the future of enhancing productive cultivars and to commercial production. Therefore, it is of great importance that conventional and novel steps be taken to genetically manipulate peanut germplasms so that superior cultivars with resistance to major pests be developed in the future. Numerous pesticides presently are being used to produce peanut, but because of public opposition to toxic chemicals and their expense to producers, resistance to pests and tolerance to environmental stresses should be major thrust areas.

A limited number of germplasm lines is known to have various levels of pest resistance. However, more than 10,000 cultivated accessions and numerous wild species of peanut are available for further exploitation. No single genotype or species has resistance or immunity to all the major pests. Also, many germplasm sources with favorable traits are unadaptable to conventional production or have barriers to reproductive compatibility. Therefore, a concentrated effort should be made toward a major break-through in developing superior pest resistant peanut cultivars. Breeding and manipulating techniques are known or are being developed to incorporate genetic resistance into productive peanut genotypes.

The purpose of this paper is to group the previously known and recently developed disease resistant or tolerant peanut genotypes, and, genotypes with known insect or nematode resistance for use by peanut scientists.

The authors wish to acknowledge the generous assistance of Robert Lynch, entomologist, USDA-ARS, Coastal Plain Station, Tifton, Ga.

^{1/} Some species names or genotypes used in this paper have not been formally published. (See end of text for statement on resistance.)

LIST OF ABBREVIATIONS, PREFIXES AND SUFFIXES:

AR	<u>Aspergillus</u> Resistant	I	Immune
AF	<u>Aspergillus flavus</u>	ICG	ICRISAT Groundnut Germplasm
AH	<u>Arachis hypogaea</u>	J	Junagadh
BND	Bud Necrosis Disease	MR	Moderately Resistant
BW	Bacterial Wilt	NC	North Carolina
CA	<u>Cercospora arachidicola</u>	NC Ac	N. C. Accession
CP	<u>Cercosporidium personatum</u>	NCGP	N. C. Germplasm
CBR	<u>Cylindrocladium</u> Black Rot	PA	<u>Puccinia arachidicola</u>
CPES	Coastal Plain Experiment Station	PI	Plant Introduction or Inventory
EC	Economic Crop	PCV	Peanut Clump Virus
F	Florida	PMVD	Peanut Mottle Virus
FESR	Federal Experiment Station (Puerto Rico)	PSV	Peanut Stunt Virus
GFA	Georgia, Florida, Alabama	R	Resistant
GH	Georgia Hybrid, or Groundnut Hybrid	RMP	Retourner Mani Pintar
GK	Gold Kist	RNP	Regional Northern Population
GKBS	Gregory, Krapovickas, Banks, Simpson	SA	<u>Sphaceloma arachidis</u>
GKP	Gregory, Krapovickas, Pietrarelli	SR	<u>Sclerotium rolfsii</u>
HG	Hybrid Groundnut	SB	<u>Sclerotinia</u> Blight
HLK	Hammons, Langford, Krapovickas	VA	Virginia
HP	Hammons, Porter	VGP	Va. Germplasm
HR	Highly Resistant	VW	<u>Verticillium</u> Wilt

SOURCE OF GENOTYPES AND METHOD OF LISTING

The latest known documentation of pest-resistant peanut genotypes evaluated by the world's peanut scientists were researched. The order of listing in the tables is not in relation to the level of resistance or tolerance. Where appropriate the genotypes are given in alphabetical or numerical sequence. Because of the variability of ratings of genotypes by different scientists, there was no way to determine relative compatability of their evaluations. Also, genotypes resistant in one environment may not have the same resistance reaction to the causal agent in another environment. More information on the relative resistance may be obtained from the literature given in the references or from the scientist who evaluated the genotypes.

RESISTANCE TO EARLY AND LATE LEAFSPOTS

In Table 1 are 76 Arachis hypogaea L. genotypes with various levels of resistance to Cercospora arachidicola Hori, Cercosporidium personatum (Berk. and Curtis) Deighton or both. Although all genotype identities are not given, 61 accessions of Arachis species were found to be resistant or immune to one or both of these pathogens. The greatest resistance is within the wild species that have genetic barriers to crossing with A. hypogaea genotypes (Table 2).

Early and late leafspot of peanut are recognized to be the most world-wide economically important diseases that reduce peanut production. Pod yield losses

of up to 50% have been noted where no chemical control measures were used. Even with the use of costly pesticides, losses of 10% have been estimated. Although several peanut genotypes have shown some resistance to leafspot infection, there are no current cultivars with acceptable leafspot resistance. Information herein indicates that resistant genotypes may be found among a great amount of genetically diverse germplasm resources in the U. S. and other peanut producing countries.

RESISTANCE TO RUST

In Table 3 are 62 A. hypogaea genotypes that have been identified as having resistance or moderate resistance to peanut rust (Puccinia arachidis Speg.). In Table 4 are 69 Arachis wild accessions found to have high resistance or immunity to P. arachidis infection.

Peanut rust has become a major threat to peanut production in Asia, Africa and Australia. For many years it was and still is a major threat to peanut production in the Caribbean, in the semi-arid tropics, including certain countries in Central and South America. Peanut rust annually is a problem in South Texas and occasional outbreaks occur in localized areas of Georgia, Florida, Alabama, North Carolina, Virginia and Oklahoma. The disease has been reported in all major peanut producing countries of the world. Peanut rust is a major cause of losses in yield and quality of peanut extensively in areas where the disease occurs. Although chemical applications offer considerable control, they are expensive and effective fungicides are not readily available in the countries where the disease is endemic and serious.

Several accessions of wild Arachis species apparently are immune to rust, but crossing compatibilities have yet to be perfected for transferring genes to cultivated genotypes. Although there has been extensive evaluation of rust in India, there is no organized systematic evaluation of genotypes in the U. S. because it is not economically important.

RESISTANCE TO AFLATOXIN-PRODUCING STRAINS OF ASPERGILLUS SPECIES

In Table 5 are 17 peanut genotypes found to have moderate to good resistance in laboratory evaluation to aflatoxin producing strains of Aspergillus species. This resistance is related to the intact testa of sound-mature seed.

Aflatoxin producing strains of Aspergillus flavus Lk. ex Fr. are an acute problem in the peanut producing areas of the world. Aflatoxins are highly toxic to animals and may induce cancer when ingested in underdetermined sublethal amounts. This problem poses a constant threat to the peanut industry (losses of 1-8% at U.S. delivery points each year), but it is most severe in years when fields of peanuts are subjected to drought stress late in the production season. For example, in 1972 about 30% of the peanut production in Alabama and 10% in Georgia were contaminated with the fungus. In 1980, a sizeable portion of the U.S. peanut production was contaminated and was unsuitable, except for oil, for use for animal food. That year 27, 24, 13, and 10% of the peanut crop in Alabama, Virginia, Georgia, and North Carolina, respectively, was contaminated with the toxic mold. Peanut farmers, processors, and end-use manufacturers consider the aflatoxin problem to be number one for the entire industry.

RESISTANCE TO CYLINDROCLADIUM BLACK ROT (CBR)

In Table 6 are given 71 peanut genotypes that have shown resistance to Cylindrocladium black rot [C. crotalariae (Loos) Bell and Sobers]. This is a devastating disease of peanut in Virginia and North Carolina, and its incidence in Georgia, Florida and Alabama is increasing. In some areas in North Carolina and Virginia, yields have been reduced 75%, and grade and quality are seriously impaired. CBR was identified in Georgia in 1965, found in South Carolina by 1968, in Virginia and North Carolina in 1970, in Alabama in 1972, and in Florida in 1976. The disease is a major threat in these areas, but is thought to be a threat to other peanut areas. There are no consistently effective economical control measures, except resistant cultivars and rotation. Currently, there is no extensively grown peanut cultivar with any appreciable resistance to the disease. Adapted improved genotypes are the most feasible method of preventing CBR losses.

Many genotypes have been evaluated for CBR resistance. The evaluations first indicated that spanish-types were a source of resistant genotypes, but resistant genotypes have been found in virginia and valencia types. Although several lines have been identified as being somewhat resistant, there is evidence of variation in infection at different locations indicating presence of different virulent strains of the pathogen. This causes breeding for resistance to be more complex. Although evaluations have been carried out, these have been limited in scope and continuity.

RESISTANCE TO COLLAR ROT

In Table 7 are given two peanut genotypes that were reported to have some measure of resistance to Collar Rot, Diplodia gossypina Cooke. The disease is sporadic in its evidence on peanut in the southern United States. It is usually thought to be a saprophyte and wound parasite. Clean cultural and crop rotation methods widely used in the peanut producing areas have been highly effective in suppressing the causal agent.

RESISTANCE TO POD BREAKDOWN

Pythium myriotylum Drechs., alone or in combination with Rhizoctonia solani Kuehn. usually is associated with the disease known as pod breakdown in the North Carolina and Virginia area of the United States. The more resistant peanut genotypes to these fungi in research evaluations are given in Table 8. These, together with gypsum applications and certain cultural practices, have been effective in reducing the losses in problem areas.

RESISTANCE TO SOUTHERN BLIGHT

The disease of peanut caused by Sclerotium rolfsii Sacc. has been called southern blight, stem rot, white mold, Sclerotium blight, root rot, etc., and it is a problem in many peanut producing areas of the world. Although no peanut genotypes are known to be highly resistant to this saprophyte with facultative parasitic capability, the genotypes in Table 9 have been reported to have some tolerance. However, rotation with grass crops and deep turning of surface litter have been widely used since the early 1960's in suppressing the severity of this

causal fungus.

RESISTANCE TO VERTICILLIUM WILT

The incidence of Verticillium wilt caused by V. albo-atrum Reinke and Berk. and V. dahliae Kleb. on peanut is usually not very widespread where good cultural and rotation practices are used. The causal fungi have a very wide host range. Therefore, incidence of the disease is possible which may cause considerable yield reduction. In Table 10 there are 12 genotypes with measurable resistance to the fungi.

RESISTANCE TO SCLEROTINIA BLIGHT

Sclerotinia blight, caused by S. minor (Lib.) de Barry, usually produces a sudden wilt of the lateral branches of peanut, and infection progresses into the main stem from the laterals. Differences in susceptibility of peanut genotypes have been found. In Table 11 there are 7 genotypes that have been shown to have some resistance or tolerance to the fungus in problem areas.

RESISTANCE TO WEB BLOTCH

Studies of the reaction of peanut to web blotch, Phoma arachidicola Marasas, have revealed that in general the virginia and runner market types of A. hypogaea were more resistant than the spanish market type. Two genotypes (Table 12) were found to have some resistance to the fungus.

RESISTANCE TO BACTERIAL WILT

Bacterial wilt caused by Pseudomonas solanacearum E. F. Sm. is usually considered a minor disease of peanut in the United States. It is a major problem in China and Indonesia, especially when peanuts are grown in wet soils. In Table 13 there are 25 genotypes found to be resistant in naturally or artificially infected tests.

RESISTANCE TO VIRUS DISEASES

In Table 14 there are peanut genotypes found by researchers to be somewhat tolerant to Bud Necrosis Disease (BND), Peanut Clump Virus (PCV), and Peanut Mottle Virus (PMV) diseases. Ten A. hypogaea genotypes and six wild species accessions listed in the table are somewhat tolerant to BND, nine A. hypogaea genotypes are tolerant to PCV, and four genotypes have tolerance to PMV (or not seed transmissible). No genotypes have been found to have measurable resistance to Peanut Stunt Virus (PSV).

In Table 15 there are 18 genotypes workers have found to be resistant to the peanut rosette virus disease.

RESISTANCE OR TOLERANCE TO INSECTS

Among A. hypogaea genotypes and/or wild Arachis species, those listed in Table 16 have been determined to have less insect damage because of non-preference, tolerance, and/or antibiosis to insect damage by fall armyworm, lesser cornstalk borer, potato leafhopper, thrips, two-spotted mite, and southern corn rootworm. The nature and extent of reduced peanut damage by these genotypes may vary with the pest. Therefore, an understanding of the insect, host and environmental interaction is beyond the scope of this paper.

One cultivated peanut genotype, Southeastern Runner 56-15, and two wild species, are reported to have resistance to the fall armyworm, 12 NC lines and six wild species have resistance or tolerance to the potato leafhopper, eight wild species are reported to resist the two-spotted spider mite, and 8 lines have shown resistance or tolerance to the southern corn rootworm.

RESISTANCE OR TOLERANCE TO NEMATODE SPECIES

The root-knot nematode, Meloidogyne arenaria (Neal) Chitwood, is a major parasite of cultivated peanut in the southeastern United States. However, in most instances, good rotation, land preparation and cultural procedures usually keep the extent of damage to an acceptable minimum. In extensive evaluations and screenings among several hundred A. hypogaea genotypes, Minton and Hammons (Pl. Dis. Repr. 12: 944-945, 1975) showed that none of the entries tested exhibited any resistance to M. arenaria. However, Banks (see ref. in Table 17) found that Arachis species section Rhizomatosae (PI 262268) was resistant to M. hapla Chitwood rootknot nematode. Two genotypes given in Table 17 were found to be resistant to lesion nematode, Pratylenchus brachyus (Godfrey) Filip Sch.

MULTIPLE RESISTANCE TO BACTERIAL WILT, LEAFSPOTS, SCAB, AND/OR RUST

In Table 18 56 A. hypogaea peanut genotypes are listed that are among those studied with multiple resistance to some of the major peanut pests. One genotype (PI 393641) was found to have resistance or tolerance to Pseudomonas solanacearum (PS), Cercospora arachidicola (C.A.), Cercosporidium personatum (C.P.), and Puccinia arachidis (P.A.). Two (P.I.'s 259747 and 350680) were resistant to C.A., C.P., Sphaceloma arachidis (S.A.), and P.A. Twelve were resistant to C.A., C.P., and P.A. Several were resistant to two of the pathogens.

In Table 19 seven accessions of Arachis wild species are listed that have multiple resistance to several major pests. For more information on the specific identification refer to the tables with specific pest reaction.

Among other genotypes with multiple resistance not given in the tables are Argentine resistant to Cylindrocladium black rot (CB) and Verticillium wilt (VW); VA 81B, resistant to CBR, Pod breakdown, and Sclerotinia blight; NC 8C resistant to C. arachidicola (C.A.) and Southern blight (SB); NC 3033 resistant to CA, CBR, SB and Sclerotinia blight; and PI 365553, resistant to SB, lesion nematode and Sclerotinia blight (Other multiple resistance in respective pest tables).

POTENTIAL FOR USE OF PEST RESISTANT GERMLASM

TO ENHANCE ECONOMICAL PEANUT PRODUCTION

From the information on resistance studies of A. hypogaea and wild species genotypes given herein, it is evident that there are several germplasm sources of pest resistance that may be utilized to incorporate resistance traits into improved peanut genotypes of favorable quality and adaptability. Although this listing may not be complete and many other peanut germplasms have not been evaluated for pest resistance, there are high levels of resistance already known to some of the major pests, especially in the wild peanut species.

Most exotic peanut germplasm is poorly adapted and requires the transfer of

desirable genes to adapted genotypes. A coordinated program to collect, maintain, evaluate, and enhance the peanut germplasm program through efforts of various peanut scientists should help speed up the development of peanut genotypes with improved yield, quality and resistance to major pests currently known. Since the peanut is one of the major food crops in many countries, it is imperative that an adequate, steady, and predictable supply of peanut, and high quality peanut oil, be maintained by efficient, economical production methods.

Production costs have been rapidly increasing, especially from the application of chemicals necessary for controlling peanut pests. Yields of high quality peanut have reached a plateau in the U.S. It is obvious that if great strides are not made in improving pest resistance, and enhancing genetic and reproductive mechanisms, production costs may approach or exceed the market value obtained by the producer. Production costs currently are at or below the break even point under high management programs used in the United States.

Genetic manipulation techniques of peanut using wild species are somewhat poorly understood. Genetic linkage groups, for the most part, are unknown or misunderstood. No genes have been mapped or associated with different chromosomes. Cytological analyses are difficult to perform and often unrepeatable. Isogenic lines have yet to be established for specific genetic traits. Estimates of heterosis and combining ability are meager, and inheritance patterns are difficult to establish. Little is known of physiological genetics.

[Note: Authors and reviewers warn that there are great variation in the use of 'resistance' of genotypes by workers cited in this report. Some report resistance for the top most genotypes, other include all but the susceptible. Therefore, information interpretation may require knowledge of checks used for comparisons.]

Table 1. Peanut (*Arachis hypogaea*) Genotypes Resistant to (*Cercospora arachidicola* (C.A.) or *Cercosporidium personatum* (C.P.)) Leafspot Diseases.

Genotype Identity	Resistance*			Genotype Identity	Resistance*		
	C.A.	C.P.	References		C.A.	C.P.	References
<u>P.I.'s (U.S.)</u>				<u>NC Accessions</u>			
PI 109839	*		3,4,6,10,11,14	NC 3033	*		2,4,7,9,10
PI 162857	*		4,14	NC Ac 927		*	15
PI 196604	*		6,10,11,14	NC Ac 3139	*		7
PI 196652	*		10	NC Ac 17090		*	15
PI 196658		*	10	NC Ac 17124		*	15
PI 196677	*		10	NC Ac 17129		*	15,18
PI 203395	*	*	9	NC Ac 17130		*	15
PI 203396		*	10	NC Ac 17132		*	15
PI 203397		*	9,10	NC Ac 17133y		*	16,19
PI 215696		*	17,19	NC Ac 17135		*	16,19
PI 259639	*		14	<u>EC Lines</u>			
PI 259747		*	4,11,14,15,16,17,19	EC 21011	*	*	13
PI 261893	*	*	5,9,10	EC 76446(292)		*	15,19
PI 261906		*	9,10	<u>C Lines</u>			
PI 262090		*	5,10	C-45-23		*	16
PI 262129	*		1,4	<u>Others</u>			
PI 296685	*		4,11,14	BH-8-18	*	*	13
PI 298115		*	17	C 501	*	*	13
PI 306230	*		5,10	CES-2-25	*		12
PI 314817		*	17	Dwarf Mutant-1		*	18
PI 315608		*	17	FESR 5-13		*	9,10,15
PI 341879		*	17	HG-1	*	*	8
PI 350680		*	4,11,14,15,16	HYG 13-3-18	*	*	13
PI 371521		*	2	Kanyoma	*		4,8
PI 381622		*	17	BL advanced lines, Fla.	*	*	5
PI 390593		*	17	Kapwato	*	*	8
PI 390595		*	17	Krap. Str. 16		*	15,16
PI 393516		*	17,19	Kutamba No. 1	*	*	8
PI 393517		*	17	Matevere	*	*	8
PI 393526		*	17	(Tanganyika)			
PI 393527		*	17	Mwitunde	*	*	8
PI 393531		*	17,19	(Tanganyika)			
PI 393641		*	17,19	RMP-91		*	15
PI 393643		*	17	S-185	*	*	8
PI 393646		*	17	T-98	*	*	13
PI 405132		*	17,19	UPL-PM 2	*		12
PI 407454		*	17	Wima Bunch	*	*	8
PI 414331		*	17	(Tanganyika)			
PI 414332		*	17				

Table 1. (continued)

Genotype Identity	Resistance*			Identity	Resistance*		
	C.A.	C.P.	References		C.A.	C.P.	Reference

VA Lines

VA 732813	*		2	VA 732817	*		2
VA 732815	*		2	VA 732818	*		2
VA 732816	*		2				

1. Abdou, et al., 1974. Peanut Sci. 1: 6-11.
2. Coffelt and Porter, 1982. Proc. Am. Peanut Res. and Educ. Soc. 14: 70.
3. Foster, et al., 1980. Peanut Sci. 7: 88-90.
4. Foster, et al., 1981. Oleagineux 36: 139-143.
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6. Hammons, et al., 1980. Crop Sci. 20: 292.
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8. Hemingway, 1977. Empire J. Exp. Agric. 25: 60-68.
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17. Subrahmanyam, et al., 1983. Plant Dis. 67: (In press).
18. Yadava and Singh, 1977. Indian Farming 27: 15.
19. Yeh Wei Lin, 1982. Personal communication to R. O. Hammons.

Table 2. Peanut (*Arachis* sp.) Wild Genotypes Resistant or Immune to *Cercospora arachidicola* (CA) or *Cercosporium personatum* (CP) Leafspot Diseases.

Section / Series / Identity	Resistant C.A.	Reaction [†] C.P.	References
<u>Arachis</u>			
<u>A. cardenasii</u> (PI 262141) (GKP 10017)	R	R	1, 2
<u>A. chacoense</u> (PI 276235) (GKP 10612)	R	R	1, 2
<u>A. spegazzinii</u> (PI 263133) (GKP 10038)	R	R	1, 4
<u>A. stenosperma</u> (PI 338280) (HLK 410)	R	R	1, 2, 5
<u>Caulorhizae</u>			
<u>A. repens</u> (GKP 10538)	MR	R	1, 3
<u>Rhizomatosae</u>			
Of 56 germplasms tested:			1
One was (PI 276233) (GKP 10596)	I	I	
50 were	HR	HR	
and PI 262280 and 262839	--	HR	
<u>A. glabrata</u>	R	--	3
<u>A. hegenbeckii</u>	R	--	3
<u>Extranervosae</u>			
<u>A. marginata</u> (GKP 10406)	I	I	1
<u>A. villosulicarpa</u>	I	I	1

† = R = Resistant; MR = Moderately resistant; HR - Highly resistant; I = Immune.
(Continued on next page)

Table 2. (Continued)

1. Abdou, et al., 1974. Peanut Sci. 1: 6-11.
2. Foster, et al., 1981. Oleagineux 36: 139-143.
3. Gibbons and Bailey, 1967. Rhod. Zamb. Mal. J. Agric. Res. 5: 57-60.
4. Moss, 1977. Proc. Am. Peanut Res. and Educ. Soc. 9: 34.
5. Sharief, et al., 1978. Euphytica 27: 741-751.

Table 3. Peanut (*Arachis hypogaea*) Genotypes Resistant to Rust (*Puccinia arachidis*).

<u>Genotype Identity</u> <u>P.I.'s (U.S.)</u>	<u>Resistance</u> <u>Reaction†</u>	<u>References</u>
PI 215696 (Tifrust-1) (ICG 7881)	R	6, 14, 15, 16
PI 259747 ('Tarapoto')	HR	3, 4, 10, 11, 15, 16
PI 270806	MR	13
PI 298115, 315608 (Tifrust 13) (ICG 4776)	MR	1, 3, 8,10,11,14,15
PI 314817 (DHT-200) (Tifrust 14) (ICG 7882)	R	1, 3, 9, 10,14,15
PI 341879 ('Tarapoto')	R	5, 10
PI 350680 ('Tarapoto') (ICG 6340)	R	3, 14, 15, 16
PI 372263	R	2
PI 372303	R	2
PI 381622 ('Tarapoto') (ICG 7885)	R	10, 14, 15
PI 390593 (Tifrust-2) (ICG 7886)	R	7, 10, 14, 15
PI 390595 (Tifrust-13) (ICG 7887)	R	6, 14, 15
PI 393516 (Tifrust-8) (ICG 7888)	R	6, 14, 15, 16
PI 292517 (Tifrust-9) (ICG 7889)	R	6, 14, 15
PI 393526 (Tifrust-10) (ICG 7890)	MR	6, 14, 15
PI 393527B (Tifrust-12) (ICG 7892)	R	6, 10, 14, 15
PI 393531 (Tifrust-11) (ICG 7893)	R	6, 14, 15, 16
PI 393641 (Tifrust-5) (ICG 7894)	R	6, 14, 15, 16
PI 393643 (Tifrust-6) (ICG 7895)	R	6, 14
PI 393646 (Tifrust-7) (ICG 7896)	HR	6, 10, 14
PI 405132 ('Tarapoto') (ICG 7897)	HR	10, 14, 16
PI 407454 (Tifrust-4) (ICG 7898)	R	7, 10, 14
PI 414331 (Res. Corto) (ICG 7899)	R	10, 14, 15
PI 414332 (Res. Largo) (ICG 7900)	HR	10, 14, 15
<u>NC Accessions</u>		
NC Ac 927	R	13
NC Ac 17090 (ICG 1697)	HR	11, 14
NC Ac 17124 (ICG 6280)	HR	11, 14
NC Ac 17127 (ICG 1703)	MR	14
NC Ac 17129 (ICG 1704)	MR	11, 14, 15
NC Ac 17130 (ICG 1705)	MR	11, 14
NC Ac 17132 (ICG 1707)	MR	11, 14
NC Ac 17133 (RF)	R	12, 16
NC Ac 17135 (ICG 1710)	MR	11, 14
NC Ac 17142 (ICG 1712)	MR	14, 16

Table 3. (continued)

<u>Genotype Identity</u>	<u>Resistance Reaction†</u>	<u>References</u>
<u>EC Line</u>		
EC 76446 (292) (ICG 2716)	R	10, 11, 14, 16
<u>FESR Lines</u>		
FESR-1	R	6
FESR-2	R	6
FESR-3	R	6
FESR-4	R	6
FESR-5	R	5, 12
FESR-6	R	5, 12
FESR-7	R	5, 12
FESR-8	R	5, 12
FESR-9	R	5, 12
FESR-10	R	5, 12
FESR-11	R	5, 12
FESR-12	R	5, 12
FESR-13	R	7
FESR-14	R	7
<u>Others</u>		
AH-114	R	5
AH-4088	R	5
AH-8045	R	5
Big Japan	R	5
C-112	R	5
C-148	R	5
C-168	R	5
C-45-23 (ICG 3580)	MR	14
JH-60	R	5
S-230	R	5
T-28	R	5
1-2	R	5
4-16	R	5

† = R = Resistant. MR = Moderately resistant. HR = Highly resistant.

1. Bromfield and Cevario, 1970. Plant Dis. Repr. 54: 381-383.
2. Coffelt et al., 1977. Proc. Am. Peanut Res. & Ed. Soc. 9: 33.
3. Cook, 1972. Plant Dis. Repr. 56: 382-386.
4. Mazzani and Hinojosa, 1961. Agron. Trop. (Maracay, Venez.) 11: 41-45.
5. Misra and Misra, 1975. Indian Phytopathology 28: 557-559.
6. Hammons, et al., 1982. Crop Sci. 22:452-453.
7. Hammons, et al., 1982. Crop Sci. 22: 453.
8. Hammons, et al., 1982. Crop Sci. 22: 697.
9. Hammons, et al., 1982. Crop Sci. 22: 697-698.
10. ICRISAT, 1982. Annual Report, 1982. Andhra Pradesh 502 324, India, pp. 159-213.
11. Subrahmanyam, et al., 1980. Peanut Sci. 7: 10-12.
12. Subrahmanyam, et al., 1980. Proc. Am. Peanut Res. & Ed. Soc. 12: 76.
13. Subrahmanyam, et al., 1980. In Proc. Intl. Workshop of Groundnuts, ICRISAT Patancheru, India, pp. 193-202.

Table 3. (continued)

14. Subrahmanyam, et al., 1983. Phytopathology 73: 253-256.
 15. Subrahmanyam, et al., Plant Disease 67: (In press). Accepted for publication 16 April 1983.
 16. Yeh Wei Lin, 1982. Personal communications to R. O. Hammons

Table 4. Peanut (*Arachis* Sp.) Wild Genotypes Resistant or Immune to Rust (*Puccinia arachidis*).

Section/Series/Subspecies/Identity	ICG No.	Resistance Reaction†	Reference
<u>Arachis (Annuae)</u>			
<u>A. batizocoi</u> PI 298639	8124	I	4
<u>A. batizocoi</u> 338312	8124	I	4
<u>A. duranensis</u> 219823	8123	I	4
<u>A. spgazzinii</u> 262133	8138	I	4
<u>Arachis (Perennes)</u>			
<u>A. cardenasii</u> 262141	8216	I	4
<u>A. chacoense</u> 276235	4983	I	4
<u>A. correntina</u> 262134	8134	I	4
<u>A. correntina</u> 262808	8132	I	4
<u>A. correntina</u> 262809	8140	I	4
<u>A. correntina</u> 262880	8132	I	4
<u>A. correntina</u> 298635	8134	I	4
<u>A. correntina</u> 331194	4984	I	4
<u>A. correntina</u> X Manfredi-5	8918	I	4
<u>A. villosa</u>			
<u>A. monticola</u> 263393		HR	1, 3
<u>A. stenosperma</u> 337308	8137	HR	4
<u>A. stenosperma</u> 338297			
<u>A. stenosperma</u> 338279	8125	HR	4
<u>A. stenosperma</u> 337308			
<u>A. stenosperma</u> 338280	8126	HR	4
<u>A. stenosperma</u> 337309			
<u>A. villosa</u> PI 210554	8144	I	4
<u>Arachis (Series not known)</u>			
GK 30006	8190	I	4
Gk 30011	8193	I	4
GK 30031	8952	HR	4
GK 30035	8954	HR	4
<u>Erectoides (Tetrafoliatae)</u>			
<u>A. apressipila</u> GKP 10002	8129	I	4
<u>A. paraguariensis</u> PI 337358	8130	I	4
<u>Arachis</u> sp. PI 261877	8127	I	4
<u>Arachis</u> sp. PI 261878	8128	I	4
<u>Extranervosae</u>			
<u>A. villosulicarpa</u> PI 336985	8142	I	2, 3, 4

Table 4. (Continued)

Section/Series/Subspecies/Identity	ICG No.	Resistance Reaction†	Reference
<u>Rhizomatosae (Eurhizomatosae)</u>			
<u>A. glabrata</u> PI 118457		I	1,3
<u>A. glabrata</u> 231318		I	1,3
<u>A. glabrata</u> 262141		I	1,3
<u>A. glabrata</u> 262287		I	1,3
<u>A. glabrata</u> 262301	8941	I	4
<u>A. glabrata</u> 262792	8167	I	4
<u>A. glabrata</u> 262793	8168	I	4
<u>A. glabrata</u> 262796	8935	I	4
<u>A. glabrata</u> 262797	8936	I	4
<u>A. glabrata</u> 262801		I	1,3
<u>A. glabrata</u> 262807	8933	I	4
<u>A. glabrata</u> 262812	8155	I	4
<u>A. glabrata</u> 338261	8149	I	4
<u>A. glabrata</u> 338262	8150	I	4
<u>A. glabrata</u> 338263	8150	I	4
<u>A. glabrata</u> 338265	8153	I	4
<u>A. glabrata</u>	8902	I	4
<u>A. hagenbeckii</u> 338267	8146	I	4
<u>A. hagenbeckii</u> 338305	8922	I	4
<u>Arachis</u> sp. 201856	8154	I	4
<u>Arachis</u> sp. 262268	8171	I	4
<u>Arachis</u> sp. 262798	8170	I	4
<u>Arachis</u> sp. 262818	8156	I	4
<u>Arachis</u> sp. 262825	8158	I	4
<u>Arachis</u> sp. 262827	8929	I	4
<u>Arachis</u> sp. 262828	8159	I	4
<u>Arachis</u> sp. 262836	8161	I	4
<u>Arachis</u> sp. 262841	8162	I	4
<u>Arachis</u> sp. 262844	8165	I	4
<u>Arachis</u> sp. 262848	8166	I	4
<u>Arachis</u> sp. 276233	4984	I	4
<u>Arachis</u> sp. 298638	8154	I	4
<u>Arachis</u> sp. 338284	8148	I	4
<u>Arachis</u> sp. 338316	8145	I	4
<u>Arachis</u> sp. GKP 9618	8160	I	4
<u>Arachis</u> sp.	8937	I	4
<u>Arachis</u> sp. GKP 9893		I	4
<u>Rhizomatosae (Series not known)</u>			
<u>Arachis</u> sp.	8172	I	4
<u>Arachis</u> sp. 2 A5	8916	I	4
<u>Arachis</u> sp. GKBS PSC Z 30085		I	4

Table 4. (Continued)

Section/Series/Subspecies/Identity	ICG No.	Resistance Reaction†	Reference
<u>Triseminale</u>			
<u>A. pusilla</u> PI 338448		I	4
<u>A. pusilla</u> PI 338449	8131	I	4

1. Bromfield and Cevario, 1970. Plant Dis. Repr. 54: 381-383.
2. Hammons, 1970. PANS 23: 300-304.
3. Subrahmanyam, et al., 1980. Peanut Sci. 7: 10-12.
4. Subrahmanyam and Moss, 1983. Plant Disease 67: 209-212.

† = I = Immune. HR = Highly resistant.

Table 5. Peanut (Arachis hypogaea) Genotypes Resistant to Toxin-Producing Strains of Aspergillus sp.

Genotype Identity	References	Genotype Identity	References
AH 7223	7	PI-337394F	3, 5
AR-1, -2, -3, and -4	4	PI 337409	3, 5
Faizpur	7	Robut 33-1	3
GFA-1 and -2	4	UF 71513	1
J-11	2	Var. 27	7
M 13	3	55-437	6
Monir 240-30	7		

1. Bartz, et al., 1978. Peanut Sci. 5: 53-56.
2. Mehan, et al., 1981. Oleagineux 36: 501-505.
3. Mehan, et al., 1982. Oleagineux 37: 185-189.
4. Mixon, 1983. Crop Sci. 43: (In press)
5. Mixon and Rogers. Agron. J. 65: 560-562.
6. Zambettakis, et al., 1981. Oleagineux 36: 370-385.
7. ICRISAT, 1982. Annual Report. Patancheru P.O., Andhra Pradesh 502 324, India.

Table 6. Peanut (Arachis hypogaea) Genotypes Resistant to Cylindrocladium Black Rot (Cylindrocladium crotalariae).

Genotype Identity	References	Genotype Identity	References
<u>PI's</u>		PI 365552	5
PI 295195	5	PI 371519	5
PI 295212	5	PI 413758	5
PI 295215	5	<u>GA Lines</u>	
PI 295255	5	GA 61-42	5
PI 295267	5	GA 116	5
PI 295313	5	GA 123	5
PI 311264	4	GA C32	5
PI 315613	5	<u>NC Lines</u>	
PI 323238	5	NC 3033	2, 5, 9
PI 341879	5	NC 8C	10
PI 342657	5	NC 17168	5
PI 343380	5	<u>VA Lines</u>	
PI 355278	5	VA 7329017	5
PI 362143	5	VA 7329043	5

Table 6. (Continued)

<u>Genotype Identity</u>	<u>Reference</u>	<u>Genotype Identity</u>	<u>Reference</u>
<u>VA Lines</u>		<u>Others</u>	
VA 7329064	5	CBR-R1	7
VA 7329076	5	CBR-R2	7
VA 7329118	5	CBR-R3	7
VA 7329143	5	CBR-R4	7
VA 7329146	5	CBR-R5	7
VA 750878	5	CBR-R6	7
VA 761060	5	Chico	4
VA 761742	5	Comet	4
VGP-1	3, 5	Dixie Spanish	5
<u>Others</u>		GK-19	5
Argentine	1, 4, 8	Spancross	4, 5, 6
AU-3	4	Spanhoma	4
GA 32-13	5	Spanish 2B	9
GA 32W	5	Spantex	5
GA GC 32-20	5	Starr	4
GA GC 32-22	5	T 2172-3	5
GA GC 133	5	T 2172-5	5
GA GC 168	5	T 2173-2	5
GA 722105	5	T 2173-6	5
GA 722110	5	Tamnut 74	4
GA 722205	5	Tifspan	4
GA 722206	5	Toalson	5
GA 722208	5		
Tifton-8	5		

1. Bell, et al., 1973. Plant Dis. Repr. 57: 90-94.
2. Beute, et al., 1976. Crop Sci. 16: 887.
3. Coffelt, 1980. Crop Sci. 20: 419.
4. Coffelt, 1980. Peanut Sci. 7: 91-94.
5. Coffelt and Garren, 1982. Peanut Sci. 9: 1-5.
6. Garren and Coffelt, 1976. Plant Dis. Repr. 60: 175-178.
7. Hammons, et al., 1981. Peanut Sci. 8: 117-120.
8. Phipps and Beute, 1977. Plant Dis. Repr. 61: 300-303.
9. Wynne, et al., 1975. Peanut Sci. 54-56.
10. Wynne, et al., 1983. Crop Sci. 23: 183-184.

Table 7. Peanut (*Arachis hypogaea*) Genotype Resistant to Collar Rot (*Diplodia gossypina*).

<u>Genotype Identity</u>	<u>Reference</u>
F334A-B-14	Porter and Hammons, 1975. Peanut Science 2: 23-25.
Florispán	Porter and Hammons, 1975. Peanut Science 2: 23-25.

Table 8. Peanut (Arachis hypogaea) Resistant to Pod Breakdown Caused by Pythium myriotylum and/or Rhizoctonia solani.

<u>Genotype Identity</u>	<u>Reference</u>	<u>Genotype Identity</u>	<u>Reference</u>
<u>(P. myriotylum and R. solani)</u>		<u>(P. myriotylum)</u>	
GA 722105	1	PI 341885	5, 6
GA 722210	1	PI 365553	1, 6
Early Runner	3	Toalson	4, 6
F439-16-10-6	3		
Florunner	3	<u>(R. solani)</u>	
Florigiant	3	PI 295724	7
NC 17	3	PI 296551	7
NC 3033	1	PI 341885	6
PI 341880	3	PI 365553	6
PI 341885	3	Toalson	4, 5
PI 362129	1		
VA 750915	1		
VA 750917	1		
VA 751607	1		

1. Coffelt, et al., 1977. Proc. Am. Peanut Res. & Ed. Soc. 9: 33.
2. Frank, 1977. In Kranz, et al., Eds., Diseases, Pests, and Weeds in Tropical Crops. Verlag Paul Parey, Berlin and Hamburg, Germany.
3. Porter, et al., 1975. Peanut Sci. 15-18.
4. Simpson, et al., 1979. Toalson. Texas Agric. Exp. Stn., College Stn., Texas. 1 p.
5. Smith and Joswell, 1979. Proc. Am. Peanut Res. and Educ. Soc. 11: 53.
6. Smith, et al., 1981. Texas AES PR 3853.
7. Woodward and James, 1980. Plant Disease 64: 949-950.

Table 9. Peanut (Arachis hypogaea) Tolerant to Sclerotium rolfsii.

<u>Genotype Identity</u>	<u>References</u>
NC 2	3
NC 8C	5
NC 3033	1 (moderately resistant)
PI 365553	4
S-28-261 (Taiwan)	2
S-78-282 (Taiwan)	2

1. Beute, et al., 1976. Crop Sci. 16: 887
2. Cheng and Lin, 1961. JCCR, Plant Industry Series No. 22: 134-146. (July 1961).
3. Garren, 1964. Phytopathology 54: 279-281.
4. Sewonou, 1983. Master of Science Thesis, Texas A&M University, College Station, Texas.
5. Wynne and Beute, 1983. Crop Sci. 23: 183-184.

Table 10. Peanut (*Arachis hypogaea*) Genotypes Resistant to Verticillium Wilt (*V. albo-atrum* and *V. dahliae*).

<u>Genotype Identity</u>	<u>Reference</u>	<u>Genotype Identity</u>	<u>Reference</u>
Argentine	3	PI 268759	3
Ga. 182-28	3, 4	PI 268778	3
PI 240555	3	PI 268795	3
PI 248768	3	PI 268818	3
PI 259671	3	PI 268825	3
PI 268707	3	Schwartz-21 (Sel.)	1, 2

1. Frank and Krikum, 1968. Israel J. Agric. Res. 18: 83-84.
2. Frank and Krikum, 1969. Plant Dis. Repr. 53: 744-746.
3. Khan, et al., 1972. Proc. Am. Peanut Res. and Educ. Assn. 4: 145.
4. Smith, 1961. Phytopathology 51: 411-412.

Table 11. Peanut (*Arachis hypogaea*) Resistant to Sclerotinia Blight (*S. minor*).

<u>Genotype Identity</u>	<u>Reference</u>	<u>Genotype Identity</u>	<u>Reference</u>
Chico	2	VA 81B	1, 2, 3
NC 3033	2	VA 732813	2
PI 371521	1	VGP-1	2
PI 343392	5		

1. Coffelt and Porter, 1980. Proc. Am. Peanut Res. and Educ. Society 12: 69.
2. Coffelt and Porter, 1982. Plant Disease 66: 385-387.
3. Coffelt, et al., 1982. Crop Sci. 22: 1085-1086.
4. Porter, 1980. In Proc. International Workshop of Groundnuts. ICRISAT Patancheru, P. O., Andhra Pradesh 502 324, India. Pp. 177-185.

Table 12. Peanut (*Arachis hypogaea*) Resistant to Web Blotch (*Phoma arachidicola*).

<u>Genotype Identity</u>	<u>Reference</u>
GK-19	Smith, et al., 1979. Peanut Sci. 6: 99-101.
Florunner	

Table 13. Peanut (*Arachis hypogaea*) Resistant to Bacterial Wilt (*Pseudomonas solanacearum*).

<u>Genotype Identity</u> (PI's)	<u>References</u>
267771 (Matjan)	3
341884 (Matjan)	3
341886 (Schwartz 21)	3
393531	10
393641	10
445925 (Lok-Won)	7
445926 (Sui-man-tai-Zong)	7
461460 (China unnamed line 1502)	8
461461 (" " " 1504)	8
461442 (" " " 1122)	8

Table 13. (continued)

<u>Genotype Identity</u>	<u>Reference</u>
PI 461463 (China unnamed line 1127)	8
(Others)	
GA 119-20	1
Hai-hua 1 (HP 5) PI 476825	2
NC Ac 17129	10
NC Ac 17142	10
Schwarz 21	4, 6
Tai shan san li rou	9
Tai shan shen dou	9
Tai shan zhen shu (Teishan Zhenghu)	9
Teishan sanliyue	5, 9
Xie kong chung	5
Xie kong qing	9
Yie-you 22 (HP-23) PI 476842	2
Yue-you 589 (HP-15) PI 476834	2
320-14 (HP-4) PI 476824	2
1. Hammons, 1971. Crop Sci. 12: 313.	
2. Hammons and Porter, 1982. Collected on their visit to People's Republic of China as being resistant to bacterial wilt.	
3. Jenkins, et al., 1966. Plant Dis. Repr. 50: 520-523.	
4. Schwartz and Hartley, 1950. Landbouw, Boger 22: 223-244.	
5. Sun Darong, et al., 1981. Proc. Am. Peanut Res. and Educ. Society 13: 21-28.	
6. Winstead and Kelman, 1952. Phytopathology 42: 628-634.	
7. Bacterial Wilt resistance indicated when received and U.S. Plant Introduction Office.	
8. Lines selected by Sun Darong of People's Republic of China Institute of Oil Crops in F ₉ or F ₁₀ in 1980/81.	
9. Sun Darong of the People's Republic of China reported using these as resistant parents in crosses.	
10. Yeh Wei Lin, 1982. Personal communication to R. O. Hammons.	

Table 14. Peanut Germplasms Reaction to Bud Necrosis Disease, Peanut Clump Disease, Peanut Mottle Virus Disease, and Peanut Stunt Virus.

<u>Genotype Identity</u>	<u>Reference</u>	<u>Genotype Identity</u>	<u>Reference</u>
Bud Necrosis Disease (BND) (Tomato-Spotted Wilt Virus)			
(Resistance not substantiated) [†]			
<u>Arachis hypogaea</u>		C 145	2
NC Ac 343	2	Robut 33-1	1, 2
NC Ac 841	2	<u>Wild Species</u>	
NC Ac 1705	2	<u>A. sp.</u> 9667 (PI 262848)	6
NC Ac 1741	2	<u>A. sp.</u> 10596	6
NC Ac 2242	2	<u>A. sp.</u> (PI 268248)	3
NC Ac 2243	2	<u>A. Chacoense</u>	3, 5
NC Ac 2575	3	<u>A. glabrata</u> (PI 276233)	3, 6
C 123	2	<u>A. pusilla</u> (PI 338448)	5, 6
		[†] (See ICRISAT Annual Repts. 1979-80, 1980-81).	

Table 14. (Continued)

<u>Genotype Identity</u>	<u>Reference</u>	<u>Genotype Identity</u>	<u>Reference</u>
Peanut Clump Virus (PCV)			
<u>Arachis hypogaea</u> (Tolerant)			
C 334-AB-13	3	NC Ac 17740	3
EC 21887	3	NC Ac 17047	3
M 884-75	3	NC Ac 17066	3, 5
NC Ac 2242	5	RG 13 - No. 301	5
NC Ac 1709	5		
Peanut Mottle Virus (PMV)			
(Tolerant)		(No seed transmission)	
PI 261945	4	EC 76446(292)	5
PI 261946	4	NC Ac 17133RF	5
Peanut Stunt Virus Disease (PSV)			
None reported resistant or tolerant			
1. Amin and Mohammed, 1980. In Proceeding International Workshop of Groundnuts. Int'l. Crops Res. Inst. for the Semi-Arid Tropics, ICRISAT, Patancheru, P.O. Andhra Pradesh 502 324, India.			
2. Annual Reports, 1980-81, 1981-82, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru, P. O., Andhra Pradesh 502 324, India.			
3. Ghanekar, 1980. In Proceedings International Workshop of Groundnuts. Int'l. Crops Res. for the Semi-Arid Tropics, ICRISAT, Patancheru, P. O. Andhra Pradesh 502 324, India.			
4. Kuhn, et al., 1978. Plant Dis. Repr. 62: 365-368.			
5. Reddy, 1983. Personal communication to R. O. Hammons taken from proposed chapter in Groundnut (a monograph to be published by Indian Council of Agric. Res.)			
6. Rao, 1980. In Proc. International Workshop on Groundnuts, Int'l. Crops Res. Inst. for the Semi-Arid Tropics (ICRISAT), Patancheru P. O., Andhra Pradesh 502 324, India.			

Table 15. Peanut (Arachis hypogaea) Genotypes Resistant to Rosette Virus.

<u>Genotype Identity</u>	<u>Reference</u>	<u>Genotype Identity</u>	<u>Reference</u>
B 222-RR-6-B1-1	4, 7	RG 1	4, 7
Castle Cary Cultivars	3	RMP	5
GH 243C	8	RMP 87	8
H-32	1	RMP 89	8
KH 149A (Syn. 272)	5	RMP 91	8
M 25.68	6	RMP-12	8
M 309.69	6	48-37	6
QH 217D	5	56-369	1
QH 243A	5	69-101	2, 6
1. Dhery and Gillier, 1971. Oleagineux 26: 243-251.			
2. Gautreau and De Pins, 1980. In Proc. Int'l. Workshop on Groundnuts, 13-17 Oct. ICRISAT, Patancheru, P.O. Andhra Pradesh, India.			
3. Gibbons, 1966. In Fourth Nat'l. Res. Conf., July 1966. Tifton, GA. 18 pp.			
4. Gibbons and Mercer, 1972. Proc. Amer. Peanut Res. and Ed. Assn. 4: 58-64.			
5. Gillier, 1978. Oleagineux 33: 25-28.			
6. Harkness, 1977. In Report African Res. Council, 45 p.			

Table 15. (Continued)

7. Mercer, 1977. *Oleagineux* 32: 483-488.
 8. Annual Report, 1982, of Institut de Recherches Pour Les Huiles et Oleagineux, Republique de Haute Volta, Upper Volta, 11, Square Petrarque 75016 Paris, France.

Table 16. Peanut species Resistant to Fall Armyworm (*Spodoptera frugiperda*), Lesser Cornstalk Borer (*Elasmopalpus lignosellus*), Potato Leafhopper (*Empoasca fabae*), Thrips (*Frankliniella fusca*), Two-Spotted Spider Mite (*Tetranychus urticae*), Southern Corn Rootworm (*Diabrotica undecimpunctata howardi*), and Velvetbean Caterpillar (*Anticarsia gemmatilis*).

<u>Genotype Identity</u>	<u>References</u>	<u>Genotype Identity</u>	<u>References</u>
	(Fall Armyworm)		
<u>Arachis hypogaea</u>		<u>Wild Species</u>	
Southeastern Runner 56-15	8,10,12	-A. burkartii (PI 261851)	12
		A. villosa (PI 261872)	12
		(Lesser Cornstalk Borer)	

Arachis hypogaea

(Although many lines were less susceptible than many cultivars, none were resistant enough for listing. Those mentioned as less susceptible were Early Runner, Dixie Spanish, Florunner, Florigiant and Virginia Bunch 67.)

Wild Species

A. pusilla (Section Triseminalae) were highly resistant 6
 (Potato Leafhopper)

<u>Arachis hypogaea</u>		<u>Arachis hypogaea</u>	
NCGP 343	3	NC Ac 15729	2, 3
NC Ac 10207	3	NC Ac 15730	3
NC Ac 10211	3	NC Ac 15736	3
NC Ac 10247	2, 3	NC Ac 15739	3
NC Ac 10272	2, 3	NC Ac 15744	3
NC Ac 10277	3	NC Ac 15745	2, 3

Genotype IdentityWild SpeciesReference

<u>A. sp.</u> (PI 276233) Sec. <u>Rhizomatosae</u>	5
<u>A. glabrata</u> (PI 262797) Sec. <u>Rhizomatosae</u>	5
<u>A. macedoi</u> (PI 276203) Sec. <u>Extranervosae</u>	5
<u>A. villosa</u> (PI 331196) Sec. <u>Arachis</u>	5
<u>A. stenosperma</u> (PI 338280) Sec. <u>Arachis</u>	5
<u>A. batizocoi</u> (PI 298639) Sec. <u>Arachis</u>	5
(Two-Spotted Spider Mite)	

Wild species

<u>Arachis sp.</u> (PI 262841)	8
<u>Arachis sp.</u> (PI 276233) Sec. <u>Rhizomatosae</u>	15
<u>A. sp.</u> (PI 338317) Sec. <u>Rhizomatosae</u>	15
<u>A. correntina</u> (PI 331194) Sec. <u>Arachis</u>	15
<u>A. glabrata</u> (PI 262797) Sec. <u>Rhizomatosae</u>	15
<u>A. macedoi</u> (PI 276203) Sec. <u>Extranervosae</u>	15
<u>A. repens</u> (Sec. <u>Caulorhizae</u>)	8
<u>A. villosulicarpa</u> (PI 263396)	8

Table 16. (Continued)

<u>Genotype Identity</u> (Southern Corn Rootworm)		<u>Genotype Identity</u> (Velvetbean Caterpillar)	
<u>Arachis hypogaea</u>		<u>Arachis hypogaea</u>	
NC 6	4	Tifton 8	14
NC Ac 17167	5	Advanced Lines	
NC Ac 17201	5	72 x 41A-6	17
NC Ac 17205	5	73 x 18A-5	17
NC GP 343	1	73 x 20B-3	17
Tifton 8	6		
VA 751012R	6		
VA 751014	6		
----- Thrips -----		-----	
<u>Arachis hypogaea</u>		<u>Arachis hypogaea</u>	
Spanish Types		Runner Types	
PI 259594	18	PI 280688	18
PI 268770	18	PI 290599	18
PI 268771	18	Starr	18
PI 270804	18		
PI 306223	18		

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Table 17. Peanut (Arachis species) Genotypes Resistant or Tolerant to Nematode Species.(Lesion Nematode, Pratylenchus brachyurus)

<u>Genotype Identity</u>	
PI 295223	Smith and Boswell, 1980. Proc. Am. Peanut Res. and Educ. Society 12: 54.
PI 365553	
PI 290606	Smith, et al., 1978. Crop Sci. 18: 1008-1011.
(Northern Root-knot Nematode, <u>Meloidogyne hapla</u>)	
PI 262286 (Rhizomatosa)	Banks, 1969. Proc. Am. Peanut Res. and Educ. Assn. 1: 23-28.

Table 18. Multiple Resistance of Peanut (*Arachis hypogaea*) to Bacterial Wilt (BW) (*Pseudomonas solanacearum*), Leafspots (*Cercospora arachidicola* (CA) and (*Cercosporidium personatum*) (CP), Scab (*Sphaceloma arachidis*), Rust (*Puccinia arachidis*), *Aspergillus flavus* (AF), and Viruses.

	BW	CA	CP	Scab	Rust	AF	Virus	References
(PI's)								
203395		*	*		*			18
215696		*	*		*			9,27,28,30
(Tifrust-1)								
259747		*	*	*	*			4,7,14,19,23
(Tarapoto)								24,28,30
298115			*		*			3,4,10,27,28
314817			*		*			3,4,27,28
341879			*		*			15,28
(Tarapoto)								
350680		*	*	*	*			4,7,14,18,19,
(Tarapoto)								23,24,26,28
381622			*		*			27,28
(Tarapoto)								
390593			*		*			9,27,28
390595			*		*			8,27,28
393516		*	*		*			8,27,28,30
393517			*		*			8,27,28
393526			*		*			8,27,28
393527			*		*			8,27,28
393531	*		*		*			8,27,28,30
393595		*	*		*			8,27,28,30
393641	*	*	*		*			8,27,28,30
393643			*		*			8,27,28
393646			*		*			8, 27
405132		*	*		*			27,28,31
407454			*		*			9,27,28
414331			*		*			27,28
414332			*		*			27,28
(Other)								
C 45-23			*		*			26,27
C 501		*	*		*			20
EC 76446(292)		*	*		*		mottle	21,24,27,30
NC Ac 927			*		*			24
NC Ac 17090			*		*			11,27
NC Ac 17124			*		*			24,27
NC Ac 17129	*	*	*		*			24,27,30
NC Ac 17130			*		*			24,27
NC Ac 17132			*		*			24,27
NC Ac 17133			*		*			26,27

Table 18 (continued)

	BW	CA	CP	Scab	Rust	AF	Virus	References
NC Ac 17133RF		*	*		*		mottle	21,25;26,30
NC Ac 17135			*		*			24,27
NC Ac 17142	*	*			*			27,30
NC GP 343		*	*					2
FESR Lines 5-13			*		*			16,17,24
HG 1		*	*					12
HG 13-3-18		*	*					20
Matevere (Tanganyika)		*	*					12
Mwitunde (Tanganyika)		*	*					12
Robut 33						*	Bud necrosis	1,2
S 185		*	*					12
Samaru (Nigeria)		*	*					12
Schwartz 21	*			(Verticillium wilt)				5,6,13,22,29
T 98		*	*					20
Wima Bunch (Tanganyika)		*	*					12

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Table 19. Peanut (*Arachis* sp.) Wild Genotypes Resistant or Immune to Leafspots (*Cercospora arachidicola* (CA) and *Cercosporidium personatum* (CP), *Puccinia arachidis* (PA), Bud Necrosis Disease (BND), Rootknot Nematode (RN) and Potato Leafhopper (PL).

	CA	CP	PA	BND	RN	PL	References
Section/Series/ Identity†							
<i>Arachis</i> sp.							
<i>A. cardenasii</i>	*	*	*				1,4,11
<i>A. chacoense</i>	*	*	*	*			1,4,6,10,11
<i>A. spegazzinii</i>	*	*					1,8,11
<i>A. stenosperma</i>	*	*	*				1,3,4,11,12
<i>Rhizomatosa</i>							
<i>A. sp.</i>	*	*	*		*	*	1,2,3,11
<i>A. glabrata</i>	*			*		*	3,5,6,9,11
<i>A. hagenbeckii</i>	*		*				5,7,11

† For specific identify see Tables with specific resistance reactions.

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ABSTRACT

During 1968-1969, a series of embryo culture studies were conducted using normal developing Arachis hypogaea L. pegs, ovules, and embryos. The objectives were to develop basic techniques, which might later be used to rescue potentially abortive hybrid embryos from crosses of certain cultivated by wild genotypes. The culture media employed were those of Hoagland and Arnon (1938), Randolph and Cox (1943), White (1963), and Nitsch and Nitsch (1969). The media were sometimes supplemented with various additives including 2,4-D, casein hydrolysate, kinetin, indole-acetic acid, ethrel, coconut milk, tomato juice and orange juice. Although many of the cultures failed because of fungal contamination, some successes were achieved and a few plants resulting from the cultures were grown to maturity in the greenhouse. The best results were obtained with Randolph and Cox medium, supplemented with coconut milk, when embryos showing differentiated cotyledons were cultured.

INTRODUCTION

Valuable genes for disease and insect resistance are present in the genomes of certain wild species of Arachis that are largely absent in the cultivated peanut (Arachis hypogaea L.). Unfortunately, most of these wild species have evolved with cross-compatibility barriers to outcrossing which thus far have precluded their direct use in peanut breeding programs. It was because of failures to achieve certain hybrids between species of Arachis that some early work was started in our laboratory at Stillwater, Oklahoma, to develop embryo rescue procedures using tissue culture methods. Use of embryo culture methodology was already established as a means of achieving wide crosses in prunes by Skirm (1942), in tomatoes by Smith (1944), and in clovers by Keim (1953). The tissue culture work on peanuts described here was preliminary in nature and used an empirical approach which was based on the assumption that the hybrid failures were due to nutritional irregularities as described in tobacco by Brink and Cooper

¹ Mention of a trademark, proprietary product, or vendor does not constitute a guarantee or warranty of the product by the USDA or by Oklahoma State University, or imply their approval to the exclusion of other products or vendors that may also be suitable.

(1941). Johansen and Smith (1956) described an embryo failure phenomenon in Arachis which was similar to that in tobacco. The objective of this study was to develop basic procedures on embryo rescue techniques by first utilizing normally developing embryos and later to extend these approaches to potentially abortive hybrids in wide crosses. The techniques employed were crude at best and the media used were somewhat primitive by today's standards. Growth promoters were mostly nondefined at that time and were often supplied by additions of coconut milk and fruit juices. Nuchowicz (1955) had succeeded in culturing embryonic axes taken from mature seeds to produce plants but his work had gone unnoticed. Our efforts on culturing embryos from peanuts was not the first, however. W. C. Gregory (personal communication) had tried this approach during 1963-64 on some of his failing hybrids but he was unsuccessful and never published the results.

The experiments were conducted during three trial periods (5/31/68 - 1/30/69, 1/24/69 - 4/16/69, and 5/9/69 - 7/10/69) because these coincided with the availability of pre-medical technology students who had received basic training in sterile culture techniques. The experiments were terminated when these students were no longer available and because other research projects became more pressing. The research results reported here are inconclusive because of the preliminary nature of the experiments and because of the lack of adequate statistically analyzable data. It does establish, however, where we were at that time.

MATERIALS AND METHODS

The basic culture and transfer procedures used were those of Keim (1953) for clovers and birdsfoot trefoil with modifications adapted from Randolph and Randolph (1955) and Smith (1944). Simply stated they consisted of transferring embryos under sterile conditions from growing plants to glass tubes containing appropriate nutrient media, covering the tubes to prevent contamination followed by incubation in a suitable environment.

The transfers were made under a hood employing a UV light for presterilization of the work environment (laminar flow hoods, used today, had not come into general use). During the early trials (5/31/68 - 1/30/69) measurements were made of the young pods so that successes might be correlated with pod development. The cultures were grown in a Stultz seed germinator which employed a water curtain for temperature control. Light was supplied by six F30T12/CW/RS fluorescent tubes. The day-night regimes were approximately 12 hours each and the

temperatures were 28 C and 18 C, respectively. Observations of the cultures were made at various intervals when notes and occasional photographs were taken. Contaminated cultures were generally discarded but some were retransferred to new media when the contaminating agent did not seem to involve the tissue itself. Cultures that responded by giving rise to plants with roots and/or shoots were noted, some were photographed and the better rooted plants were generally transplanted to sand, soil, or peat pellets. The transplants were temporarily returned to the germinator for 2-3 days to recover from shock and then moved to a greenhouse for further growth and observation.

The culture media used included those of: Randolph and Cox (1943) alone and with various supplements of coconut milk, orange juice, tomato juice, IAA, IBA, and Nitsch and Nitsch (1969) pollen medium; White (1963) alone and supplemented with various additions of 2,4-D, Randolph and Cox B-1 solution, casein hydrosylate, and kinetin; Nitsch and Nitsch (1969); and Hoagland and Arnon (1938) with 3% sucrose. The tissues utilized were of various sizes and ages which included embryos (prior to cotyledon differentiation through various stages of differentiation), embryonic axes from immature and almost mature seeds, young whole ovules of various sizes, and peg tips. Some young embryos were exposed by sectioning ovules or pegs with a razor or microtome blade and subsequently were placed on the culture media.

The genotypes used included purelines from all three botanical types of peanuts as follows: Spanish - Aureus, Dixie Spanish, Krinkle leaf, Pearl, Spanhoma, Starr, and PI 288155; Virginia - F 416, Florigiant, NC 4X, PI 268837, PI 280688, PI 288169, and PI 295974; Valencia - PI 262129, PI 295197, and PI 314817 as well as some F2 hybrid selections involving the above genotypes. In addition, a few (nineteen) ovules were cultured where in vitro fertilization was attempted by applying pollen directly to the micropyle after the ovules were placed in the culture tubes.

RESULTS AND DISCUSSION

A summary of the results of the experiments by culture period is shown in Table 1. It should be noted that a high percentage (80 and 84) of the cultures of the first two periods became contaminated with microbes. Fungal rather than bacterial contamination dominated but exact identifications were not made. Our technique had improved by the third period as indicated by less contamination and

greater success with achieving transplants. In all, 689 culture attempts were made although some tubes contained more than one unit of tissue (e.g. a tube may have contained 2 or 3 whole ovules, etc.). The total number of tissues cultured was 823 consisting of the following types (by percentage): Prefertilization ovules - 2.3%, embryos - 49.2%, whole ovules - 27%, peg tips - 1.9%, and embryonic axes - 19.6%. Table 2 shows the distribution of the media used during the trials. An analysis of 52 transplants obtained during these trials showed that 40.4% had been grown on Randolph and Cox media supplemented with coconut milk (150 ml/l), 30.8% were grown on plain Randolph Cox medium, 17.3% on Randolph Cox medium with coconut milk to which IAA (0.01 ppm) had been added and 11.5% on Nitsch and Nitsch pollen medium. The youngest embryos successfully cultured were excised from Starr or Spanhoma pods 1.0 cm or less in width and were grown on Randolph and Cox medium with coconut milk and IAA. No tissues were successfully cultured unless the embryos showed good cotyledon differentiation. Several plants arising from the successful cultures were maintained in the greenhouse long enough to flower and produce mature seeds. These plants appeared to be normal according to genotype and no signs of genetic change due to culturing were ever noted. These results, although meager and somewhat superficial by today's standards where methods have improved and a flurry of tissue culture activity is apparent, did show our ability to culture some normal developing embryos to produce fertile progeny.

We have recently renewed our efforts at developing tissue culture methodology that may be useful in enhancing peanut germplasm and for maintenance and propagation purposes. For these new approaches we are utilizing more refined techniques with defined media, providing better environment control and employing better experimental designs so that the results can be more accurately assessed by using statistical analysis procedures.

Recent reviews on peanut tissue culture results, procedures and projects have been published by Sastri et al. (1981) and Ketring et al. (1982). Bajaj et al. (1982) reported successful culture of embryos (taken 30-35 days after pollination) from a hybrid of A. hypogaea x A. villosa Benth. However, this hybrid had been achieved much earlier by Krapovickas and Rigoni (1952) and Kumar et al. (1957) using conventional crossing procedures. Therefore, the culture technique they described did not achieve anything new. But it does advance our knowledge about the potentials of tissue culture. A more significant report is

that of Sastri and Moss (1982) who claim to have achieved hybrids between A. monticola Krap. et Rig. and A. sp. PI 276233 (section Rhizomatosae with known resistance to peanut leafspots) and A. hypogaea X A. sp. PI 276233. These hybrids have never been accomplished before by conventional crossing procedures although many attempts have been made in our laboratory and elsewhere (Gregory and Gregory, 1979). The hybrids were achieved by applying growth regulators to the hypanthium bases of the maternal parents following pollination. Although Sastri and Moss indicated that hybridity of the plants was confirmed by morphological and electrophoretic studies, the details to substantiate their claim are absent in the report. They also reported success at culturing immature embryos taken from developing pods of A. hypogaea X A. glabrata Benth, (section Rhizomatosae) where the flowers were treated similarly. Further details on all of these hybrids would be very interesting.

How effective embryo culture will be in allowing gene flow among the various taxa of Arachis is still uncertain. There is circumstantial evidence to suggest that all hybrid failures in Arachis following fertilization are not caused by nutritional difficulties expressed during embryogenesis but some may be due instead to lethal factors within the embryos themselves. This potential problem must be addressed before embryo culture methodology can realize its full potential in future peanut germplasm enhancement programs.

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TABLE 1. SUMMARY OF EMBRYO CULTURE TRIALS, 1968-69.

Culture Period	Total Cultures	Showed Growth (%)	Contaminated (%)	Other Discards (%)	Transplants (%)
5/31/68-1/30/69	467	20	80	16	4
1/24/69-4/16/69	101	25	84	12	4
5/09/69-7/10/69	112	52	22	51	27
	<hr/> 689				

TABLE 2. DISTRIBUTION OF CULTURE MEDIA USED FOR EMBRYO CULTURE TRIALS

<u>MEDIUM</u>	<u>PERCENT OF TOTAL CULTURES</u>
Randolph and Cox (R & C)	18.3
R & C with coconut milk	24.2
R & C with other additives	8.1
Nitsch and Nitsch	1.7
White	8.1
White with additives	32.7
Hoagland and Arnon with sucrose	6.8

Effect of Row Spacing, Row Orientation, and Gypsum on the Production and Quality of Nonirrigated Florunner Peanuts. J. I. Davidson, Jr., Mechanical Engineer, P. D. Blankenship, Agricultural Engineer, T. H. Sanders, Plant Physiologist, R. J. Cole, Research Microbiologist, and R. A. Hill, Mycologist, National Peanut Research Laboratory, Dawson, GA 31742; R. J. Henning, Agronomist, University of Georgia Cooperative Extension Service, Tifton, GA 31793; and W. R. Guerke, Director, Georgia Seed Test Laboratory, Atlanta, GA 30334.

ABSTRACT

CY 1981 and CY 1982 field studies showed that close row spacing, north-south row orientation and land plaster application at blooming provided benefits in the nonirrigated production of Florunner peanuts. Close rows generally provided a larger taproot crop, cooler soil temperatures and slightly higher germination percentages than obtained with wide rows. North-south row orientation provided cooler soil temperatures, higher yields and higher germination percentages than east-west row orientation. Close row spacing and north-south orientation also appear to be effective in conserving soil moisture. An application of land plaster at blooming increased germination by several percentage points and reduced aflatoxin contamination levels by a factor of 2.

INTRODUCTION

Peanut growers are continually seeking improved agronomic practices that will provide higher yields of better quality peanuts at a lower cost. Three specific agronomic practices that have this potential are close row spacing (1, 4, 5), north-south row orientation (6), and gypsum (land plaster) applications at blooming (2, 7, 9, 10). During Crop Years (CYs) 1981 and 1982, these practices were evaluated while growing Florunner peanuts in large-scale, nonirrigated field studies. This paper summarizes the effects of these practices on yield, grade, seed quality, aflatoxin, soil temperatures, soil moisture, and fruiting characteristics of the peanut plant.

MATERIALS AND METHODS

The experimental design consisted of a split-split-split plot experiment with farm as the main plot (3 farms), row orientation (east-west vs north-south) as the subplot, row spacing as the sub-subplot, and land plaster application (0 lb/A vs 1000 lbs/A) at blooming as the sub-sub-subplot. Three farms were selected in different areas of Terrell County, Georgia, so that the effects of different soil types, weather, and rainfall patterns could be examined. Each year a different 20 acre field was selected on each farm. Each field was divided into eight 2 1/2 acre plots with four of the plots having rows running north-south and

four of the plots having rows running east-west. In each row orientation two plots had the wide (36") row spacing and two plots had the close twin (10" in 1981 and 6" in 1982--both with 36" between center pair) row spacing. One plot in each row orientation and row spacing had 1000 lbs/A of 420 coarse land plaster applied at blooming while the other plot had no land plaster applied at blooming.

Generally the agronomic, harvesting, and drying practices were those recommended by the Georgia Cooperative Extension Service (3). Rainfall, maximum and minimum daily soil temperatures, fruiting data, disease and pest control practices, and soil analyses were measured and recorded during the growing season. Peanut moisture at digging and digging losses were also recorded. A standard drying wagon was used to dry the peanuts from each plot. After drying, the yields and grades were determined and a large sample (approximately 300 pounds) was removed from each wagon (plot) for shelling and quality evaluations. The large sample was divided into subsamples to provide two germination samples, two samples for chemical analyses, four large (approximately 60 pounds each) samples for aflatoxin analyses, and two samples for shelling and physical property determinations. Germination tests were conducted by the Georgia State Seed Testing Laboratory. Chemical analyses were conducted by the University of Georgia Chemistry Laboratory. The aflatoxin analyses were conducted by the USDA FSIS Laboratory in Albany, Georgia. Data were analyzed statistically using analysis of variance and regression analyses.

RESULTS AND DISCUSSION

In 1981, high temperatures and marginal rainfall reduced yields, grades, and seed germination percentages and produced aflatoxin on one of the farms (Farm 3). In 1982, excellent climatic conditions resulted in good yields, grades, and seed germination percentages and no aflatoxin on any of the three farms. The general growing conditions on each farm during 1981 and 1982 are summarized in Table 1. Severe drought stress and high soil temperatures on Farm 3 in 1981 produced high levels of aflatoxin and drastically reduced yields and germination. Also, rainfall interrupted harvest on Farm 3 in 1981 requiring two digging dates. In 1981 on Farm 2, poor weed control and hard, dry soil at harvest drastically reduced yields and grade. The effect of the weeds and hard soil on the digger operation resulted in higher digging losses for the close row than for the wide row peanuts. Excessive digging losses were not experienced in the other 5 harvest

situations.

Even though there were large variations in soil type, climatic conditions, disease and weed control, and harvest conditions, significant differences were found among the treatments and in yield, grade, and germination for both crop years (Table 2). The north-south row orientation provided a significantly higher yield (162 lbs/A) than the east-west row orientation. Land plaster applications of 1000 lb/A at blooming reduced the percent of damaged kernels by 14%; reduced the percent of foreign material by 25%, and increased germination by 10%. Landplaster reduced aflatoxin on Farm 3 in 1981 by a factor of 1.7 (Table 3). The apparent higher aflatoxin levels for Digging II may have resulted from a loss of more mature kernels causing a higher percentage of immature kernels for Digging II than for Digging I. Generally in such severe drought conditions the immature kernels have higher contamination levels than the mature kernels (8). However, the apparent higher aflatoxin levels for Digging II may have resulted from an increase in aflatoxin with time. Application of land plaster also produced a higher calcium content in the seed (Figure 1). There was a high correlation of aflatoxin and germination with calcium content of the seed ($R = 0.73$ and 0.91 , respectively). The north-south row orientation and the close row spacing provided slightly higher (but not significantly) average germination percentages than the east-west row orientation and the wide row spacing, respectively. The larger digging losses (measured but not reported here) for the close row spacing on Farm 2 during 1981 greatly influenced the yield data resulting in higher yields for the wide row spacing (Table 4). However, 1982 data indicated slightly higher average yields for the close row spacing.

Average differences in grade (SMK + SS) were usually small (Table 5). Evidently use of land plaster at blooming reduced kernel damage and foreign material by reducing pod and kernel disease.

Application of 1000 lbs/A of land plaster at blooming provided much higher germination percentages than when land plaster was not applied (Table 6). The effect of land plaster on germination was much greater for drought stressed peanuts because a higher concentration of calcium in the pegging zone is required for peg uptake when soil moisture is low or inadequate. During severe drought stress the north-south row orientation and the close row spacing provided higher germination percentages than the east-west row orientation and wide row spacing.

Soil temperature measurements showed that the close row spacing and north-south row orientation tended to provide cooler soil temperatures (Table 7) and higher peanut (soil) moisture contents (Table 8) than obtained with the wide row spacing and east-west row orientation. The benefits of north-south and close rows were more apparent during drought stressed periods. The close row spacing also provided a larger proportion of peanuts around the taproot (Table 9) than for the wide row spacing.

SUMMARY AND CONCLUSIONS

The application of land plaster at blooming, north-south row orientation, and close row spacing provided certain benefits in growing dry land Florunner peanuts during 1981 and 1982. The additional cost of these practices and potential problems in using them appear to be minimal. Use of north-south row orientation on flat land and square shaped fields (or north-south rows--longer than east-west rows) should present no problems. On rolling land and/or large field length to width ratios with very short north-south rows the north-south row orientation may not be practical because of erosion problems and too many short rows. Negative considerations for using close row spacing include the cost of close row planting equipment, the additional seed peanuts required per acre (20-30% more), and the potential problems in digging the close row peanuts in hard dry soils and/or in weedy fields. The cost of applying land plaster is a major consideration, but the results of this study show that land plaster and water are prerequisites for providing good quality peanuts.

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Table 1. General growing conditions during 1981 and 1982

Farm	Soil Type ¹		Total Rainfall ²		Disease control ³		Weed Control ⁴		Harvest Conditions ⁵	
	1981	1982	1981	1982	1981	1982	1981	1982	1981	1982
1	HSL	MSL	17.3"	20.0"	G	E	E	E	E	E
2	MSL	HSL	20.5"	32.0"	G	F	P	G	P	G
						(LLS)	(BW-TM)		(DHS-EDL)	
3	LSL	LSL	15.5"	23.0"	P	E	G	F	F	G
					(ELS)			(BW)	(RIH)	

¹Soil nutrients were adequate. HSL = Heavy Sandy Loam; MSL = Medium Sandy Loam;
LSL = Light Sandy Loam

²Total rainfall was the cumulative values from planting to harvest.

³G = Good; E = Excellent; F = Fair; P = Poor; LLS = Late Leaf Spot; ELS = Early Leaf Spot

⁴BW = Beggar Weed; TM = Texas Millet

⁵DHS = Dry Hard Soil; EDL = Excessive Digging Losses; RIH = Rain Interrupted Harvest

Table 2. Average yields (lb/A), grades (%) and germination (%) for 1981 and 1982

Variable	Row direction		Row pattern		Land plaster rate		mean
	N & S	E & W	Wide	Close	1000 lbs/A	0 lb/A	
Yield	3114* ^{1/}	2952*	3076	2993	3039	3031	3034
Grade (SMK and SS)	73.1	73.8	73.6	73.3	73.5	73.4	73.4
Damaged kernels	2.1	2.0	2.1	2.0	1.9*	2.2*	2.0
Foreign material	3.8	3.2	3.7	3.3	3.0*	4.0*	3.4
Germination	82.3	80.3	80.7	81.7	85.3**	77.7**	81.4

Means of like treatments within the same row followed by * or ** are significantly different at $p = 0.05$ and $p = 0.01$, respectively.

Table 3. Average aflatoxin values of 1981 peanuts
(Farm 3)

Digging dates ¹	Aflatoxin (ppb)					
	Row direction		Row pattern		Land plaster rate ²	
	N&S	E&W	Wide	Close	1000 lbs/A	0 lb/A
1	338	346	-	-	254	429
2	436	391	382	445	300	526

¹Digging I was performed just prior to a 2" rain.
Digging II was performed 4 days after the 2" rain.
Aflatoxin contamination levels appeared to be higher
for Digging II than for Digging I.

²Land plaster had a highly significant effect ($p = 0.01$)
on the aflatoxin content of the kernels for both digging
dates.

Table 4. Average yields

		Pounds per acre						
Farm	Crop Year	Row Direction		Row pattern		Land plaster rate		Farm avg.
		N & S	E & W	Wide	Close	1000 lbs/A	0 lb/A	
1	1981	3516	3057	3396	3177	3315	3258	3286
2 ¹	1981	2499	2379	2753	2126	2524	2355	2440
3 ²	1981	1747	1612	1630	1729	1671	1688	1680
Average		2587	2350	2593	2344	2503	2434	2469
1	1982	3848	3642	3711	3786	3682	3818	3748
2	1982	3501	3384	3395	3494	3500	3387	3441
3	1982	3577	3640	3568	3650	3542	3680	3610
Average		3642	3555	3558	3643	3575	3628	3600

¹Yields on Farm 2 were drastically reduced by weeds and digging
losses.

²Yields on Farm 3 were drastically reduced by drought and poor leaf
spot control.

Table 5. Average grades

Farm	Crop Year	% SMK + % SS					
		Row direction		Row pattern		Land plaster rate	
		N & S	E & W	Wide	Close	1000 lbs/A	0 lb/A
1	1981	71.2	72.8	71.8	72.2	71.8	72.2
2 ¹	1981	69.0	69.0	68.8	69.2	69.0	69.0
3	1981	73.5	75.8	74.8	74.5	75.0	74.2
Average		71.2	72.5	71.8	72.0	71.9	71.8
1	1982	72.5	72.8	73.3	72.0	72.8	72.5
2	1982	74.8	75.5	75.0	75.3	74.5	75.8
3	1982	77.6	77.3	78.3	76.8	78.0	77.0
Average		74.9	75.2	75.5	74.7	75.1	75.1

¹Grades on Farm 2 were drastically reduced by weeds and digging losses.

Table 6. Germination

		% Germination						
Farm	Crop Year	Row direction		Row pattern		Land plaster rate		Farm avg.
		N & S	E & W	Wide	Close	1000 lbs/A	0 lb/A	
1	1981	85.5	81.9	84.9	82.5	85.1	82.2	83.6
2	1981	83.8	88.1	86.9	85.0	87.0	84.9	86.0
3 ¹	1981	67.5	58.5	59.0	66.5	79.4	46.6	62.9
Average		78.9	76.2	76.9	78.0	83.8	71.2	77.5
1	1982	85.8	84.9	84.5	86.1	86.1	84.5	85.3
2	1982	84.3	80.9	82.0	83.1	84.0	81.1	82.6
3	1982	87.0	87.3	87.3	87.0	90.3	84.0	87.2
Average		85.7	84.4	84.6	85.4	86.8	83.2	85.0

¹Severe drought stress drastically reduced germination of peanuts on Farm 3.

Table 7. Average maximum soil temperatures for 1981

Farm	Soil Temperature, °F			
	In row ¹		Between row	
	Close rows	Wide rows	Close rows	Wide rows
1	84.2	85.9	84.1	85.2
2	82.9	83.0	83.3	84.4
3 ²	89.6	93.6	96.2	98

¹In row temperatures for north and south rows were
1° to 2° cooler than east and west rows.

²Poor growing season (drought stress). Very poor
leaf spot control.

Table 8. Mean peanut kernel moisture¹ at digging time

Crop year	Mean kernel moisture (% w.b.)					
	Row orientation		Row spacing		Land plaster rate	
	N&S	E&W	Wide	Close	1000 lbs/A	0 lb/A
1981	32.6	27.9	25.8	34.8	29.9	30.7
1982	42.3	39.4	41.0	40.6	39.9	41.8

¹Differences in kernel moisture were attributed to dif-
ferences in soil moisture.

Table 9. Ratio of taproot¹ to limb² crop for 1982 Florunner peanuts

Farm	Row direction		Row pattern		Land plaster rate		Farm Avg.
	N&S	E&W	Wide	Close	1000 lbs/A	0 lb/A	
1	2.8	2.8	1.8	3.8	3.1	2.5	2.8
2	2.4	2.9	2.3	3.1	2.7	2.6	2.7
3	2.1	2.2	1.5	2.9	2.0	2.4	2.2
Avg.	2.4	2.6	1.9	3.3	2.6	2.5	2.6

¹ Although Florunner peanuts have no peanuts growing on the taproot, the taproot crop is defined as those pods having stems attached to the lateral branches within 5" of the taproot.

² The limb crop is defined as those peanuts with stems attached to the lateral branches over 5" away from the taproot.

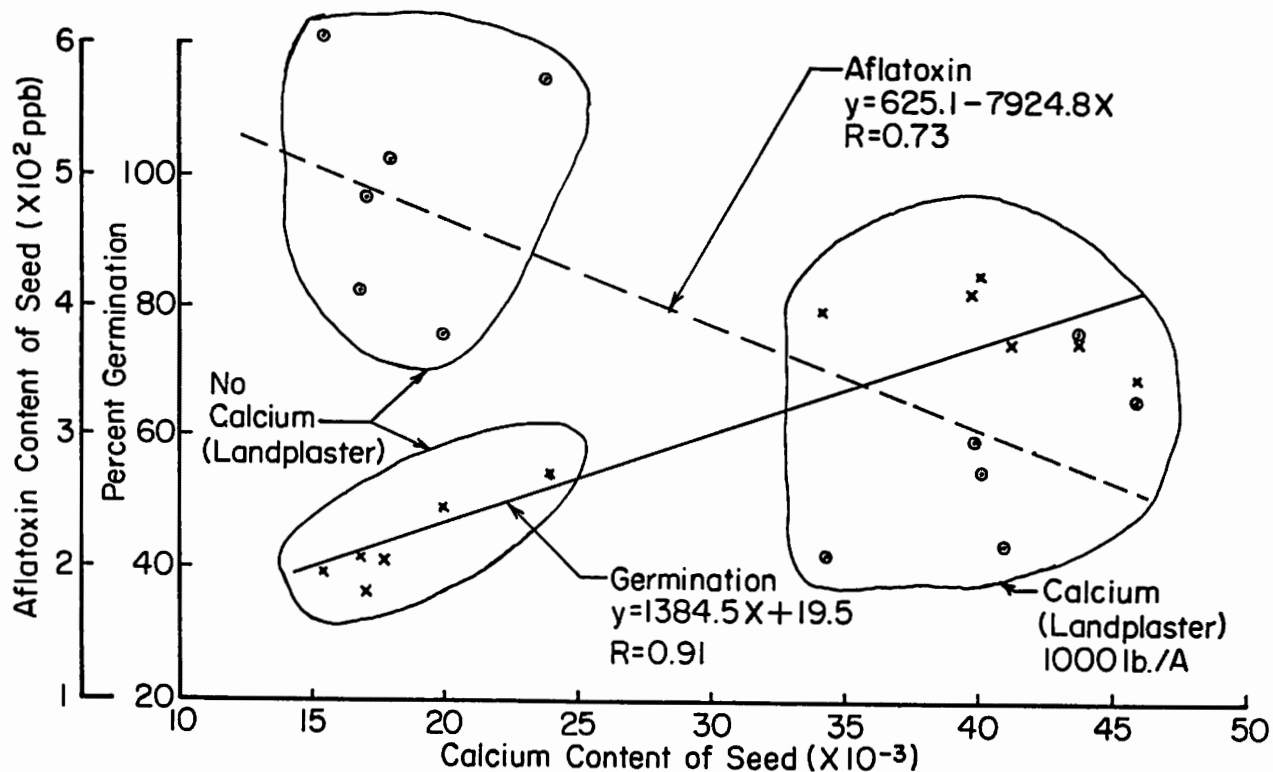


Figure 1. Effect of calcium in seed on germination and aflatoxin for Farm 3 (Crop Year 1981).

Effect of N Application on Peanut Leaf Composition. S. K. Pancholy and Sheikh M. M. Basha, Division of Agricultural Sciences, Florida A&M University, Tallahassee, FL, and D. W. Gorbet, Agri. Res. Center, University of Florida, Marianna, FL.

ABSTRACT

In 1981, a study was conducted to determine the effect of N application on nodulating and non-nodulating peanut lines. In this paper, the effect of N application on peanut leaf composition is reported. A field experiment was laid-out in a randomized block design employing four rates of N (0, 67, 134, and 268 kg N/ha), applied one month after planting, and four peanut lines. The four peanut genotypes tested included a non-nodulating line and three normal nodulating genotypes, namely, the cultivar 'Florunner', PI262090 and UF487A-. The latter two lines are the parents of the non-nodulating line. Peanut leaf samples were collected at 45, 80, and 110 days after planting, lyophilized, ground, and stored at -20 C. The leaf samples were analyzed for chlorophylls 'a' and 'b', soluble carbohydrates, total N, and total amino acids. Nitrogen starvation symptoms were evident in non-nodulating peanut plants at all three sampling dates. Only in the non-nodulating line did the application of N result in increases in total N (20 to 75%), chlorophyll 'a' (15 to 95%), chlorophyll 'b' (10 to 100%), and soluble carbohydrates (25%, only at 45 days sampling). Application of N had significant effect only on amino acids serine and methionine.

INTRODUCTION

The peanut (Arachis hypogaea L.), is capable of fixing atmospheric N through the symbiotic relationship between root nodules and Rhizobia (5, 17). Nodulating peanut plants derive reduced N from nitrate reduction in soil as well as nitrogen fixation (3, 4, 5, 11). A non-nodulating peanut genotype, such as reported by Gorbet and Burton (7), is dependent on nitrate reduction as the sole source of reduced N (3, 11) and show N starvation symptoms toward maturity (7, 12).

It has been a common practice among farmers and researchers alike to apply small amounts of N fertilizers to increase peanut yield (15). However, the application of N to peanuts is known to suppress biological nitrogen fixation (14) and the results obtained from N fertilization studies of legumes in general (3, 16, 17) and peanuts in particular have been erratic and inconclusive (14, 15).

Application of N increased leaf protein content in three sorghum genotypes tested by Ajakaiye (1). However, protein content and total N uptake into fababean

shoots were unaffected by N application (16). Walker et al. (18) did not observe any effect of foliar N application on N content of the tops of 'Florunner' peanuts. Hanaway and Weber (9) reported that non-nodulating soybean plants accumulated approximately 30% as much nitrogen compared to nodulating varieties. Hallock and Coffelt (8) correlated productivity and leaf nutrient among ten Virginia peanut genotypes, and reported that genotypes with higher crop value were somewhat higher in Ca, Mg, Mn, and B.

Since seed yield is dependent upon photosynthesis by the leaves and translocation of assimilates to the seed and there is much demand for N during flowering and pod formation (4, 10, 15, 19), it is of importance to know if peanut leaf composition is affected by application of N to soil.

This study was conducted to determine the effect of N application on leaf composition of nodulating and non-nodulating peanuts.

MATERIALS AND METHODS

A field experiment was laid-out in 1981 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, two of its parental lines: PI262090 and UF487A-, and a commercial cultivar, Florunner). The study was conducted at the Agricultural Research Center, Marianna, Florida.

Fully developed leaves were collected at 45, 80, and 110 days after planting, placed on ice in the field, transferred to the laboratory, lyophilized, ground and stored at -20 C. The leaf samples (250 mg) were extracted with 80 percent ethanol and centrifuged at 20,000 x g for 20 min. The supernatant was saved and the pellet was re-extracted twice with 80 percent ethanol. The three supernatants were mixed, made to a known volume, and used in the determination of chlorophylls and soluble carbohydrates. Chlorophylls 'a' and 'b' were measured at 665 nm and 645 nm, respectively (5). Soluble carbohydrates were analyzed by the method of Yemm and Willis (20). The nitrogen content of peanut leaf tissue was determined by the micro-Kjeldahl method (2). The amino acid composition of leaf protein was obtained by hydrolyzing the samples at 110 C for 18 h, followed by analysis of JEOL-6AH amino acid analyzer (13).

RESULTS AND DISCUSSION

The chlorophylls 'a' and 'b' are the most important pigments active in the photosynthetic process (5). Application of N significantly increased chlorophylls

'a' and 'b' in leaf tissue of non-nodulating peanuts at 45 and 110 days after planting (Tables 1 and 2). However, no significant differences were noted at the 80 day stage. In nodulating peanut lines, PI262090, UF487A-, and Florunner, chlorophyll 'a' and 'b' showed erratic response to N application. Chlorosis was evident in non-nodulating plants as early as 45 days after planting and became severe at 80 and 110 days after planting, when no N was applied. Since N is an essential part of the porphyrin structure which make-up chlorophyll, nitrogen deficiency results in chlorosis and a drop in chlorophyll content (5, 11). Chlorophyll 'a' content in the non-nodulating line almost doubled when 268 kg N/ha was applied. Chlorophyll 'b' also showed similar increases in response to N fertilization. It is evident from the data that the application of 268 kg N/ha to non-nodulating line resulted in chlorophyll levels comparable to control treatments in the nodulating entries.

Application of N had a significant effect on soluble carbohydrates in peanut leaf tissue only at 45 days after planting (Table 3). Significant increases in soluble carbohydrates were observed in the non-nodulating genotype and UF487A- with increasing doses of N application. It has been shown that the carbohydrate status of leaf is influenced by the interaction between the production of carbohydrates by photosynthesis and the utilization by active sinks. Other factors such as sink size, metabolic activity, and the efficiency of the translocation system are also involved in creating the demand for carbohydrates from the leaves (10). Eglin *et al.* (6) reported that changes in free sugar levels in soybean leaves during seed filling varied from an increase to no change to a decrease across a 3-year period. Similar results were observed in our study where soluble carbohydrates in peanut leaf tissue showed variable response to N application.

Nitrogen fertilization had a significant effect on peanut leaf N only at 110 days after planting (Table 4). Although, application of N increased leaf N at all three samplings in nodulating and non-nodulating peanuts, significant differences between N doses were obtained only in non-nodulating line. In general, leaf N content in peanuts decreased toward maturity. Richards and Soper (16) in fababeans and deMooy *et al.* (4) in soybean have reported similar observations. Maximum N utilization by the soybean plant was reported to occur during the later growth states of flowering and pod-filling (3, 4), Reid and Cox

(15) have shown that percent N in peanut foliage decreased from 5.5 to 2.5 during 10 weeks of plant growth toward maturity. Our data show that application of 134 and 268 kg N/ha increased leaf N in non-nodulating peanuts to a level similar to that of nodulating plants at 45 and 80 days after planting. However, when no N was applied, non-nodulating plants had approximately 1/3 less leaf N than nodulating plants. Application of N had no significant effect on the total amino acid composition of peanut leaf protein except for serine and methionine (Table 5). However, only methionine content showed a consistent increase in response to N application.

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Table 1 . Effect of N Application on Peanut Leaf Chlorophyll a⁺

Days After Planting	Applied N kg/ha	Peanut line or cultivar			
		Non-nod	PI262090	UF487A-	Florunner
Absorbance					
45	0	0.120a	0.207b	0.213b	0.220b
	67	0.145b	0.208b	0.174a	0.172a
	134	0.180c	0.174a	0.236c	0.174a
	268	0.212d	0.214b	0.259d	0.218b
80	0	0.186a	0.207a	0.312a	0.257a
	67	0.197a	0.256a	0.316a	0.221a
	134	0.225a	0.248a	0.265a	0.259a
	268	0.213a	0.254a	0.259a	0.237a
110	0	0.317a	1.10a	1.24a	0.986a
	67	0.412b	1.17b	1.20a	1.07b
	134	0.573c	1.14ab	1.26a	1.10b
	268	0.747d	1.15b	1.25b	1.07b

⁺Chlorophyll a was measured at 665 nm.

Means within a column followed by unlike letters are significantly different at the 5% level as determined by Duncan's multiple range test.

Table 2. Effect of N Application on Peanut Leaf Chlorophyll b⁺

Days After Planting	Applied N kg/ha	Peanut line or cultivar			
		Non-nod	PI262090	UF487A-	Florunner
Absorbance					
45	0	.053a	.077b	.082c	.092c
	67	.064b	.081c	.074b	.075a
	134	.079c	.070a	.060a	.084b
	268	.075c	.073a	.086d	.088b
80	0	.072 a	.110 a	.099a	.092a
	67	.070 a	.087 a	.119 a	.076 a
	134	.082 a	.102 a	.102 a	.084 a
	268	.075 a	.111 a	.093 a	.094 a
110	0	.126a	.390a	.447a	.366a
	67	.161b	.410b	.437a	.393c
	134	.220c	.420b	.461b	.382b
	268	.279d	.422b	.452b	.383b

⁺Chlorophyll b was measured at 645 nm.

Means within a column followed by unlike letters are significantly different at the 5% level as determined by Duncan's multiple range test.

Table 3. Effect of N Application on Peanut Leaf Soluble Carbohydrates

Days After Planting	Applied N kg/ha	Peanut line or cultivar			
		Non-nod	PI262090	UF487A-	Florunner
Percent of dry wt.					
45	0	4.20a	5.15a	4.33ab	5.09a
	67	5.00ab	5.88a	4.29ab	4.77a
	134	5.63b	5.13a	4.03a	5.33a
	268	5.69b	5.67a	5.20b	4.75a
80	0	3.55a	4.49 a	3.63a	3.90a
	67	4.01a	3.57 a	3.85a	4.44 a
	134	3.75a	4.73 a	4.03a	4.46a
	268	3.71a	3.85 a	3.68a	4.50a
110	0	4.09a	4.78 a	3.82 a	5.24 a
	67	3.46 a	4.93 a	4.73 a	4.97 a
	134	3.96 a	3.75 a	4.53 a	4.96 a
	268	3.93 a	4.47 a	4.36 a	4.59 a

Means within a column followed by unlike letters are significantly different at the 5% level as determined by Duncan's multiple range test.

Table 4. Effect on N Application on Peanut Leaf Nitrogen

Days After Planting	Applied N kg/ha	Peanut line or cultivar			
		Non-nod	PI262090	UF487A-	Florunner
Percent N					
45	0	4.51a	5.49a	5.47a	5.07a
	67	4.80a	5.53a	5.93a	5.35a
	134	5.33a	5.66a	5.43a	5.33a
	268	5.37a	5.66a	6.70a	5.74a
80	0	3.35a	4.85a	5.42a	4.88a
	67	3.64a	4.77a	5.60a	4.98a
	134	4.49a	4.88a	5.23a	5.00a
	268	4.94a	4.94a	5.34a	4.94a
110	0	1.73a	4.26a	4.41a	4.19a
	67	2.13b	4.40a	4.48a	4.35a
	134	2.84c	4.25a	4.49a	4.29a
	268	3.04c	4.49a	4.92a	4.44a

Means within a column followed by unlike letters are significantly different at the 5% level as determined by Duncan's multiple range test.

Table 5. Effect of N Application on Peanut Leaf Amino Acids (Total)

Amino Acids	Applied N	Peanut line or cultivar			
	kg/ha	Non-nod	PI262090	UF487A-	Florunner
		Percent of total amino acids			
Serine	0	4.13a	4.25b	5.03b	4.52b
	67	5.21c	5.19c	4.70a	4.55b
	134	4.43c	3.98a	6.45c	4.45b
	268	4.99c	4.12ab	4.46a	3.77a
Methionine	0	0.56a	0.82a	0.53a	0.85b
	67	0.64b	0.82a	0.64b	0.85b
	134	0.64b	0.85a	0.84c	0.78a
	268	0.65b	0.87a	1.01d	0.88b

Means within a column followed by unlike letters are significantly different at the 5% level as determined by Duncan's multiple range test.

GENERAL SESSION

Peanut Research in Asia and Africa. R. W. Gibbons, International Crops Research Institute for the Semi-Arid Tropics, ICRISAT Patancheru P.O., Andhra Pradesh 502324, India.

Peanut research in Asia and Africa has often been fragmentary and hampered by lack of continuity, trained personnel and adequate funding. India has the largest research program in Asia and it is coordinated through a national directorate. In Africa several countries including Senegal, Nigeria, Sudan, Zimbabwe and Malawi have long histories of peanut research. All developing countries in Asia and Africa face serious constraints to peanut production and the most important limiting factors are drought, pests and diseases. However, at a national level, these constraints have been little researched or overcome to date. During the last decade several international and regional peanut research programs have been initiated to overcome major yield-limiting factors and these are described and discussed.

Subject Matter Area:

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Peanut Breeding in China, 1982. Ray O. Hammons*, ARS-USDA, Bx 748, Tifton, GA 31793.

Peanut (Arachis hypogaea L.) is one of the most important crops in China with 15-20% of world production. The Institute of Oil Crops, the Shandong Peanut Research Inst., and the Guangdong Acad. Agric. Sciences have the major role in applied (70%) and basic (30%) research. For more than 3 centuries Chinese peasants selected peanut for adaptation, disease resistance, and ability to produce despite adverse weather and poor soil fertility. Germplasm resources now consist of 1776 Chinese and 601 exotic A. hypogaea and 26 Arachis sp. accessions. Conventional hybridization, including backcross, single-seed-descent and winter increase, has produced numerous new cultivars as production shifted to early-maturing spanish double-cropped behind wheat or rice. Cultivars with moderate resistance to bacterial wilt and leafspot are in production, and cv. Zheng zhou 7432, which combines the reproductive prolificacy of spanish with fruit size of virginia, was released in 1982.

Peanut Diseases in China - 1982. D. Morris Porter. ARS, United States Department of Agriculture, Tidewater Research Center, Suffolk, VA 23437.

Peanuts (Arachis hypogaea L.) in China, the world's second largest producer, are plagued by both foliar and soilborne pathogens. Diseases caused by fungi, viruses, nematodes and a bacterium are commonplace. Leafspot diseases (Cercospora arachidicola and Cercosporidium personatum) have long caused serious damage throughout China. Losses due to leafspot range from 10 to 20% annually. Diseases such as rust (Puccinia arachidis) and bacterial wilt (Pseudomonas solanacearum) have only recently become serious. Losses due to rust and bacterial wilt often exceed 50% at some locations. In some provinces Aspergillus crown rot (Aspergillus niger) and diplodia collar rot (Diplodia gossypina) are serious. Rootknot nematodes (Meloidogyne arenaria and M. hapla) are widely distributed throughout China. Viruses including mottle, mosaic, rosette and other unidentified viruses are widespread. Other diseases often found include stem rot, fusarium root rot, pod rot, botrytis blight, web blotch, scorch, sclerotinia blight and numerous foliar fungi. Aflatoxin contamination is minimized by drying seed down to moisture contents of 6 to 8% before storing. Management strategies in China include cultural practices (crop rotations, time of planting, proper drainage, proper fertilization, etc.), resistant varieties and limited use of pesticides.

Subject Matter Area

1. See remarks by R. O. Hammons concerning back to back presentations of his paper and this one.
2. Plant Pathology

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BREEDING AND GENETICS

Flavonoid Analyses of Colored Testa Peanuts. D. J. Daigle*, W. D. Branch, and R. L. Ory, Southern Regional Research Center, ARS-USDA, P. O. Box 19687, New Orleans, LA 70179.

The defatted flours of 57 colored testa (tan, pink and red) peanut (Arachis hypogaea L.) genotypes were analyzed for flavonoids. After separation from methanolic extracts of the 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 show differences among the genotypes, especially those with a red testa.

Subject: Breeding and Genetics
Processing and Utilization

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Genetic Study of Peanut Photosynthesis. W. D. Branch* and J. E. Pallas, Jr., Univ. of Georgia, Coastal Plain Expt. Stn., Tifton and USDA-ARS, Southern Piedmont Conservation Res. Center, Watkinsville, GA.

Three parental peanut (Arachis hypogaea L.) lines were crossed in a complete diallel design to study the genetics of photosynthesis. Parents chosen with regard to genotypic rates were NC 4 (high), Spanhoma (medium), and Chico (low). CO₂ measurements were conducted under controlled environmental conditions inside growth chambers. Youngest fully expanded leaves of 3- to 4-week-old plants were placed into semi-closed compensating systems to determine net photosynthesis. Significant differences were detected among parents and crosses. All F₁ rates equalled or exceeded the high parent for each cross. Reciprocal differences were also found between the Chico x Spanhoma and Spanhoma x NC 4 cross combinations. The results obtained from this experiment indicates that dominance plays a key role in the inheritance of peanut photosynthesis using such test regimes.

Mass Selection for Yield Among F₂ Progenies of Intra- and Intersubspecific Crosses in Peanuts. R. N. Holley* and J. C. Wynne, Crop Science Dept., North Carolina State Univ., Raleigh, NC 27650.

The effectiveness of mass selection for yield among F₂ plants for five crosses of exotic germplasm with a locally adapted cultivar was investigated as a method to aid in broadening the genetic base of peanuts (*Arachis hypogaea* L.). High and low yielding F₂ plants were selected from each cross using stratified mass selection. The selected F₂ families were evaluated in F₄ generation yield tests at two locations in North Carolina. Mass selection for yield was effective in three of the five crosses. However, the effectiveness of selection was not reflective of the level of diversity represented by the cross. The relatively low cost of this method of screening exotic germplasm justifies further study of when it will be most effective.

Subject Matter Area: 1) Genetics and Breeding

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Parent-Offspring Regression Estimates of Heritability for Four Crosses of Virginia-Type Peanuts. C. C. Green,* N. Alwi, and J. C. Wynne, Crop Science Dept., North Carolina State Univ., Raleigh, NC 27650.

Narrow-sense estimates of heritability (h^2) are useful to breeders in predicting expected response to selection. Most heritability estimates in peanuts have been broad-sense or repeatability estimates. These estimates overpredict the expected response to selection. To determine estimates of h^2 for the F_2 generation of four crosses of virginia-type peanuts, F_3 plot means for yield/plant, fruit length, fruit weight, seed weight and meat content were regressed on F_2 plant means for each cross. Heritability was estimated as $h^2 = 2/3 b$ where b is the coefficient of regression between F_2 plant and F_3 plot mean. Estimates of h^2 for yield for the four crosses ranged from $-.042$ to $.091$ and were not significantly different from zero. Estimates of h^2 for fruit length ($.024$ -. $.317$), fruit weight ($.124$ -. $.446$), seed weight ($.164$ -. $.273$) and meat content ($.081$ -. $.286$) were generally significant. These data suggest that selection for yield in these crosses would not be effective in the F_2 generation, whereas selection for the remaining traits should be effective.

Subject Matter: Genetics and Breeding

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End-of-Row Effects on Plot Yield Comparisons Among Peanut Cultivars. O. D. Smith*, C. E. Simpson, E. R. Howard, and J. E. Davis, Jr., Texas A&M Univ., Dept. of Soil and Crop Sciences, College Station, TX 77843 and Stephenville Research and Extension Center, Stephenville, TX 76401.

Peanut genotypes are frequently compared for yield potential in Texas on the basis of replicated two-row plots 4.57 m in length. Extra length rows are planted and trimmed to the designated length after emergence. Early row length adjustment increases labor efficiency but causes concern regarding potential misclassifications because of possible differences among cultivars in end-of-row border effects. Yield measures were made on two sequential row sections of 46 cm each beginning at the ends of the rows, and compared on a square meter basis with yields from the center row section and the total planted plot as a whole. Data were collected on two cultivars each of the spanish, runner, and virginia market types from an irrigated and a nonirrigated, replicated yield test at each of two locations for 2 years. Significant end-of-row effects were observed for all cultivars with the greater effect being on virginia and runner cultivars in non-irrigated tests. Row section x location, irrigation, and market type interactions for yield were significant ($P=.0001$) but the cultivar within market type x row section interaction was not significant ($P=.05$) when averaged over tests. End-of-row effects on selection for yield under the varied test conditions will be discussed.

Early Attempts at Embryo Culture in Peanuts. D. J. Banks, USDA-ARS, Agronomy Dept., Oklahoma State Univ., Stillwater, OK 74078. (For paper see page 39.)

During 1968-1969, a series of embryo culture studies were conducted using normal developing Arachis hypogaea L. pegs, ovules, and embryos. The objective was to develop basic techniques to rescue potentially abortive hybrid embryos from crosses of certain cultivated by wild species genotypes. The culture media employed were those of Hoagland and Arnon (1938), Randolph and Cox (1945), White (1963), and Nitsch and Nitsch (1969). The media were sometimes supplemented with various additives including 2,4-D, casein hydrolysate, kinetin, indole-acetic acid, ethyrel, coconut milk, tomato juice, and orange juice. Although many of the cultures failed because of fungal contamination, some successes were achieved and a few plants resulting from the cultures were grown to maturity in the greenhouse. The best results were obtained with Randolph and Cox medium, supplemented with coconut milk when embryos showing differentiated cotyledons were cultured.

ABSTRACT

Germplasm for Use in Genetic Enhancement of Peanut Genotypes. A. C. Mixon*, R. O. Hammons, USDA-ARS, and W. D. Branch, University of Georgia, Coastal Plain Station, Tifton, Georgia 31793. (For paper see page 15.)

Peanut germplasm are given that are known to have resistance or immunity to leaf, pod, root, seed and stem infection or colonization by pathogenic (bacterial, fungal, nematocidal or viral) organisms, aflatoxin contamination, drought and other environmental stresses, and insect damage. Also, other germplasm are given which have beneficial chemical, physiological (including photosynthetic efficiency), and structural characteristics for use in peanut genotype enhancement. Scientific evidence and sources of these germplasm are presented.

Relative Value of Certain Plant Introductions as Parents in Leafspot Resistance Breeding. D. W. Gorbet*, F. M. Shokes, and A. J. Norden, University of Florida, Agricultural Research Center, Marianna, Florida, Agricultural Research and Education Center, Quincy, Florida, and Department of Agronomy, Gainesville, Florida.

Eight peanut (Arachis hypogaea L.) plant introductions (PIs) were used as parents with certain cultivars and breeding lines to improve leafspot (Cercospora arachidicola Hori and Cercosporidium personatum (Berk. and Curt.) Deighton) resistances in 1972-74. Selection of progenies in the F₂-F₈ generations were made in the field under unsprayed (no fungicide) conditions. Resulting breeding lines were subsequently evaluated in replicated field tests with no fungicide. Progeny from PI 203396 produced the greatest number of year-entries at 127, the highest mean pod yield at 3790 kg/ha, and the best average leafspot resistance. PI 145681 progeny had the highest average 100-seed weight at 69 g. Progeny from PI 121067 and 259785 produced the highest average shelling percent at 78%.

Progeny from 'Florunner' and PI 203396 produced the highest mean pod yields at 3812 kg/ha and ranged from 2602 to 5011 kg/ha. Although Florunner had a mean pod yield of 1914 kg/ha and a mean disease rating of 9.0, progeny from PI 121067 x Florunner had the least leafspot of the Florunner crosses, with a mean rating of 4.7 on a 1-10 scale (with 1.0 being no disease). Selections from PI 203396 x F427B- were among the most resistant to leafspot with a mean rating of 3.7.

Inheritance of Rust Resistance in Peanuts. D. A. Knaft* and A. J. Norden,
Dept. of Agronomy, Univ. of Florida, Gainesville, FL 32611.

Three peanut (Arachis hypogaea L.) lines, PIs 314817, 315608, and 350680, reported in the literature to be resistant to peanut rust (Puccinia arachidis Speg.) were crossed with a susceptible sister line of Florunner, UF439-16-10-3. Segregating generations and parental lines were exposed to natural populations of rust in Vero Beach, Florida, where disease levels are severe enough to kill Florunner plants each year. The F_2 and F_3 populations were grown for two and one years, respectively. Data from the two generations suggest duplicate recessive gene action for inheritance of rust resistance. Data fit a chi square test for an F_2 ratio of 15 susceptible: 1 resistant, and F_3 data from susceptible F_2 plants fit a ratio of 7 non-segregating lines to 8 segregating lines. PI 315608 showed a low level of rust resistance and was ineffective in conferring rust resistance to its progeny.

Subject Matter Area:

1. Breeding and Genetics
2. Plant Pathology

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Disease Resistance and Agronomic Characters of Wild Species Derivatives. J. P. Moss* and A. K. Singh, ICRISAT, Patancheru P.O., 502 324 A.P., India.

Plants resistant to peanut rust (caused by Puccinia arachidis) and/or late leafspot (caused by Cercosporidium personatum) were selected from among progenies of hybrids involving Arachis hypogaea and wild species received at ICRISAT from North Carolina State University.

Selections were grown in progeny rows and further selections made for disease resistance, earliness, growth habit, productivity and uniformity. Fifty-two uniform tetraploid lines were grown in a replicated trial in rainy season 1982 at ICRISAT, where both rust and leafspot were prevalent, and 33 selected lines at Bhavanisagar, where late leafspot was the major disease.

In addition to resistance to disease, selected lines had greater pod yield than local cultivars and haulm yields were consistently greater.

Introgression Of Leafspot Resistance Into Arachis Hypogaea L.

C.E. Simpson*, D.H. Smith, W.H. Higgins, Jr., K.E. Woodard, and D.L. Higgins.
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Introgression of leafspot resistance into cultivated peanut (Arachis hypogaea L.) has world-wide interest. In our studies, three pathways were attempted: (1) A. hypogaea X A. cardenasii Krap. et Greg. nom. nud. followed by chromosome doubling to 6x level, backcrossing to pentaploid and lower, and selection for fertility; (2) A. cardenasii X A. chacoensis Krap. et Greg. nom. nud. was chromosome doubled to tetraploid ($4x=40$) and crossed to A. hypogaea; (3) A. cardenasii X A. chacoensis F_1 hybrid was crossed onto A. batizocoi Krap. et Greg., the three species hybrid ($2n=20$) chromosome number was doubled and crossed with A. hypogaea (cv. 'Florunner' and 'Tannut 74'). The tetraploid complex hybrid was then backcrossed two times to A. hypogaea (cv. Florunner and Tannut 74). Methods 1 and 2 were abandoned because of lack of fertility. Progenies from method 3 materials have ranged from 2 to 82 percent male fertile (assessed by pollen stain) and seed set was from 0 to 200 per plant. Materials have segregated for vigor, fertility, and resistance; selections to this point have been based on fertility. Fertile progenies are presently being screened for leafspot resistance.

Subject Matter Area:

1. Breeding and Genetics
2. Pathology

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Introgression of Early Leafspot Resistance from *Arachis cardenasii* to Cultivated Peanuts. H. T. Stalker*, Crop Science Dept., North Carolina State Univ., Raleigh, NC 27650.

The diploid species *Arachis cardenasii* Krap. et Greg. has moderate levels of resistance to early leafspot, *Cercospora arachidicola* Hori. Hybrids between *A. hypogaea* and *A. cardenasii* have been made and fertile 40-chromosome plants obtained. The objectives of this investigation were to determine if *A. hypogaea* x *A. cardenasii* hybrid derivatives with high levels of early leafspot resistance could be selected, and to evaluate the agronomic potential of the hybrid selections. Thirteen hybrids were selected from a large advanced-generation interspecific hybrid population and compared in the field and greenhouse to *A. cardenasii*, four susceptible lines, and 12 resistant lines. Based on the average number of lesions per leaf in 3 years of field tests, four hybrid selections had significantly higher levels of resistance than the best resistant line, PI 109839. A detached leaf study indicated that several hybrid selections also had greatly reduced sporulation as compared to *A. hypogaea*. The yields of the four most resistant hybrid selections ranged between 832 and 1921 kg/ha as compared to 3596 and 3632 kg/ha for NC 6 and Florigiant, respectively. However, a new and valuable source of early leafspot resistance has been found in tetraploid selections originating from interspecific hybrids.

Subject Matter: Breeding and Genetics

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Variations in the Seed Protein Composition Among the Arachis species.
Sheikh M. Basha*, Sunil K. Pancholy, Division of Agricultural Sciences,
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Seed proteins from six different Arachis species were extracted with 2 M NaCl, 10 mM Tris-HCl, pH 8.2 buffer and fractionated into 10 peaks on Sephacryl S-300 column based on their molecular weight. Comparison of gel filtration profiles showed major qualitative and quantitative variations in the protein composition between the wild and cultivated species. For example, the species A. hypogaea contained a large amount (15 to 25%) of protein in peak I while the wild species, A. monticola, A. villusulicarpa, and A. stenosperma contained very little protein in this region. All the Arachis species showed great variation in methionine (0.6 to 1.2%) and cysteine (0.4 to 1.3%) contents. Following two-dimensional gel electrophoresis, the methionine-rich proteins normally resolve into six polypeptides having different pI's and molecular weights. In all the six cultivars examined, the methionine-rich protein fraction was composed of six polypeptides with similar protein content. However, the species, A. batizogaea and A. monticola, A. villusulicarpa and A. Chacoense, and A. stenosperma contained 6, 2 and 3 polypeptides, respectively. In addition to differences in the number of the polypeptides, there were also differences in their quantity and quality. The wild species also showed variations in the subunit composition and pI's of arachin.

Subject Matter Area: Breeding and Genetics
 Processing and Utilization

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PRODUCTION TECHNOLOGY, MYCOTOXINS

Field Performance of Atesta (Bald) vs. Intact Peanut Seed. D. K. Bell* and R. D. Hankinson, University of Georgia Agricultural Experiment Stations, Coastal Plain Station, Tifton, Georgia 31793.

One row of bald and one of intact seed from the same lot were planted on the same bed. Plots were 0.9 x 7.6 m with ca. 83,220 Florunner seed/ha (ca. 33% normal seeding rate). Twenty-four plots were planted May 12. Stands from bald seed 10 and 20 days after planting were 31.8% and 35.5% less ($P=0.05$) than those from intact seed. At 32 and 62 days after planting, four plots each from bald and intact seed were dug and plants weighed separately. At 32 days, the average weight of the 195 plants from bald seed was 32.3% less than the average weight of the 200 plants from intact seed ($P=0.05$). After 62 days, the average weight of the 254 plants from bald seed weighed 15.3% less than the average weight of the 279 plants from intact seed ($P=0.05$). Sixteen plots each from bald and intact seed were dug 149 days after planting. Yield of plots from bald seed was 20.4% less (1562.2 kg/ha) than yield of plots from intact seed [1963.0 kg/ha ($P=0.05$)]. Sound mature kernels produced by bald and intact seed averaged 72.4% and 73.6%, respectively, and other kernels produced by bald and intact seed averaged 4.3% and 3.8%, respectively. When plant populations from bald and intact seed were statistically adjusted to equal numbers, there was no difference in yield.

SUBJECT MATTER AREA: 1st choice; Production Technology
2nd choice; Plant Pathology.

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Use of the CASAS (Computerized Automated Seed Analysis System) Dynamic Electrical Conductivity Analysis as an Aid for Quick Quality Control Evaluation of Seed Peanuts. R. D. Keys* and R. Margapuram, Department of Crop Science, North Carolina State Univ., Raleigh, NC 27650.

The CASAS (Computerized Automated Seed Analysis System) dynamic electrical conductivity (DEC) analysis was tested for potential use as a quick seed quality control evaluation. Approximately 200 commercial seed peanut lots of the varieties Florigiant, NC 6 and NC 7 harvested in 1980-1982 were analyzed for total ionic efflux by measuring electrical conductivity of 3 x 200 g/rep/lot over a 3-hour period. No differences in varietal DEC were observed. The 1982 lots had a significantly reduced DEC compared to 1980 and 1981 lots. DEC analysis results compared with standard germination test results by 10 percentile increments showed a significant difference in DEC of increments 7, 8, and 9 (70-99% germination) vs. increments of 6 or less (<70% germination).

Subject Matter: Production Technology
Harvesting, Curing, Shelling

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Effect of Row Spacing, Row Orientation, and Gypsum on the Production and Quality of Nonirrigated Florunner Peanuts. J. I. Davidson, Jr.*, P. D. Blankenship, T. H. Sanders, R. J. Cole, and R. A. Htl1, USDA, ARS, National Peanut Research Laboratory, Dawson, GA 31742; R. J. Henning, Cooperative Extension Service, Rural Development Center, Tifton, GA 31793; and W. R. Guerke, Director, Georgia Seed Test Laboratory, Atlanta, GA 30334. (For paper see Page 46.)

CY 1981 and CY 1982 field studies showed that close row spacing, north-south row orientation and land plaster application at blooming provided benefits in the nonirrigated production of Florunner peanuts. Close rows generally provided a larger taproot crop, cooler soil temperatures and slightly higher germination percentages than obtained with wide rows. North-south row orientation provided cooler soil temperatures, higher yields and higher germination percentages than east-west row orientation. Close row spacing and north-south orientation also appear to be effective in conserving soil moisture. An application of land plaster at blooming increased germination by several percentage points and reduced aflatoxin contamination levels by a factor of 2.

Population and Pod Production. C. S. Kvien*, R. J. Henning, J. E. Pallas, and W. D. Branch, Univ. of Georgia, Coastal Plain Experiment Station, Tifton, GA, Georgia Cooperative Extension Service, Tifton, GA, USDA-ARS, Watkinsville, GA, and Univ. of Georgia, Coastal Plain Experiment Station, Tifton, GA.

Spacing effect on single plant pod production was studied during the 1981 (Florunner) and 1982 (20 peanut lines) growing seasons using a wagon wheel experimental design. In this design, rows radiate out from the center of a circle (hub) like the spokes on a wagon wheel. By varying the seed spacing within the row, a tremendous number of row spacing-seeding rate combinations is possible. Most peanut lines exhibited a very accurate method for adjusting pod number to the space each plant occupies even over a wide range of geometric configurations. As plant population decreased from one plant per 500 sq cm to one plant per 5000 sq cm, yield decreased only 35%.

Leaf area index was both population and genotype dependent, with the LAI of UF 80202 averaging 31% greater than Florunner over all population densities. Main stem height of the Florunner variety increased from 63 cm to 28 cm as the growing area per plant increased from 140 sq cm to 4500 sq cm.

Subject Matter: Production Technology

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Yield Response of Ten Peanut Genotypes to Water Management. L. C. Hammond*, J. M. Bennett, K. J. Boote, and A. J. Norden, Depts. of Soil Science and Agronomy, Univ. of Florida, Gainesville, FL 32611.

Three varieties and seven experimental lines of peanuts (*Arachis hypogaea* L.) were grown on Kendrick fine sand (loamy, siliceous, hyperthermic Arenic Paleudult) with and without irrigation during 1980, 1981, and 1982. Irrigation amounts were 14, 21, and 9 cm in the respective seasons. Yield increases due to irrigation were highest in 1980 and least in 1982 (negative in four genotypes). In 1980 only, no gypsum was applied, and this resulted in a marked genotype x water interaction. Yield increases from irrigation were 89 and 23% for virginia and runner types, respectively. Except for the above response, observed genotype differences in wilting did not produce consistent differences in pod yields or in response to irrigation.

Effects of a Growth Regulator on the Market Quality of Virginia-type Peanut Cultivars. R. W. Mozingo* and J. L. Steele, VPI & SU and USDA-ARS, Tidewater Research and Continuing Education Center, Suffolk, Virginia 23437.

The growth regulator, succinic acid 2, 2-dimethyl hydrazide (Kylar), was applied on five virginia-type peanut cultivars in 1980, 1981 and 1982 in Martin County, North Carolina, and Suffolk, Virginia. Treated and untreated peanuts at each location were harvested on two dates each year for market grade, yield and value/ha evaluations on the cultivars: Florigiant, NC 6, NC 7, VA 81B and NC 8C. Yields and values/ha within each cultivar were statistically different across years and locations. Based on yield and value/ha, harvest dates were significantly different for Florigiant, NC 6 and NC 8C. The growth regulator significantly reduced the percentage of fancy pods for all cultivars except VA 81B while significantly increasing the percentage of extra large kernels for all cultivars except NC 8C. The yield and value/ha of Florigiant and NC 6 were significantly increased by the growth regulator. NC 7 yields/ha increased with growth regulator application but were not statistically different; however, the NC 7 values/ha increased significantly. Growth regulator applications on NC 8C and VA 81B affected neither yield nor value/ha. Thus, the growth regulator, Kylar, can be a beneficial peanut production tool; however, the response within cultivars was inconsistent across years and locations.

Subject Matter Area

1. Production Technology
2. Extension Technology

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Peanut (Arachis hypogaea L.) yields and grades between conventional and reduced tillage methods for peanut production were compared in Virginia during 1980, 1981, and 1982. The conventional tillage method consisted of moldboard plowing at least six weeks before planting and two diskings at planting. The reduced tillage method consisted of incorporating preplant herbicides and planting with a tiller-planter or rolling cultivator-planter behind the moldboard plow without disking. In two out of three years, the reduced tillage method resulted in higher yields and higher percentages for grade factors than the conventional method. The average yields for the three years were 3139, 3377, 3495 kg/ha for the conventional, tiller-planter, and rolling cultivator-planter, respectively. The potential exists to conserve energy by reducing field operations and to reduce soil erosion due to high winds in early spring by using reduced tillage in peanut production.

SUBJECT MATTER

Production Technology

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The Role of Field Surveys in Developing Effective Extension Programs for Peanuts in South Carolina. D. T. Gooden*, J. W. Chapin, and C. E. Drye, Edisto Expt. Stn., Clemson Univ., Blackville, SC 29817.

Field surveys were conducted in 1981-82 by a team of extension specialists. The purpose was to determine production trends and define major production problems that keep S.C. peanut yield depressed. The following denote several of the observations that were made: Soil fertility problems were evident with pH outside the desired range in one-half of the fields sampled. Phosphorus and calcium levels were low in several fields. Weeds constituted a yield deterrent in nearly two-thirds of the fields. Major weed species included crabgrass, Florida beggar-weed, croton and nutsedge. Cowpea and broadleaf signalgrass are new problem weeds. Diseases, especially Sclerotium rolfsii and Cylindrocladium black rot were present in many fields. Other problems were observed with leafspot, insects, poor nodulation, poor stand, lack of growth control and poor field selection. Estimated yields correlated well with optimum pH and also with level of weed control. The field survey has proved very useful in helping direct the extension educational program for peanuts in South Carolina.

Groundnut Research on Sandy Soils in the Interior of Suriname. J. F. Wienk, K. E. Neering,* D. Goense, Project LH/UvS 02, CELOS, Paramaribo, Suriname.

In Suriname, groundnut is mainly grown on sandy ridges in the coastal clay belt. Total groundnut acreage has been gradually decreasing as labour is scarce and possibilities for mechanization are limited. South of the coastal belt large areas of low fertility acid sandy-loam soils occur. The potential of these soils for annual crops is being studied. Groundnut is a promising crop. Results are based mainly on the local early maturing spanish-type cultivar, Matjan. No marked improvements have been recorded with introduced cultivars. Except for Ca groundnut has no specific plant nutritional requirements. Lime or gypsum should be supplied. Leafspot and rust diseases can be adequately controlled with fungicides, but yield losses due to these diseases make control measures not economically justified. Erratic rainfall distribution during the growing season normally has no disastrous effects. All field practices can be mechanized. The available USA-manufactured harvesting equipment is designed for runner-type cultivars. Matjan is a bunch type, causing digging losses sometimes as high as 15%. The average yield of 2460 kg/ha obtained in 56 different experiments compares favourably with yields recorded elsewhere in the world. Large-scale groundnut production on the loamy-sand soils in the interior would be possible and deserves further study. The possibility of monocropping should not be excluded thereby.

Subject Matter: Production Technology
Extension Technology

Annual and Perennial Grass Control in Peanuts with Fluazifop-Butyl. J. N. Lunsford,* I.C.I. Americas Inc., Statesboro, Georgia.

Texas panicum control was influenced by the fluazifop-butyl rate, application time, peanut canopy, and cultivation. Rates of 0.25 lb ai/A and higher plus 1% COC provided 93-100% control season long. Applications made between 3-5 weeks after planting provided excellent control. The 3-week post plant application of 0.125 lb ai/A provided good initial control, but allowed reinfestation prior to peanut canopy closure. The rate of 0.25 lb ai/A applied at the same time controlled the initial grass flush and also latent grass reinfestation with soil residual activity. The peanut canopy and cultivation greatly influenced the overall late season control of Texas panicum after increasing control 10-20%. Broadleaf herbicide when tank mixed with fluazifop-butyl showed little influence in overall control of Texas panicum. Control of rhizome Johnsongrass in peanuts was influenced by the fluazifop-butyl rate, peanut canopy, degree of rhizome fragmentation, and broadleaf herbicide tank mixed. Fluazifop-butyl rates of 0.38-0.50 lb ai/A plus 1% COC provided 95-100% control. Tillage which limited rhizome fragmentation reduced control. Tank mix combinations of broadleaf herbicide and fluazifop-butyl showed 5-10% lower control than when fluazifop-butyl was used alone.

Subject: Weed Control
Production Technology

Non-Performance and Carryover Problems Associated with Power-Driven Rotary Tiller Incorporation of Herbicides. C. W. Swann*, Cooperative Extension Service, The University of Georgia, Tifton, Georgia 31793.

Power-driven rotary tillers are used for herbicide incorporation on approximately one-third of Georgia's peanut acreage. In recent years numerous complaints concerning poor herbicide performance and herbicide carryover have been linked with use of this tool for herbicide incorporation. Cooperative on-farm trials conducted by the Georgia Cooperative Extension Service, Eli Lilly and Company, Paulk Manufacturing Company and Kelley Manufacturing Company have established that these problems result largely from movement of treated soil from the bed into the tractor wheel tracks by the soil mixing action of the tiller. Residue analysis of soil established that up to three times the use rate (3X) of benefin may be detected in the wheel tracks with approximately one-half X rates being detected in the crop row area.

The uniformity of horizontal herbicide distribution is improved by either: (a) initial herbicide incorporation with a disc harrow and then following with a power-driven rotary tiller or (b) mounting a soil striking device forward of the spray nozzles which fills the tractor wheel tracks prior to herbicide application and incorporation.

Subject Matter: Weed Control
Production Technology

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Aflatoxin Production By *Aspergillus flavus* and *A. parasiticus* On Visibly Sound Rehydrated Peanut, Corn and Soybean Seed. D. M. Wilson* and D. K. Bell, Plant Pathology Department, Coastal Plain Station, Tifton, Georgia 31793.

Peanut, corn and soybean seed were inoculated with fourteen isolates of *A. flavus* and *A. parasiticus*. The seeds were hand sorted to remove all visibly damaged seed and were fumigated under vacuum with 2.2% methylmercury dicyandimide at 37 C for 48-72 hours. All seed had a minimum of 95% germination and a maximum of 5% residual contamination by bacteria and fungi. Corn and peanut samples (100 g/flask) were remoistened to 28% moisture and inoculated with all isolates; soybeans (100 g/flask) were rehydrated to 25% moisture and inoculated with four *A. flavus* and two *A. parasiticus* isolates. Samples were incubated for nine days at 30 C and analyzed for aflatoxins by TLC. *A. parasiticus* isolates produced B₁, B₂, G₁ and G₂ while *A. flavus* isolates produced B₁ and B₂. Mean B₁ production for twelve isolates was 34 mg/kg in peanuts and 3.6 mg/kg in corn. Two *A. flavus* isolates produced 3.8 to 5.4 mg/kg B₁ on peanuts, and 2.2 mg/kg on corn. Overall the mean B₁, B₂, G₁ and G₂ production was about 10 times higher on peanuts than corn. However, more G₁ was produced on soybeans than B₁. The substrate seems to be the limiting factor in aflatoxin production. The capability of the fungus to produce aflatoxins is influenced by the substrate and peanuts accumulate more aflatoxin than corn or soybeans when they are all inoculated with the same isolates and incubated under similar conditions.

SUBJECT: mycotoxins, storage, plant pathology

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Drought Soil Temperature Range for Aflatoxin Production in Preharvest Peanuts.
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In 1982 Florunner peanuts were grown in experimental plots to evaluate the effect of various drought soil temperatures on aflatoxin production in preharvest peanuts. Drought and soil temperature regulation were initiated 90 days after planting. Mean soil temperatures under the peanut rows in the various treatments were 31.7 C, 29.9 C, 27.7 C, 26.3 C, 24.7 C and 25.6 C (irrigated control). At harvest, no aflatoxin was found in peanuts from the control or 31.7 C plot and concentrations of aflatoxin decreased with decreasing temperature for other drought treatments. At 24.7 C only the other edible size category contained aflatoxin (20 ppb).

Microflora associated with peanuts from each plot were assessed and Aspergillus flavus group fungi were found in peanuts from each plot.

SUBJECT MATTER CHOICE

1. Mycotoxins
2. Plant Pathology

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Comparing the Amount of Aflatoxin Extracted from Raw Peanuts Using AOAC Methods I and II. T. B. Whitaker* and J. W. Dickens, USDA-ARS, North Carolina State University, Raleigh, NC 27650.

Four lots of raw shelled peanuts, naturally contaminated with aflatoxin, were each ground into a paste. Sixty-four 50-g samples were removed from three of the lots and forty 50-g samples were removed from the fourth lot. For each lot, aflatoxin was extracted from half of the samples by the AOAC Method I (CB) and from the remaining half by the AOAC Method II (BF). The four lots averaged 52, 115, 215, and 402 parts per billion (ppb) total aflatoxin when measured by the CB method. On the average across the four lots, the BF method extracted 26, 25, 22 and 18% less aflatoxin B₁, B₂, G₁, and G₂, respectively, than the CB method.

Inoculation and Infection of Peanut Flowers by *Aspergillus flavus*. C. H. Styer*, Department of Agronomy, Coastal Plain Experiment Station, Tifton, GA 31793, R. J. Cole, and R. A. Hill, USDA-S&E-ARS, National Peanut Research Laboratory, Dawson, GA 31742.

Flowering peanuts, *Arachis hypogaea* L. 'Florunner', in pots were placed in a growth chamber with 14h of light, 80-90% humidity, and a temperature of 29C. Freshly opened flowers were inoculated by dusting the stamens and style with a camel's hair brush carrying spores of *A. flavus* from cultures isolated from peanuts.

Flowers were collected in 70% ethanol immediately before and after inoculation and after periods of one to eight days. The styles were removed from the flowers and placed in a mixture of malachite green, acid fuchsin, lactophenol and glycerol.

No spores were observed on styles of uninoculated flowers, whereas styles from inoculated flowers were covered with large numbers of spores. Some germination had taken place 24h post inoculation (PI) but by 48h PI, many spores had germinated and hyphae were observed growing over the surface of the stigma and pollen grains. Some of the hyphae entered the style through the stigma and ramified in the stylar tissue proximal to the stigma, until some hyphae had grown down to the top of the ovary. In some flowers, after as little as two days PI, conidiophores bearing spores were observed on the anthers and distal portions of the filaments, thus providing a secondary source of inoculum. Research is currently being undertaken to determine if the ovary and later, the fruit harbor the fungus.

EXTENSION AND INDUSTRY

Herbicide Evaluation Manager, Software for Small Plot Experiments. F. M. Godley and L. Thompson, Jr., American Agricultural Services, Inc., Cary, North Carolina.

The Herbicide Evaluation Manager is microcomputer software that simplifies the tasks of conducting small plot experiments. It prompts for herbicide, rate, and application method, then generates the randomization and calculates mixing instructions. Plot numbers and mixing instructions may be printed on pressure sensitive labels. Background data prompts and storage (i.e. soil type, rainfall, crop size, etc.) conform to or exceed that generally requested or collected by the pesticide industry. Evaluation data (i.e. yield, weed control ratings, etc.) may be entered at the keyboard or with the aid of a portable data collector (Datamyte 1003, Electro/General Corp., Minnetonka, MN 55343). The system software manages transmission of appropriate data and prompts to the recorder as well as collection and storage of experiment data from the recorder. The report for each experiment includes concisely formatted background data, treatment means, LSD statistics, dependent on an analysis of variance, and CV statistics. An additional reporting facility transmits unsummarized data to other computers.

A Prototype Electronic Data Collection System for IPM Programs in North Carolina. H. M. Linker, K. L. Tyra, North Carolina State University, Raleigh, North Carolina.

A system for electronic data collection of scouting information for IPM programs in North Carolina was developed in 1982. The system was designed to (1) give crop scouts a lightweight, easy-to-use electronic data collection device (EDCD) that could be taken into the field and used to record pest and crop observations and (2) to give IPM Agents a method of quickly transferring and reviewing data summaries to help them in making pest management decisions. Software was developed for an EDCD which allowed easy entry, review, and transfer of data. Microcomputer programs were developed for county computers (TRS-80 Models II or 12) to accept data entered either manually or electronically and construct summary files. Summaries could be reviewed by printing reports or viewing on video screen. An IPM scout using this system takes the EDCD into the field and records pest numbers for each field scouted. When a farm has been completed, the scout reviews the data and writes a report for the grower. The data is then transferred to the county microcomputer via direct connection (RS-232) or phone line. The IPM Agent can then review the data and formulate responses to the pest situation.

PLANT PATHOLOGY

Biological Control of Peanut Leafspot. Harvey Spurr* and Jack Bailey, USDA-ARS and Dept. of Plant Pathology, North Carolina State Univ., Raleigh, NC 27650.

Different species of nonpathogenic bacteria were obtained from foliage, soil and other habitats. These bacterial isolates were tested for antagonistic activity to fungal pathogens which cause foliar disease such as peanut leafspots (Cercospora arachidicola and Cercosporidium personatum). Bacillus thuringiensis and Pseudomonas cepacia were selected and identified for their potential to control foliar pathogens. They completely controlled pathogenic fungi in laboratory tests and provided up to 70% disease control in small-scale field tests. Formulated bacteria sprayed on peanut foliage using a 14-day schedule provided significantly more control than unformulated bacteria. Formulation ingredients such as sugar can increase disease and detergent can decrease disease, thus altering the efficacy of biological control bacteria. Larger scale field tests for peanut leafspot control were made in North Carolina during 1981 and 1982. A formulation of B. thuringiensis gave 74% control of leafspot and a significant increase in peanut yield. These results demonstrate the future potential of this disease control strategy.

Evaluation of Peanut Genotypes for Resistance to Cercospora arachidicola in Field Plots. H. A. Melouk*, D. J. Banks, and M. A. Fanous, USDA-ARS, Depts. of Plant Pathology and Agronomy, Oklahoma State Univ., Stillwater, OK 74078 and Faculty of Agriculture, McGill Univ., Montreal, Quebec, Canada.

Evaluations for early leafspot reactions, caused by C. arachidicola, were conducted on 151 peanut entries representing genotypes of cultivated (A. hypogaea), wild species of Arachis, and hybrids at Perkins, OK in 1981. Plants were grown in single row 3-m plots irrigated weekly (2.5-3.0 cm) and leafspot evaluations were conducted at 115 to 120 days after planting. A subjective scale index of 1 to 5 (low to high response) was used to describe each of the following criteria: (1) amount of leaf necrosis, (2) degree of sporulation of C. arachidicola, and (3) leaf defoliation. A leafspot reaction index (LSRI) for each entry was determined by multiplying leaf necrosis and sporulation indices, where the lowest and highest values of the LSRI were 1 and 25, respectively. The Kruskal-Wallis one-way analysis of variance by ranks and multiple comparison test were used to test the equality of the effects of genotypes on the criteria listed above. The Spearman rank correlation for each pair of criteria was calculated for each genotype. Significant positive correlations were obtained between LSRI and defoliation and amount of leaf necrosis and defoliation for all genotypes. Information obtained from this statistical analysis is useful in evaluating resistance of peanut entries to C. arachidicola in field plots on a yearly basis.

Comparison of Peanut Cultivars for Leafspot Susceptibility, Fungicide Requirements and Yield. M. A. Crawford* and P. A. Backman. Dept. of Botany, Plant Pathology and Microbiology, Alabama Agr. Exp. Sta., Auburn University, AL 36849.

Four peanut cultivars, Florunner, Florigiant, Pronto, and Tifspan were compared under three leafspot management levels (none, moderate and high) for leafspot development, and yields. Florigiant was most resistant while Pronto was most susceptible to leafspot primarily caused by Cercospora personatum. Increasing numbers of fungicide applications always resulted in improved leafspot control, but yields were most responsive to frequent fungicide application in the long-season cultivars (Florunner and Florigiant). Numbers of sprays might be reduced on short-season cultivars, however the increased yield potential of Florunner demanded a high level of leafspot management, or major yield reductions were recorded. Overall, there was no economic advantage for growing a short-season cultivar in order to reduce fungicide applications.

Equations Relating Yield Loss in Florunner Peanuts to Disease Severity of Either Early or Late Leafspot Infections. Paul A. Backman* and M. A. Crawford, Dept. of Botany, Plant Pathology, and Microbiology, Alabama Agr. Exp. Sta., Auburn University, AL 36849.

Levels of peanut leafspot caused by either Cercospora arachidicola or Cercosporidium personatum were adjusted by utilizing fungicide programs of differing effectiveness. Disease levels 2-3 weeks before harvest were related to yield in 1975, 1979, 1981 and 1982. Data averaged over the 4-year study indicated that for florunner peanuts with a yield potential of about 4,400 kg/ha (3925 lbs/Acre), yield was reduced by an average of 57 kg/ha (51 lbs/Acre) for each percent defoliation regardless of the causal organism. Peanuts could tolerate low levels of infection, but all levels of defoliation resulted in yield loss. No difference in loss producing potential (yield loss per unit disease) was detected between the two leafspot fungi. Disease progress on chlorothalonil sprayed and nonsprayed peanuts was also monitored; these data will be presented as a means of predicting probable losses from a leafspot control with time for program modification.

Effects of Adjuvants on Foliar Uptake of Propiconazol and Its Efficacy Against *Cercospora arachidicola* in Peanuts. H. G. Hancock* and J. D. Weete. Depart. of Botany, Plant Pathology, and Microbiology, Ala. Agric. Exp. Stn., Auburn Univ., AL 36849.

Experiments were conducted to determine the effects of several adjuvants on the penetration of [^{14}C]-propiconazol (CGA-64250) into peanut leaflets. Maximum uptake occurred between 8 and 12 h. Application of Penetrator 3, a non-ionic oil-surfactant, in combination with CGA-64250 resulted in a significantly greater initial uptake and higher sustained levels of [^{14}C] in the leaf tissue. In growth-chamber experiments, using mixtures of Penetrator 3 (0.15% v/v) and propiconazol 3.6 EC (74, 99, 124, 148, and 173 g a.i./ha; 140 L/ha), all fungicide treatments significantly reduced the incidence of peanut leafspot on plants inoculated with *Cercospora arachidicola*. A negative linear response of infection to fungicide concentration was observed in plants treated with the fungicide alone. Addition of the adjuvant resulted in a negative, non-linear response of infection to fungicide concentration and an overall 58% reduction in the number of lesions per plant. Symptom development was suppressed with all fungicide treatments; those lesions formed remained small for 14 to 16 days after inoculation. No defoliation of fungicide-treated plants was observed. Untreated plants developed characteristic lesions after 7 to 8 days and were severely defoliated 14 days after inoculation.

Deposition of Chlorothalonil on Peanut Foliage. R. H. Littrell*, F. S. Shokes, and W. A. Rohde, Coastal Plain Stn., Tifton, GA, Agric. Research and Education Cent., Quincy, FL, and SE Watershed-USDA, Tifton, GA 31793.

A controlled droplet applicator (CDA) (spaced 15.74 cm) calibrated to apply 9.4 L of spray/ha was compared with a conventional boom sprayer (CBS) applying 93.2-186.4 L/ha using Bravo 500 at 2X, 1X, .5X, and .25X the recommended amount of chlorothalonil (1247 g a.i./ha). Leaf samples were collected from top, middle, and lower canopy levels immediately before and after treatment on the third and sixth application from a 14-day application interval. Residue analyses were done on a gas chromatograph from leaf extractions using Isooctane. Vertical distribution of deposit was similar for both applicators with decreasing amounts from top to lower canopy. Concentration on the lower leaves appeared to be adequate to stop germination of leaf spot fungi. The CDA appeared to deposit higher concentrations on uppermost leaves than did the CBS; however, the residue remaining just before third or sixth treatments was similar regardless of method of application. Differences in residue concentrations were found from 2X to 1X and no differences were found from .5X to .25X dosage. Residue analysis proved helpful in comparing the efficiency of the two application methods.

Subject Matter: Plant Pathology; Extension Technology

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Controlled Droplet Application Compared to Conventional Boom Sprayer for Control of Peanut Leaf Spot. F. M. Shokes* and R. H. Littrell, Agric. Research and Education Cent., Quincy, FL 32351 and Dept. of Plant Pathology, Coastal Plain Stn., Tifton, GA 31793.

Comparisons of controlled droplet application (CDA) and conventional boom application (CBS) of fungicides were performed at Tifton, Georgia and Marianna, Florida in 1982. Peanuts were irrigated at Tifton, but not at Marianna. Chlorothalonil (Bravo 500) was applied at three dosage levels--2494 g a.i. (2X), 1247 g a.i. (1X), 624 g a.i. (0.5X), and 312 g a.i. (0.25X)--in 9.4 L/ha or 93.5 L/ha with CDA and CBS, respectively. Fungicides were applied six times at 14-day intervals. Disease evaluations were made three times (18 and 30 August and 9 September). Percent necrosis evaluations and percent defoliation were assessed on 3-6 central stems collected from each plot. Spray appliances made no difference in percent defoliation on any sample date, and there were no significant differences in percent necrosis until the third sample date. CBS plots had lower percent necrosis and percent defoliation than CDA plots at that time. Yield was significantly affected by fungicide dosage and location, but was not different for either applicator at Tifton. At Marianna, yields for the 0.5X, 1X, and 2X rates for CDA were not significantly different but a slight yield suppression was noted for the 2X rate. A 3-week drought period (August-September) at Marianna may have interacted with the high dosage with CDA to cause the yield suppression.

Subject Matter: Plant Pathology; Extension Technology

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Virginia's Automated Weather Data Collection Network for Disease Modeling and Forecasting. S. D. Shaffer*, T. Martin, and N. L. Powell, Department of Agronomy, Virginia Tech, Blacksburg, Virginia 24061; and J. L. Steele, USDA-ARS, P. O. Box 7099, Suffolk, Virginia 23437.

The major benefits from the development of a pilot agricultural-environmental monitoring network by NASA and Virginia Tech were the generation of a *Cercospora* leafspot advisory for southeastern Virginia's peanut growers and the accumulation of detailed weather information throughout Virginia for three years. Constrained by the requirement of automated, unattended operation, a system was designed that minimized the complexity of the field equipment and concentrated data processing activity at the more powerful and operator accessible central computer. The field design included distribution of reference signals within the analog processing circuits for constant calibration as well as selective duplication of essential components and software that operates independently of individual component failure to maintain continuity of operation. The network central computer was programmed to collect data from the six field stations, convert it, perform diagnostics, then archive and transfer the results to the university computing facilities. There it became accessible to research and extension services through information retrieval software written for this application. The concepts used are adaptable to new systems integrating the latest commercial equipment. For its operational phase, this project has been transferred to USDA-ARS in Suffolk, Virginia.

1. ABSTRACT

Criteria for Effective Utilization of Peanut Leafspot Advisories in Virginia. P. M. Phipps* and N. L. Powell, Tidewater Research Center, VPI&SU, Suffolk, VA 23437.

On-farm tests were conducted in 1981 and 1982 to identify criteria for improved utility of leafspot advisories in Virginia. Variables included peanut cultivars, fungicides, and spray schedules. Weather data from a computerized station in Suffolk were used to develop advisories by a reported method (Parvin et al. 1974. *Phytopathology* 63:385-388). Fungicide sprays were applied 3 and 2 times according to advisories, and 7 and 6 times according to a 14-day schedule in 1981 and 1982, respectively. NC 6 and NC 7 exhibited moderate leafspot resistance, whereas Florigiant and VA 81B were highly susceptible. Although defoliation was similar, more leafspot occurred in advisory plots than in 14-day schedule plots treated with benomyl (0.28 kg/ha) plus sulfur (3.37 kg/ha). Mean yields for cultivars under advisory and 14-day programs were 4671 and 5011 kg/ha in 1981, and 4025 and 4013 kg/ha in 1982, respectively. Untreated plots had mean yields of 4282 in 1981 and 3467 kg/ha in 1982. Sprays with chlorothalonil (0.31 kg/ha) gave superior leafspot control on Florigiant in comparison to other fungicides (benomyl/sulfur, fentin hydroxide/sulfur, copper hydroxide/sulfur), but no significant differences in yields were apparent. Mean yields for fungicides on the advisory and 14-day schedule averaged 5460 and 5510 kg/ha in 1981, and 4908 and 4716 kg/ha in 1982, respectively.

2. SUBJECT MATTER: Plant Pathology

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Evaluation of the Peanut Leafspot Advisory System in South Carolina. C. E. Drye*,
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Various peanut foliar fungicides were evaluated at Blackville, SC in 1982 in a comparison of timing of spray applications by either a standard calendar (10 to 14 days) approach or the advisory method utilizing a hygrothermograph to determine timing intervals. All fungicides were applied using a CO₂ backpack sprayer with 20 gallons of water per acre. At five grower sites, sprays were applied with grower equipment (ground application). Leafspot disease pressure was very high at Blackville (poor crop rotation) and much lower on grower sites (good crop rotation). Six sprays were applied by calendar and three by advisory at Blackville. At three grower sites, sprays were reduced by one spray using the advisory approach without subsequent yield reductions. In all cases, disease buildup was greater in advisory plots than in calendar spray plots. The advisory approach shows much promise under SC disease pressure conditions and will be evaluated further in 1983 to determine the extent of its role in future extension programs in South Carolina.

1. ABSTRACT

Transmission of Sclerotinia minor by Florunner Peanut Seed. D. F. Wadsworth* and H. A. Melouk, Dept. of Plant Pathology and USDA-ARS, Oklahoma State University, Stillwater, OK 74078.

Florunner peanuts were planted in a field known to be highly infested with Sclerotinia minor. Replicated plots were selected from areas having nearly 100% prevalence of Sclerotinia blight and three methods of harvesting and handling were compared for seed transmission: (1) hand dug, pods hand picked, greenhouse dried, and hand shelled, (2) hand dug, field dried, threshed with small thresher, and hand shelled, (3) machine dug, field dried, threshed with field combine, and machine shelled. In methods (1) and (2), pods were divided into lots of undamaged pods and damaged pods. A random sample of 50 pods was taken from undamaged pods and also damaged pods, disinfested with 0.5% NaOCl for two min, and dried over night. Pods were hand cracked and two seeds placed aseptically in petri plates containing potato-dextrose agar amended with 100 µg/ml of streptomycin sulfate. Plates were incubated in dark at 25±2C for 3-4 weeks. In method (3), machine-shelled seed were disinfested with NaOCl for three min, drained, plated and incubated as above. Seed transmissions of 25.9% and 8.7% were obtained from seeds handled by methods 1 and 2, respectively. Significantly more seed transmission resulted from damaged pods than from undamaged pods. Transmission was reduced to 1.4% by method (3). However, seed from combine-culled pods showed 22.7% transmission.

2. SUBJECT MATTER CHOICE
Plant Pathology

3. REVIEWED BY

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The Influence of Soil Moisture on the Development of Sclerotinia Blight of Peanut.
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Sclerotinia blight (Sclerotinia minor, Jagger) is one of the most serious diseases of peanuts in Virginia. High soil moisture content and duration of canopy leaf wetness are considered to be two important factors which encourage the development of this disease in the peanut field. The objective of this research was to determine the relationship between soil moisture content of several Virginia soils and the development of Sclerotinia blight of peanut during the growing season. The research data were collected from peanut plants grown in microplots located in a peanut field. Results discussed are from data collected during two growing seasons. When soil moisture content was high, plants grown on soils with a history of Sclerotinia blight had a higher disease severity index (DSI) than plants grown on soil from the same field but without a history of Sclerotinia blight. Similar results were obtained from sclerotia populations found in the soils. With low soil moisture content, there was little difference between the soils studied with respect to DSI and sclerotia population.

1. ABSTRACT

Tolerance of Sclerotinia minor to Vinclozolin, Iprodione and Dicloran.
T. B. Brenneman*, P. M. Phipps and R. J. Stipes. Tidewater Research Center,
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Isolates of Sclerotinia minor from five peanut fields were used to determine sensitivity to dicloronitroaniline fungicides in glucose-yeast extract agar. Mean ED₅₀ values for linear extension inhibition of mycelium in vitro were 0.07, 0.11 and 0.91 µg/ml for vinclozolin, iprodione and dicloran, respectively. Thirty-three strains of S. minor were sub-cultured from growth sectors on fungicide-amended media during the tests. Five strains originating on vinclozolin amended media and four strains originating on iprodione amended media were tolerant to these fungicides at 100 µg/ml after repeated transfers on non-amended medium. Preliminary evidence indicates that these nine strains are cross tolerant to all three fungicides, and as pathogenic on peanut as the original field isolates. Surveys of naturally-infected Florigiant peanut in fungicide-treated field plots at three locations in 1982 failed to detect tolerance among 288 isolates. Three applications of vinclozolin at 0.84 kg/ha and iprodione at 1.12 kg/ha suppressed disease incidence by 57 and 20%, respectively, at the location with heavy disease pressure. One spray of dicloran at 3.36 kg/ha followed by two sprays at 2.52 kg/ha suppressed disease incidence by 26%. Yield increases from treatments with vinclozolin, iprodione and dicloran at this location were 1293, 829 and 791 kg/ha, respectively. Untreated plots yielded 3140 kg/ha.

2. SUBJECT MATTER: Plant Pathology

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Occurrence Of *Pythium myriotylum*, *Rhizoctonia solani* and Plant Parasitic Nematodes in Oklahoma Peanut Fields And Their Pathogenicity To Peanut. M. J. Martin*, H. A. Melouk, Dept. of Plant Pathology and USDA-ARS, Oklahoma State Univ., Stillwater, OK 74078.

A survey was conducted to determine the frequency of *Pythium* spp., *Rhizoctonia* spp., and plant-parasitic nematodes in peanut fields of two Oklahoma counties. Fifty 4 acre blocks from 25 fields were sampled from late September to mid November 1982. Species of *Meloidogyne*, *Tylenchorhynchus*, and *Pratylenchus* were detected in 52, 56 and 16% of the fields, respectively. Potentially damaging populations of *Meloidogyne* (>500 larvae/100 cm³ soil) were detected in 5 fields. *Pythium* spp., including *P. myriotylum* and *Rhizoctonia* spp. were detected in 52, 12, and 44% of the fields, respectively. Greenhouse tests with Tamnut 74 and Early Bunch cultivars indicated that Oklahoma isolates of *P. myriotylum* caused stunting, chlorosis, and pod and root rot. Other species of *Pythium* were not pathogenic. Nine of 13 *Rhizoctonia* isolates were *R. solani*. Although all *R. solani* isolates belonged to anastomosing group IV, variation in growth rate, sclerotial-forming ability, and pathogenicity occurred. Binucleate isolates of *Rhizoctonia*-like fungi, in general, were not pathogenic to seedlings, roots, or pods. In conclusion, isolates of *Pythium* spp. and *Rhizoctonia* spp. must be speciated and characterized to determine their pathogenic potential to peanut.

Subject matter area: Plant Pathology

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Assessment of Peanut Yield Losses Caused by *Meloidogyne arenaria*. R. Rodriguez-Kabana*, P. S. King, J. C. Williams, and R. A. Shelby, Dept. of Botany, Plant Pathology, and Microbiology, Agric. Exp. Stn., Auburn Univ., Auburn, AL 36849.

Regression analyses were performed on data from 16 peanut (*Arachis hypogaea*) field experiments to determine the relation between yield and larval numbers of *Meloidogyne arenaria* (Neal) Chitwood. Results indicated that yields were negatively related to larval numbers determined near harvest. Quadratic equations described the relation between the two variables better than the linear models. Results indicated the possibility of significant seasonal influences on the values of regression coefficients. The average yield loss caused by the average number of larvae/100 cm³ soil ranged from 427-539 kg/ha. The equations obtained suggested that yield losses caused by *M. arenaria* occur even on lightly infested soil (<50 larvae/100 cm³ soil) and do not support the view that there is a range of larval population levels for which there is no corresponding yield reductions.

Subject: Nematology or Plant Pathology

Control of *Cylindrocladium* Black Rot with Soil-Injected Fumigants and the Partially Resistant Variety NC 8C. J. E. Bailey, Dept. of Plant Pathology, North Carolina State Univ., Raleigh, NC 27650.

Experiments were conducted in 1982 in two fields with historically severe infestations of *Cylindrocladium* black rot (CBR). Treatments consisted of the CBR-susceptible cultivar 'Florigiant' and the partially resistant cultivar 'NC 8C' with or without several rates of two soil-injected fumigants. The fumigants and rates were: Terr-O-Cide 54-45 @ 1.7, 6.5 and 16.2 liters/hectare (1.1, 4.3 and 10.7 gallons/acre or 28, 112 and 280 cc per 30.5-m row) and Vapam @ 15.2 and 29.7 liters/hectare (10.0 and 19.6 gallons/acre or 260 and 510 cc per 30.5 m row). Fumigants were injected 8 inches deep during bedding operations 12-14 days before planting. A randomized complete block design with four replications was used. Average disease ratings were lower and yields higher for NC 8C than Florigiant; however, this was significantly different only in the most diseased location. Fumigant treatments with NC 8C were as good as, or significantly better than, the same treatments on Florigiant for disease control and yield increase. Vapam @ 15.2 liters/hectare (10 gallons/acre) plus NC 8C had 25X less disease and 2.9X more yield than treated Florigiant (4388 kg/ha vs 1494 kg/ha) when averaged over both locations.

Influence of Calcium Source on Pod Rot, Absorption and Elemental Concentrations in Peanut Fruits. A. S. Csinos*, T. P. Gaines, and M. E. Walker, Dept. of Plant Pathology and Agronomy, Univ. of Georgia, Coastal Plain Expt. Stn., Tifton, GA 31793.

Three rates of CaSO_4 , Ca-Mg-CO_3 , and CaCO_3 applied at early flower were evaluated as a source of Ca for peanut, subsequent Ca absorption, and effect on elemental concentration in peanut pods. Peanuts treated with CaSO_4 had less pod rot, higher grade and yield than Ca-Mg-CO_3 -treated plots. Peanuts treated with CaCO_3 were intermediate in results. Analysis of soil (post-element application) indicated soil pH was lower than the control in CaSO_4 -treated plots and higher in plots treated with Ca-Mg-CO_3 or CaCO_3 . Ca levels in the soil were higher than the control in all Ca-Mg-CO_3 treatments, the two highest CaCO_3 treatments and the highest CaSO_4 treatment. At harvest, only the soil from the two highest rates of Ca-Mg-CO_3 and the highest rate of CaCO_3 had higher Ca levels than the control. Analyses of hulls indicated that total N, P, Mg, and Zn were lower and Ca higher in CaSO_4 treatments than in the control. Ca levels in hulls treated with CaCO_3 and Ca-Mg-CO_3 were not different from the control and other elements were higher or not different from the control. The same general trends were observed for elemental analysis of seed. Hull elements and pod rot were correlated positively with total N and most cations except Ca, which was inversely correlated with pod rot. This general trend was also true for elements in seed.

Subject Matter: Plant Pathology

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Colorimetric Evaluation of Pod Disease Severity. T. E. Boswell*, O. D. Smith, and W. J. Grichar, Texas A&M Univ., Yoakum Plant Disease Res. Stn., Yoakum, TX 77995 and Dept. of Soil & Crop Sciences, College Station, TX 77843.

Pods collected from tests to evaluate chemical and genetic control of soil-borne diseases were rated visually and colorimetrically for pod disease discoloration. The colorimeter, a Gardner XL-865, used a 45 geometric optical system that provided uniform circumferential (360) illumination utilizing fiber optics technology. The relative effectiveness of visual and instrumental evaluation was compared using ANOVA, partial regression, and simple correlation analyses.

Coefficients of correlation for visual and instrumental evaluations ranged from 0.60 to 0.99 when the mean pod discoloration, estimated visually, was 20% or more. The values were lower when the disease incidence was less. Coefficients of variability (C.V.) for the instrument evaluations ranged from 3.4 to 8.1%, whereas the C.V. for visual ratings of the pod samples ranged from 20.7 to 35.0%. The visual and instrumental ratings of one test were highly correlated ($r = 0.80-0.99$) even though the samples had weathered in the field before correlation. Selection for the best and poorest 15% of the lines for pod disease was from 50 to 100% congruent in preliminary tests. These results indicate that objective colorimetric evaluation of pod samples for disease severity in fungicide evaluation and genetic screening tests may be very useful because of rapidity of the test, repeatability of observations, and operation by minimally trained personnel.

Comparison of Three Procedures for Purification of Peanut Mottle Virus (PMV) from *Pisum sativum* cvs. 'Alaska' and 'Little Marvel'. J. L. Sherwood, Dept. of Plant Pathology, Oklahoma State Univ., Stillwater, OK 74078.

Three procedures for purification of PMV from *P. sativum* cvs. 'Alaska' and 'Little Marvel' were compared based on the specific infectivity of the virus. Specific infectivity was based on lesions produced on primary leaves of *Phaseolus vulgaris* cv. 'Topcrop' by a virus suspension with $A_{260} = 2.0$. Three to 4 weeks after inoculation with PMV approximately 500 g of *P. sativum* tissue was subdivided for purification using the three procedures. Based on two purifications, the procedure of Bock (Ann. Appl. Biol. 74:171) yielded 3.9 mg/100 g cv. 'Alaska' tissue and 4.9 mg/100 g cv. 'Marvel' tissue, but preparations were essentially noninfectious. Based on four purifications, the procedure of Paguio and Kuhn (Phytopathology 63:720) yielded 6.4 mg/100 g cv. 'Alaska' tissue and 7.0 mg/100 g cv. 'Marvel' tissue with a specific infectivity of 32 and 28 lesions/half leaf, respectively. Based on four purifications, the procedure of Sanborn and Melouk (Plant Disease, in press) yielded 5.6 mg/100 g cv. 'Alaska' tissue and 7.1 mg/100 g cv. 'Marvel' tissue with a specific infectivity of 78 and 86 lesions/half leaf, respectively. All three procedures yielded similar amounts of virus; however, the procedure of Sanborn and Melouk was the best for retaining infectivity. Modifications of the procedure for increasing virus yield are under investigation.

Subject Matter: Plant Pathology

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Effects of *Bacillus subtilis* Seed Treatment on Peanut Plant Phenologies and Chronic Root Infections. J. T. Turner, Jr.* and P. A. Backman, Dept. of Botany, Plant Pathology, and Microbiology, Agric. Exp. Stn., Auburn Univ., Auburn, AL 36849.

Previous reports have related *Bacillus subtilis* seed treatments (ABG-4000, Abbott Labs; Quantum, Gustafson, Inc.) to increased rates of germination and vigor in peanuts. Subsequent experiments were performed to elucidate the nature of the vigor response. Growth responses in Florunner peanuts were reflected in increased numbers of nodes and increased internode lengths. These plant characteristics were shown to be positively correlated with yields and negatively correlated with chronic root disease caused primarily by *Rhizoctonia* and *Fusarium*. These data indicate that control of chronic fungal infections of peanut roots is a major mechanism by which *B. subtilis* increases yields. A survey of peanut fields in Alabama, Georgia, and Florida showed these diseases to be quite common, especially in early harvested peanuts. Antibiotic positive strains of the bacterium produced yield increases of 12-21%, while antibiotic negative strains produced yields similar to the control (fungicide only). Further, those fields rotated with nonlegumes had lower incidences of root infection than did those in which continuous legumes were grown. These results indicate a possible means of differentiating yield-responsive fields from nonresponsive fields.

Subject: Plant Pathology

Leafspot (Cercospora arachidicola and Cercosporidium personatum) and rust (Puccinia arachidis) are the main factors limiting groundnut (Arachis hypogaea) production at two experimental farms in Suriname. In fungicide trials benomyl and thiophanate-methyl controlled leafspot alone; maneb was mainly effective against rust. Chlorothalonil provided effective control of both leafspot and rust; a mixture of thiophanate-methyl and maneb was less effective. With adequate control of leafspot and rust, yields of up to 5000 kg/ha have been recorded. Without control, yield reductions of over 60% sometimes occur. These diseases cause premature defoliation, necessitating harvesting when most of the leaves have shed, usually ca. 90 days after planting. Pod quality is usually poor as the maturity index is still low at this time. Late maturing varieties cannot be grown without adequate disease control. The local variety Matjan reaches harvest maturity in 105-115 days. Other pathogens such as Sclerotium rolfsii and Aspergillus niger, though present, have not yet become a problem in Suriname. Lesion nematodes (Pratylenchus brachyurus) occasionally cause pod surface discoloration. During an outbreak of Cicadellidae, leafhopper-burn caused a yield reduction of 36%. Plants showed less vigorous growth producing shorter stems and less leaves. Carbofuran application at planting prevented damage. Other insect pests, such as red-necked peanut worm, did not warrant control.

Suspected Volcanic Ash Damage On Peanut Leaves In South Texas. A. M. Schubert*, T. E. Boswell, D. H. Smith, and Vincent Anselmo. TAMU-TAES, Yoakum, TX, and Texas Air Control Board, Austin, TX.

El Chichon, a volcano in southern Mexico, began a series of eruptions on March 29, 1982. On April 8, volcanic ash settled over much of south and south-central Texas. Approximately two weeks later, peanut producers in Frio County began reporting severe leaf damage symptoms on early peanuts. By April 27, the symptoms had been reported throughout the Frio County area. Peanuts which emerged in late March and early April exhibited necrosis in all but the youngest leaves. Damage was most severe in the third fully-expanded leaf and older leaves. Some of the most severely damaged leaves had begun to abscise. The second fully-expanded leaf was sometimes affected, but less severely and often only at the leaflet tips. Damage was found on both Florunner and Starr peanuts and on some other crops and weeds in the area. Similar symptoms were found on early, volunteer peanuts at Yoakum. Peanuts planted later were not affected. New leaves which developed after the fallout were normal, and the plants grew out of the condition with no yield reduction. Symptoms were not pathogenic in origin and were labeled "environmental damage." The observed plant symptoms are believed to have been caused by the volcanic ash fallout.

Subject Matter Area: 1) Plant Nutrition and Physiology; 2) Plant Pathology.

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ENTOMOLOGY, LESSER CORNSTALK BORER SYMPOSIUM

Comparison of In-Furrow Applications and Foliar Sprays of Insecticides for Control of Thrips in On-Farm Peanut Demonstrations. J. R. Weeks, Alabama Coop. Ext. Serv., Wiregrass Expt. Stn., Headland, AL 36345.

On-farm studies were conducted in 1982 at five locations in the Wiregrass area of Alabama to compare in-furrow applications of aldicarb, disulfoton, or carbofuran with foliar sprays of acephate for control of thrips in Florunner peanuts. At 30 days after planting all insecticide-treated peanuts had significantly less damage than untreated peanuts. After 40 days, acephate and aldicarb generally provided the best thrips control, while disulfoton-treated peanuts had increased thrips damage and carbofuran-treated peanuts were generally more severely damaged. However, the thrips control afforded by the insecticide treatments did not produce a significant yield increase at any of the five locations.

Southern Corn Rootworm Control in Peanuts with Granular or Spray Insecticides in Virginia. J. C. Smith*, Tidewater Research and Continuing Education Center, VPI & SU, Suffolk, VA 23437.

Five granular and two spray formulations of recommended insecticides were tested for efficacy in control of southern corn rootworms at six sites in southeastern Virginia. The percentage of injured pods for pooled treatments was highest (16.3%) in the City of Suffolk and lowest (4.2%) in Isle of Wight County. When sites were pooled, the order of greatest insecticidal efficacy was: Furadan 15G > Dyfonate 10G > Lorsban 15G > Thimet 20G > Furadan 4F > Mocap 10G > Lorsban 4E > Untreated. Furadan 15G showed the best efficacy in three tests, whereas Thimet 10G, Dyfonate 10G and Mocap 10G were each superior at one site. Yield data were obtained at four sites and generally did not support efficacy data, as untreated plots produced superior yields at two sites. When grades were also considered, peanuts treated with Thimet 20G had the highest grades at the other two sites. Lorsban 4E treatments produced yields and crop values/acre superior to expectations based on control efficacy.

Subject Matter: Entomology

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Population Ecology: Theory and Practice. J. W. Smith, Jr.*, Dept. of Entomology, Texas A&M Univ., College Station, Texas.

Elasmopalpus lignosellus (Zeller) populations usually occur seasonally at either high densities or very low densities. This insect is a sporadic pest reaching economically damaging numbers when periods of hot, dry weather predominate. Dry soil surfaces, high temperatures and acceptable host plants seem to be the major factors that drive E. lignosellus populations to high densities. Life table analysis shows that E. lignosellus adult densities are predictable from egg recruitment regardless of egg density. These data further corroborate abiotic conditions as the driving force for E. lignosellus population increase.

Lesser Cornstalk Borer: Larval Biology and Behavior. R. E. Lynch, Southern Grain Insects Research Lab, USDA, ARS, Tifton, GA 31793

Lesser cornstalk borer, Elasmopalpus lignosellus (Zeller), larvae are scavengers under adequate moisture conditions. During drought, however, they often damage plants or subterranean plant parts. Recent work by Carrola and Smith has shown that increased soil moisture increases movement of lesser cornstalk borer larvae, thus exposing them more often to parasites, predators, and environmental stress. Research on survival, damage, and preference of lesser cornstalk borer larvae on peanut pods at different stages of development showed that survival and damage was greatest on stage 1-3 pods and that stage 2 and 3 pods were most preferred.

Subject Area Matter: Entomology - Lesser Cornstalk Borer Symposium

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Lesser Cornstalk Borer Adult Biology and Behavior. J. E. Funderburk* and D. C. Herzog, Univ. of Florida, Agric. Research and Education Center, Quincy, FL.

Lesser cornstalk borer studies were begun in 1982 to develop adult-sampling techniques and to determine adult biology in host crops. Sampling methods which showed promise were the Pherocon® 1C pheromone trap and flushing. During early morning hours, male and female adults flew readily when disturbed. Flush samples therefore were taken at dawn on many dates in designated field areas to obtain absolute population estimates of adult males and females. Numbers flushed declined throughout the day, perhaps indicating that as temperatures increased adults dispersed from fields and/or did not display expected flight behavior when disturbed. Captures by pheromone traps placed within flush-sampling areas of each field were significantly correlated with absolute population estimates obtained by dawn flush samples. On most dates, female population estimates were ca. 30% less than male population estimates. Adult biology in host crops was elucidated by results of adult sampling and by age-structure determinations of adult populations. In most crops, several adult flights occurred between crop emergence and harvest. The first flight occurred during the seedling and early reproductive stages of crop growth and consisted of migrant adults. Multiple generations then were possible before crop harvest, and successive flights consisted of adults which emerged primarily from within fields.

Current Management Strategies for the Lesser Cornstalk Borer in Field Crops. Richard C. Berberet*, Dept. of Entomology, Oklahoma State Univ., Stillwater, OK 74078.

The lesser cornstalk borer, Elasmopalpus lignosellus, is a pest of several species of field crops. Among the legume species attacked by this pest, peanuts rank most importantly in terms of value of production which is lost and amount expended in control costs. The economic threshold for the lesser cornstalk borer in peanuts ranges from 5-15% of the plants infested depending upon the stage of crop development and the cultivar being grown. Existing sampling methods are not adequate for accurate detection of populations at these low densities. Additional research is needed to develop improved sampling procedures for decision-making related to insecticide applications. Increased emphases for research must also be placed on breeding for host resistance in peanuts, improved cultural control practices, and augmentation of beneficial organisms to assist in limiting populations of lesser cornstalk borer. An integrated approach for regulating populations of this pest must be developed with insecticide application included as an emergency measure to be employed only when adequate limitation is not provided by alternative controls.

Lesser Cornstalk Borer: Insecticidal Efficacy and Problems Encountered in Control.
L. W. Morgan and M. H. Bass, Department of Entomology, University of Georgia,
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The lesser cornstalk borer, Elasmopalpus lignosellus (Zeller), is a serious problem on several cultivated crops, especially during periods of drought. Factors which favor survival and damage by this insect, i.e. drought and high temperature, do not favor chemical control. During periods of severe drought, larvae move below the soil surface and inadequate moisture is available to move surface applied insecticides down to the target organism. On single stem crops such as corn or sorghum, directed insecticide sprays or granules have proven most effective. However, on spreading crops such as Florunner peanuts, insecticides banded over the row are most effective.

Subject Area Matter: Entomology - Lesser Cornstalk Borer Symposium

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Resistance of Peanuts to the Lesser Cornstalk Borer. W. V. Campbell*, H. T. Stalker and J. C. Wynne. North Carolina State University, Raleigh, N.C. 27650.

Twenty-seven wild Arachis species and 120 cultivated lines of peanuts were evaluated in North Carolina for resistance to the lesser cornstalk borer Elasmopalpus lignosellus (Zeller). Tests were conducted from 1976 to 1981 under natural insect infestations in the field.

Two valencia-type peanuts, PI 269116 and PI 275744, and one spanish-type peanut PI 262000 exhibited moderate resistance to the lesser cornstalk borer. High resistance to peg damage was found among the wild species in five sections of the genus Arachis, especially section Erectoides. Seventy-five percent of the wild species tested had significantly ($P = 0.05$) less damage from the lesser cornstalk borer than the 'Florigiant' standard.

Concepts in Cultural Control for Management of the Lesser Cornstalk Borer.
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Cultural practices and associated environmental parameters influence lesser cornstalk borer (LCB), Elasmopalpus lignosellus (Zeller), population density, behavior and resulting crop damage. LCB larvae feed on at least 60 plant species, including both weeds and cultivated crops, and also on dead organic matter. Severe LCB feeding damage occurs most commonly during periods of dry hot weather. Cultural management tactics which utilize the biological characteristics of the LCB include timely planting, preplanting weed control, sanitation measures, irrigation and conservation tillage. Conservation tillage is a particularly effective LCB management technique for corn and sorghum, and has recently been shown to be agronomically feasible in peanuts.

Subject Matter Area: Entomology - Lesser Cornstalk Borer Symposium

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The Role of Biological Control in Management of the Lesser Cornstalk Borer.
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Several studies have been conducted in the United States for the purpose of identifying biotic factors which limit populations of the lesser cornstalk borer, Elasmopalpus lignosellus, and quantifying effects of these beneficial organisms on population densities. At least 12 species of parasitic insects have been identified as mortality agents of larvae and pupae of the lesser cornstalk borer. Rates of parasitization by any one of these species have seldom exceeded 5% and the entire parasite complex has rarely destroyed over 15% of the host population. Incidence of insect predators such as Geocoris spp. and Therevidae has been reported but effects of predators on population densities of the cornstalk borer are not believed to be great. Pathogenic organisms such as Aspergillus sp. and an entomopox virus also destroy low numbers of host larvae. However, the combined effects of naturally occurring biotic agents are usually of minor importance in regulating lesser cornstalk borer populations. A search for exotic natural enemies will have to concentrate on South American entomophagous insects associated with E. lignosellus or an Old World equivalent.

Subject: Lesser Cornstalk Borer Symposium

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Modeling as an Aid in Lesser Cornstalk Borer Management. T. P. Mack*, Zoology-Entomology Dept., Alabama Agric. Expt. Stn., Auburn Univ., Auburn, AL 36849.

A simulation model for the lesser cornstalk borer/peanut plant interaction is currently in its early stages of development at Auburn University. The primary goal of the model is to aid in predicting and estimating the size of lesser cornstalk borer outbreaks. A systems approach is being utilized for this model. This approach helps organize our current knowledge of this interaction into a coherent unit and directs future research by delineating gaps in our knowledge. Once completed, the model will benefit lesser cornstalk borer research by allowing a researcher to quickly and cheaply simulate field studies that would take years of effort and thousands of dollars.

Extension Programs and Problems in Management of the Lesser Cornstalk Borer. H. Womack* and J. C. French*, Georgia Coop. Ext. Serv., Univ. of Georgia, Tifton, GA 31793 and Alabama Coop. Ext. Serv., Auburn, AL 36849.

The lesser cornstalk borer has been recognized as a pest of peanuts for almost 100 years. In the early 1970's attempts were made to determine economic or treatment thresholds for this pest. Various methods of determining population densities have been used and treatment is currently based on infestation levels found in the field. Treatment thresholds may vary from state to state and even within the same state on dry land versus irrigated peanuts.

In order to improve the management of this insect in peanuts, more information is needed on the biology and behavior of the lesser cornstalk borer. More information is also needed on insecticides, timing of applications, residual activity of insecticides, effects of moisture on the insect and the insecticide, and sampling techniques.

PLANT NUTRITION AND PHYSIOLOGY, QUALITY, HARVESTING AND CURING

The Effect of Inoculation and Nitrogen Fertilizer on Peanut Yields and Grades.
D. Hartzog*, F. Adams, and A. E. Hiltbold, Department of Agronomy and Soils,
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The response of peanuts to inoculation by rhizobium bacteria was evaluated on 13 fields in southeastern Alabama during 1980-1982. These fields had a long history of not being planted to peanuts. Treatments were (1) uninoculated control; (2) granular inoculant applied in-furrow at 3X recommended rate; and (3) NH_4NO_3 at 100 lb N per acre, split between applications at planting and early bloom. The soil was sampled prior to treatment and numbers of rhizobia capable of nodulating peanuts determined by the most probable number (MPN) procedure. Although the soil at six locations contained fewer than 20 rhizobia per gram, no yield responses to applied inoculant were obtained. Vine growth, color, and nitrogen content were unaffected by inoculant. Determination of inoculant viability showed the treatment provided in excess of a million rhizobia per seed and was thus considered a good quality inoculant. Lack of any yield responses to fertilizer nitrogen during the 3-year study indicated nitrogen derived through nodulation and nitrogen fixation by native soil rhizobia was sufficient in the peanut plants.

Subject Matter: Production Technology
Extension Technology

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Growth and N Uptake and Distribution in N-Fertilized Nodulating and Non-Nodulating Peanuts. A. Selamat* and F. P. Gardner, Dept. of Agronomy, Univ. of Florida, Gainesville, FL.

Field and pot experiments on peanut (*Arachis hypogaea* L.) in 1982 showed that there were significant interactions in pod yield between cultivars -M4-2 (non-nodulating) and Florunner and Early Bunch (nodulating), and applied N (0, 60, 120, and 240 kg N/ha). Pod yield of M4-2 increased linearly with increasing N rates, peaking (2.7 t/ha) at 240 kg N/ha. Pod yields of Florunner and Early Bunch generally declined with increasing N rates, peaking at 0 kg N/ha for Florunner (3.5 t/ha) and at 60 kg N/ha for Early Bunch (3.4 t/ha). In the pot experiments employing withdrawal of N during specific fruiting phenophases, the length of withdrawal period (N stress) was more critical than the specific phenophase in affecting growth and pod yield in M4-2. Some N was redistributed from vegetative parts into pods under long N-stress periods (pod initiation to maturity and full pod to maturity). The redistribution was 100% and 40% respectively. No N redistribution appeared to occur in controls and in short N-stress periods. In general, pods competed with vegetative parts for N during long stress periods but did not take N from vegetative parts during periods of short duration.

Subject Matter:

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Response of Nodulating and Non-nodulating Peanuts to Foliar applied Nitrogen.
M. E. Walker*, W. D. Branch, and T. P. Gaines, Univ. of Georgia, Coastal
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Three nodulating cultivars (Florunner, Tifrun and Early Bunch) and three non-nodulating lines (T-2289, T-2378 Ru, and T-2378 Va) of peanut (Arachis hypogaea L.) were grown at Tifton, Georgia on a Lakeland sand for two years (1981-82) to study the response of yield, grade, and nutrient uptake by the leaf and seed to foliar application of nitrogen. Nitrogen treatments consisted of 0, 13.4, 26.9, and 53.8 kg/ha of N derived from urea. The application of N had no significant effect on the yield of nodulating cultivars, except in 1982, when Tifrun showed a significant increase in yield with the highest level of N. All non-nodulating lines showed a significant increase in yield with increased rates of N. Leaf and seed samples taken from the nodulating cultivars, contained a higher level of N than non-nodulating lines, regardless of the N treatment. However, the non-nodulating lines contained a higher level of P, Ca, and Mg than the nodulating cultivars. Foliar application of N to nodulating cultivars had no effect on the quality factors, while some of the non-nodulating lines showed an increase in certain grade factors (Fancy, ELK and Seed Wt.) with the application of foliar N.

Effect of N Application on Peanut Leaf Composition. S. K. Pancholy*, Sheikh M. Basha, Florida A&M University, Tallahassee, FL and D. W. Gorbet, University of Florida, Agricultural Research Center, Marianna, FL (For paper see page 58.)

The effect of N application on peanut leaf composition is reported. 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. The four peanut genotypes, included a non-nodulating line and three normal nodulating genotypes, namely, the commercial cultivar 'Florunner', PI262090 and UF487A-. The later two lines are the parents of the non-nodulating line. Peanut leaf samples were collected at 45, 80, and 110 days after planting, lyophilized, ground, and stored at -20C. The leaf samples were analyzed for chlorophyll a and b, total nitrogen, soluble carbohydrates, α -amino nitrogen, free amino acids and total amino acids. Nitrogen starvation symptoms were evident in non-nodulating peanut plants at all three sampling dates. Only in non-nodulating line, the application of N resulted in increased total N (20 to 75%), chlorophyll a (15 to 95%), chlorophyll b (10 to 100%), soluble carbohydrates (25%, only at 45 days sampling) and α -amino nitrogen (5 to 15%). Lower levels of free basic amino acids and higher levels of free glutamic acid and proline were observed in leaf samples of nodulating as well as non-nodulating lines. Application on N had no significant effect on total amino acids.

Subject Matter Area

1. Plant Nutrition and Physiology
2. Processing and Utilization
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Metal Content of Peanut Foliage when Grown in Heavy Metal Contaminated and Amended Soils. R. K. Howell* and L. P. Rose, Jr., ARS, USDA, Beltsville, MD.

Ten years after high metal digested sludge was entrenced, peanuts inadvertently planted across the treated areas were stunted, chlorotic, and unproductive. Soil was collected from the sites of injury and treated as follows: 0, 6, 18, or 30 g of CaCO_3 /pot in Experiment 1 and contaminated soil mixed thoroughly with uncontaminated soil of the same series and pH to yield 25, 50, 75, or 100% contaminated soil in Experiment 2. Pots 25 cm in dia. contained 4.5 kg soil. Experiments were arranged as a RCB with four replications: 'NC 7' in Experiment 1 and 'NC 7' and 'Tamnut 74' in Experiment 2 were harvested 9 weeks after seeding. Concentrations of P, K, Ca, Mg and B from plants grown in contaminated soil were in the normal range, but concentrations of Mn, Fe, Cu and Zn were 10, 5, 5, and 35X normal, respectively. Mn, Fe and Cu were reduced to normal levels in plant tissues by adding only 6 g CaCO_3 ; Zn required 30 g. Diluting contaminated soil also reduced the heavy metal content of plant tissues; however, Zn was 5X the normal plant level even in the most diluted soil mix. Heavy metal deleterious effects to peanut plants were removed by both soil remedial treatments.

Subject matter area: Peanut Nutrition and Physiology

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Peanut Cultivar Response to Plant Growth Regulators. F. P. Gardner*, Dept. of Agronomy, Univ. of Florida, Gainesville, FL.

The growth response of Florunner and Dixie Runner peanut (Arachis hypogaea) cultivars to gibberillic acid (GA) and daminozide (Kylar) was studied in the greenhouse and field during 1982. GA promoted growth of both cultivars by elongation of stems and, to a lesser extent, of petioles. Kylar retarded vegetative growth of both in a similar manner. Responses to GA and Kylar were independent of dark etiolation, i.e., the dark response was additive to GA and Kylar effects and appears to be mediated by more complex controls. GA at the 100 ppm concentration was nearly as effective as 1000 ppm. Vegetative growth in field plots in response to GA and Kylar treatments was similar to that in greenhouse. However, neither chemical significantly affected yield of nuts, contrary to the hypothesis that Kylar would reduce vegetative growth with resulting at improved partitioning of assimilates to nuts and increase yields of nuts especially in Dixie Runner, whereas the reverse could occur with GA. Field losses were greater than anticipated due to disease and other factors which could have offset the hypothetical yield advantage from Kylar reported by other workers.

Subject Matter: Nutrition and Physiology

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Effect of Maturity and Plant Age on Physical Properties of Pods and Seed. E. Jay Williams*, J. Stanley Drexler, and Craig S. Kvien, USDA-ARS and University of Georgia, Coastal Plain Experiment Station, Tifton, GA 31793.

Size and weight data for individual pods and seed were obtained at selected plant ages and pod maturity classes from six plantings of Florunner peanuts during the years 1978-79. Similar data were obtained in 1982 in a varietal comparison of Florunner, Sunrunner, Sunbelt Runner, GK-7, GK-101A, GK-3, Early Bunch, Pronto, and Starr. Various size and weight parameters were derived and the effects of pod maturity and plant age were observed. Results show pod and seed weights to follow classical sigmoidal growth curves. Pod and seed weights reached a maximum at the beginning of the 'black' mesocarp color maturity class with basal seeds slightly leading the apical seeds in development. Pods reached 90 percent of their maximum size by the end of the 'white' maturity stage with additional size increases resulting from thickening of the pericarp up to the 'black' stage. Increases in seed size were not measurable past the late 'brown' stage. Percent seed reached a maximum in the middle to late 'orange' maturity stage indicating that in a distribution of maturity it is the proportion of 'yellow' maturity stage pods that principally account for grade differences in bulk compositional lots of peanuts. Significant effects of the environment, phenotype, and genetic lines comprising a variety were evidenced by slight differences in size and shape factors with time. This data is the basis for projecting weight gain and grade in predictive modeling.

Progressive Changes During Peanut Fruit Development. H. E. Pattee*, S. C. Mohapatra, and E. K. Agnello, USDA-ARS and Biological and Agric. Engineering Dept., North Carolina State Univ., Raleigh, NC 27650.

Characterization of temporal changes, at various levels of organization, associated with the development of the peanut fruit (and seed) is in progress. The study deals with light microscope (LM) and scanning electron microscope (SEM) observations on early developmental stages. Delineation of the inner and outer integument (future seed coat) was detectable through light microscopy by staining contrasts between the two layers. SEM, however, did not reveal the presence of two layers of integument because of the insensitivity of SEM toward LM staining. However, SEM revealed the ultrastructure and three-dimensional features better. Thus, structural features of connective tissues such as the placenta (which connects the embryo to the integument) and funiculus (which connects the integument to the wall of the ovary, *i.e.*, future hull) were resolved better through SEM than by LM. These and other anatomical features will be discussed with relation to the physiological stages of development and with relation to artifacts that might result from improper specimen preparation.

Subject Matter: Plant Nutrition and
Physiology

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Musty Taste Associated with Droughted Florunner Peanuts. J. E. Pallas, Jr.*, C. T. Young, J. R. Stansell and C. S. Kvien, USDA-ARS, Watkinsville, GA; Food Science Dept., N. C. State Univ., Raleigh, NC and Depts. of Agric. Engineering and Agronomy, Coastal Plain Expt. Stn., Tifton, GA.

Offtaste is of serious consequence in commercial peanuts. Production techniques and storage conditions can influence oftaste. This study was conducted under a controlled rainfall shelter on Tifton loamy sand during the growing season of 1982. Soil water regimes were full season irrigation (140 days) at specified 0.2-bar matric potential to recharge the surface 60 cm as opposed to a 30-day 0.2-bar matric potential (seedling emergence) followed by a 40-day 15-bar regime until midseason after which no irrigation was used. Yield, percentage sound mature kernels, leaf water potential, leaf diffusion resistances, and gas chromatographic profiles of headspace from heated peanuts correlated to sensory evaluation were measured. Fully irrigated plots used 70 cm of water as opposed to 30 cm for the extended midseason droughted plots. Leaf water potentials of -26 bars were recorded during the extended midseason drought treatment compared to -12 bars for the fully irrigated treatments. Average harvestable yields were 6990 kg/ha for full season irrigation and 5992 kg/ha for the extended midseason drought treatment. Musty flavor was found in midseason extended droughted peanuts, but not the fully irrigated peanuts.

Heat Inactivation of Antinutrients in Peanut Seeds. E. M. Ahmed, Food Science and Human Nutrition Dept., Univ. of Florida, Gainesville, FL 32611.

Trypsin inhibitor (TI) activities (%) and lectin (HAG) concentration ($\mu\text{g/g}$) in unheated and heated peanut seeds were chemically established. Inhibition of trypsin solution 0.02 mg/ml and agglutination of type A red blood cells (RBC) were the criteria used to detect the presence of TI and HAG, respectively, in peanut seed crude extracts. Predicting equations were calculated to estimate TI activity (%) and lectin concentration ($\mu\text{g/g}$) in peanut seed extracts.

Dry heat (as used in roasting peanut seeds) diminished the levels of these antinutrients, but moist heat was more effective than dry heat. TI was more easily inactivated by heat treatment of peanut than soybean seeds, but the reverse was true for the heat inactivation of lectin. The levels of these antinutrients varied among some commercial roasted peanut products presumably due to differences in roasting treatments and/or the botanica type of peanut seeds used.

Evaluation of Raw Peanuts Using the SRRC Volatile Profile Procedure. N. V. Lovegren*, A. J. St. Angelo and F. W. Parrish, USDA, ARS, Southern Regional Research Center, P. O. Box 19687, New Orleans, LA 70179.

The SRRC volatile profile procedure was used to determine raw peanut quality. Problem peanuts were divided into several groups by the direct gas chromatographic procedure developed in our laboratory. Normal lipid oxidation (rancidity) was indicated by peaks for pentane, hexanal, and hexanol. Compounds generated by a more complicated oxidation mechanism were indicated by a series of hydrocarbons, substituted benzenes and other volatiles that eluted beyond hexanol. A very large ethanol peak occurred when the peanuts were not dried under proper conditions. Peanuts with serious flavor problems occasionally were found that had profile peaks such as acetic acid, trimethylamine, or those that were much larger than normal sulfur compounds. External contaminants such as hexane and limonene were also identified. Besides using these individual peaks as problem indicators, peanut samples with total volatiles larger than 2 or 3 times the average for acceptable peanuts were successively more suspect. Volatile profiles of the various problem groups will be illustrated. Retention times and identification of the peaks found in volatile profiles and those that may be used for evaluation of peanut quality will be discussed.

Genotype, Soil-Type and Water-Supply Effects on Peanut Quality. J. L. Pearson^{*1}, W. D. Branch², T. H. Sanders¹, and J. L. McMeans¹, ¹USDA, S&E, ARS, National Peanut Research Laboratory, Dawson, GA; ²Department of Agronomy, University of Georgia, Tifton, GA

Three runner genotypes grown in 1981 at Tifton, GA on loamy sand and at Plains, GA on sandy clay loam in a dryland test and in an irrigated test were shelled and evaluated for over 30 parameters of quality after being stored as inshell peanuts at ambient temperature for approximately 9 months. One-way analysis of variance for each factor--quality parameter indicated the following statistically significant (5% or better) differences: Among genotypes -- raw appearance rating, raw color aL and bL, butter color bL, oxygen bomb time, iodine value, optical density of oil, % blanchability, count/100 g, butter pH value, total carbonyls, total oils, free sugars, non-reducing sugars, adhesiveness of butter, hardness of butter, pre-roast oven moisture; between soil types -- after-storage moisture, flavor rating, butter color rating, butter color L, aL, and bL, count/100 g, raw pH value, butter pH value, free sugars, reducing sugars, non-reducing sugars; between water sources -- raw color L and bL and oxygen bomb time.

SUBJECT MATTER CHOICE

1. Processing and Utilization
2. Breeding and Genetics

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Performance of Three Chinese Peanuts Under Irrigated and Nonirrigated Conditions in Virginia. T. A. Coffelt*, F. S. Wright and D. L. Hallock. U.S.D.A., ARS, and Tidewater Research and Continuing Education Center, Suffolk, Virginia 23437.

Three peanut (*Arachis hypogaea* L.) plant introductions (PI) from China (PI 420334, PI 433349, and PI 420335) were evaluated in Virginia in 1981 and 1982 under irrigated and nonirrigated conditions for grade characteristics, yield, and nutrient content of the kernels. VA 81B was included in 1982 as a local check. Four row plots 1.8 m wide x 15.2 m long in 1981 and 6.1 m long in 1982 were used. A randomized complete block design with four replications was used at all four locations. PI 420334 in 1981 and 1982 was higher in % SMK, % Meat, Value/Ha, % Mg, ppm Cu, ppm Zn, ppm Fe, and in 1981 had less Sclerotinia blight than the other Chinese lines. PI 433349 and PI 420335 were similar for all characters studied except ppm Cu for which PI 420335 was higher and ppm Zn and Fe for which PI 433349 was higher. In 1982, VA 81B had a higher yield and % K and a lower ppm Ca, Cu, Zn, Fe, and % Meat than the Chinese lines. The Chinese lines all have a reduced bunch growth habit which would limit their use in the U.S. to production systems with row widths of 0.6 m or less. PI 420334 may serve as a source of resistance to Sclerotinia blight. Irrigated plots were higher in % Mg, ppm Cu, % P, and Sclerotinia blight in 1981. Nonirrigated plots were higher in yield/ha, value/ha, % K, ppm Mn, and ppm Zn.

Subject Matter Area:

1. Breeding & Genetics
2. Production Technology

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In many large peanut shelling plants one or two packaging stations handle the entire output of the plant. Since the output consists of several grades of peanuts, several commercial lots may be packaged during the same period of time by shifting back and forth among the partially completed lots. A control panel at the packaging station enables the operator to designate the grade of peanuts packaged. A Federal-State Inspector takes samples from peanuts going into each lot as they are conveyed to the packaging station. Rapid shifts among lots make it difficult to avoid sample mixing. The inspector must monitor the packaging station constantly and stay in the crowded working area.

An automated sampling system has been developed that will automatically take the proper weight sample from each commercial lot, convey the sample to the grade room, and retain sample identity. The automated sampling system is controlled by the same electronic control panel used to designate the grade of peanuts packaged. This system prevents sample mixing. The inspector must be notified when packaging of a given lot is started or completed, but he is not required to work outside the grade room.

1. ABSTRACT

Headspace Environment in Mechanically and Naturally Ventilated Peanut Storages.
J. S. Smith, Jr.*, J. I. Davidson, Jr., T. H. Sanders, and R. J. Cole, USDA, ARS,
National Peanut Research Laboratory, Dawson, GA.

Two adjacent peanut storages, one mechanically ventilated and one naturally ventilated were instrumented for monitoring headspace air temperatures midway between the peanuts and the roof at 2-hour intervals from mid-October through March. Relative humidity measurements were recorded for each warehouse in the headspace between the peanuts and the ridge.

Data were analyzed at half month intervals for 11 periods. There were no differences between east and west side headspace temperatures or roof surface temperatures in the naturally ventilated storage during any given period. The mechanically ventilated storage had differences in headspace and roof surface temperatures during part of the periods. Headspace and roof surface temperatures were more uniform in the naturally ventilated storage, whereas the east side headspace and roof surface temperatures were lower in the mechanically ventilated storage. Relative humidities were approximately the same throughout the test for both storages except for being higher in the naturally ventilated storage during the first and second periods and lower during the last period. The headspace environment was more uniform in the naturally ventilated storage than in the mechanically ventilated storage.

2. SUBJECT MATTER AREA

First Choice - Harvesting, Curing, and Shelling
Second Choice - Processing and Utilization

3. MAILING ADDRESS

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1. ABSTRACT

Potential for Efficiency Improvement in Conventional Peanut Cleaning. P. D. Blankenship and J. I. Davidson, Jr., USDA, ARS, National Peanut Research Laboratory, Dawson, GA 31742.

An evaluation of a full-scale, conventional peanut cleaning system was conducted to identify separation processes having the greatest potential for improvement. The primary objective of the current cleaning process is to segregate with aspiration all sticks and light foreign material with a minimum amount of peanuts so that the foreign materials can be removed with high efficiency, low capacity equipment. The conventional system, when operating at optimum settings and conditions, provided peanuts with 50 to 500 pieces per 454 kg of farmers stock peanuts. To separate all sticks and light foreign material in the light portion requires two aspiration stages to provide a satisfactory ratio of heavys to lights. One operation would provide only a 30 to 70 ratio of heavys to lights. Laboratory tests indicated that a 30 to 70 ratio of lights to heavys was possible instead of the 70 to 30 ratio with an experimental aspiration system. The current system does not provide independent adjustment of air for the stoner and the aspiration tray. The current thickness separation system was inefficient even at a flow rate of 1.18 t per hour. Laboratory tests indicate that if a sufficient screen area and openings were provided and maintained, the present system should remove more than 90 percent of the sticks. In addition long slotted vibration screens cannot be used with slots wider than 19/64ths inch because of clogging.

2. SUBJECT MATTER AREA

First Choice - Harvesting, Curing, and Shelling
Second Choice - Processing and Utilization

3. MAILING ADDRESS

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Chlorpyrifos-Methyl as a Protectant for In-Shell Peanuts. Leonard M. Redlinger*, H. B. Gillenwater, and R. A. Simonaitis, USDA/ARS, Stored-Product Insects Research and Development Laboratory, Savannah, GA 31403.

A major problem for peanut warehousemen is the widespread and severe resistance to malathion among several species of stored-product insects that infest peanuts. Chlorpyrifos-methyl was tested as a protectant for farmers stock peanuts applied at six dosages ranging from 10 to 50 ppm. Results were compared with malathion-treated peanuts at the standard rate of 52 ppm. Only about one-half as much chlorpyrifos-methyl as malathion was required to protect the peanuts against insect damage. The rate of residue degradation on the peanuts was similar for both chlorpyrifos-methyl and malathion. Chlorpyrifos-methyl residue degradation was faster at low dosages than at the higher rates of application.

Equilibrium Moisture Content of Peanuts. J. L. Steele*, USDA-ARS, Tidewater Research Center, Suffolk, Virginia; J. H. Young, Biological and Agricultural Engineering Department, North Carolina State University, Raleigh, North Carolina; and J. M. Troeger, USDA-ARS, Tifton, Georgia.

The equilibrium moisture content of a hygroscopic material is defined as the moisture content of the material after exposure to a fixed atmospheric environment for an infinite period. Relationships between the equilibrium moisture content of peanut material and relative humidity and temperature of the surrounding air are essential to the design and operation of peanut drying and storage facilities. Six original studies on equilibrium moisture relationships for whole peanut pods, hulls, kernels, and other selected components were reviewed and summarized. The experimental procedures, air conditioning techniques, temperature and relative humidity ranges, varieties, types of material, sample sizes, initial moisture contents and moisture determination procedures varied considerably among the studies. Results, limitations and original contributions of each study were reported. Consolidated results were presented in the form of tables, graphs and equilibrium moisture content equations. Uses and applications of the data were considered extensively in the development of the consolidated results.

Subject Matter: Harvesting, Curing and Shelling or Processing and Utilization

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Comparisons of On-Farm Peanut Drying Systems. P. D. Bloome, D. D. Kletke, J. R. Sholar*, Depts. of Agricultural Engineering, Agricultural Economics and Agronomy, Oklahoma State Univ., Stillwater, OK 74078.

The economic and management characteristics of five on-farm peanut drying systems were compared. Costs were determined as average present value costs per ton using a 15-year planning horizon. The systems compared and their average present values of net, after tax, cash outflows were: high capacity, heated air drying, \$15.18/ton; low temperature, controlled humidity drying, \$20.38/ton; fan-powered, natural air drying, \$17.89/ton; wind-powered, natural air drying in field modules, \$20.09/ton; and sack drying in the field, \$25.95/ton. Costs for the wind-powered, field module systems were reduced to \$16.33/ton by Federal Energy Tax Credits (15%) and further reduced to \$8.80/ton by Oklahoma Energy Tax Credits (30%). Higher tax brackets and lower discount rates also enhanced the relative economic position of the wind-powered system due to its high capital cost. Management comparisons included flexibility, drying capacity with respect to weather conditions, seed quality, risks of mold development and possibilities for multiple use.

Interrupted Airflow and Solar Energy for Peanut Drying. J. M. Troeger, USDA-ARS, SAEC, Coastal Plain Experiment Station, Tifton, GA.

Interrupting the airflow for 15 to 20 min/hour during peanut drying has been shown to effectively reduce energy consumption by 15 to 20% without appreciably increasing the drying time. Experimental drying tests were run using solar-heated air with rock storage and solar-heated water with storage. Using a programmable controller, airflow was interrupted for 15 min/hour. Results were compared with a continuous flow, LP gas-fired conventional dryer.

Two years of data involving 10 drying tests showed an average of 65% savings in LP gas compared with the continuous flow dryer. Results varied greatly among tests because of variable amounts of solar radiation. Metered electricity usage showed a 20% savings for the interrupted airflow dryers. Drying times were not significantly different among the three dryers.

DISCUSSION GROUPS

Extension and Industry Discussion

J. E. Bailey, North Carolina State University, presiding

This session was organized into two parts: a) disease loss estimates, new diseases and new developments from industry, and b) use of electronic data collection and analysis equipment. The following summarizes the information exchanged during the session:

A. Diseases Loss Estimates, New Diseases and New Developments from Industry

1. Extension peanut disease loss estimates report for 1982. R. V. Sturgeon, Jr., Oklahoma State University. The cooperation of the Plant Pathologists and Nematologists from those states reporting is greatly appreciated and acknowledged.

Throughout the United States, diseases continue to be a major limiting factor in producing maximum peanut yields. Peanut disease losses from the eleven states reporting ranged from a low of 10% reported by New Mexico to the highest loss of 26.5% reported by Texas. This amounted to an approximate loss of 392,611 tons reported by ten of the states, and at 27 cents per pound the peanut growers from those reporting states lost over \$212,010,013.

Weather and control practices carried out by growers have an influence on disease incidence and loss. The severity of the diseases is dependent on several environmental factors interacting with one another affecting both pathogen and peanut plant simultaneously. These conditions will vary between infection sites and seldom are they the same each year. Therefore, disease severity varies according to existing conditions.

The disease control programs growers maintain 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 detection and accurate identification of the disease, selection of control practice and proper application. Commercial scouting or growers closely monitoring their peanut fields should reduce disease losses by providing early accurate identification of disease problems.

How much of this 212 million dollar loss that has been reported could have been prevented will never be known, yet we are confident that much of this loss could have been reduced by properly using available disease control practices.

Early and late peanut leafspots, Cercospora arachidicola and Cercosporidium personatum caused the greatest yield losses. Losses of 8.0 to 12.0 percent were reported by Alabama, Florida, and Georgia. Losses caused by

nematodes were reported to have caused the next greatest loss; however, Southern blight, Sclerotium rolfsii reportedly caused almost as much as all kinds of nematodes combined. Pod and root rot disease complex did not seem to cause as extensive damage as in past years. Seedling disease losses were greater in certain states and lower in others; yet, overall loss credited to the seedling disease complex was about the same as recent years. The peanut leafspots, nematodes and southern blight continue to be reported as the major disease problems as in past years. Rhizoctonia limb rot reported by Georgia and Pythium wilt by Virginia are new diseases and their potential should be recognized.

Estimating disease losses is difficult because of the many factors that influence the diseases and yields. However, loss estimates can be reliable when proper techniques are used such as field monitoring programs, disease control trials, crop reporting service, and surveys. Accurate disease loss estimates alert agricultural scientists, stimulate needed research and make the public aware of the existing problems.

There is a tremendous challenge for Extension and Research Plant Pathologist, Nematologists and Industry to reduce disease losses. More effective and economical disease control practices are needed by the peanut growers.

2. New developments from industry, P. C. Kennedy, CIBA-GEIGY.

Dr. Kennedy introduced Drs. D. E. Dougherty and D. J. Sarojak, both of BASF Wyandotte Corporation. Dr. Dougherty discussed the status of POAST, a new post-emergence herbicide for grass control in peanuts. Information was to be submitted to EPA for a Federal label within the month. It was mentioned that Texas had a crisis exemption for POAST in both 1982 and 1983. It was hoped that a label could be obtained in time for the 1984 season.

Dr. Sarojak explained that all information necessary for a Federal label was submitted to EPA for Ronilan as a sclerotinia blight control material. He said that section 18 (specific exemption) petitions had been filed by North Carolina and Virginia for the 1983 season. No decision had been made by EPA on these applications.

Dr. Kennedy reported that all data was submitted to EPA for a Federal label to use Ridomil for pod rot control. He pointed out that Texas and Oklahoma had section 18 exemptions in 1982. Dr. Kennedy hoped that Ridomil would be labeled for the 1984 season.

B. Use of Electronic Data Collection and Analysis Equipment

Dr. J. E. Bailey introduced Dr. H. M. Linker and Mr. F. M. Godley who gave 45 minute presentations outlining principles of computer programs for field data collection and analysis. Demonstrations of the programs were conducted using microcomputer equipment. Abstracts of these presentations are published in the Extension and Industry section of Abstracts.

ESTIMATED PERCENT LOSS OF PEANUT YIELDS IN 1982 AS RESULT OF DISEASE DAMAGE

DISEASE	PATHOGEN	ALA	ARK	FLA	GA	LA	N.C.	N.MEX	OKLA	S.C.	TEX	VA
Seedling blight	<u>Penicillium</u> spp. <u>Pythium</u> spp. <u>Rhizoctonia solani</u> , <u>Fusarium</u> spp, <u>Rhizopus</u> spp, and etc.	T	2.0	2.0	0	3.0	0.5	2.5	1.0	0.5	2.0	T
Crown rot	<u>Aspergillus niger</u>	T	-	T	0	T	0.5	0.02	1.0	0.5	1.25	T
Southern blight	<u>Sclerotium rolfsii</u>	1.0	4.0	2.0	5.0	4.0	2.0	1.5	3.75	4.0	5.0	1.0
Sclerotinia blight	<u>Sclerotinia</u> spp	-	-	0	0	T	0.5	0	1.25	0	T	9.0
Pod and Root Rot Complex	<u>Pythium</u> spp, <u>Rhizoctonia</u> <u>solani</u> , <u>Fusarium</u> spp.	T	2.0	2.0	3.0	2.0	1.0	3.0	3.0	3.0	3.0	1.4
Seg. 3 <u>A. flavus</u>	<u>Aspergillus flavus</u>	T	-	0.36	0.02	0	T	0	0.7	0.5	2.75	T
Black rot	<u>Cylindrocladium crotalariae</u>	0.25	-	0	T	T	8.0	0	0	4.0	0	1.0
Verticillium wilt	<u>Verticillium</u> spp	-	-	0	0	0	T	0.02	1.25	0	0	0.5
Fusarium wilt	<u>Fusarium</u> spp	-	-	0	0	T	0	0	-	0	T	0
Bacterial wilt	<u>Pseudomonas solanacearum</u>	-	-	0	0	0	0	0	-	0	0	0
Early and Late Leafspot	<u>Cercospora arachidicola</u> <u>Cercosporidium personatum</u>	8.0	2.0	10.0	12.0	4.0	5.0	2.0	3.25	2.0	6.0	3.0
Web blotch	<u>Phoma arachidicola</u>	-	0.5	T	0	0	T	0.5	0.75	0	T	0.1
Leaf rust	<u>Puccinia arachidis</u>	T	-	T	0	0	0	0	0	0	0	0
Other leafspot	<u>Alternaria</u> spp <u>Leptosphaerulina crassiasca</u>	-	-	T	0	T	0	0	T	0	0	0
Botrytis blight	<u>Botrytis cinerea</u>	-	-	0	0	0	0	0	0	0	0	0.1
Virus		T	-	0	1.0	3.0	T	0	0	0	T	0
Nematodes	All kinds	3.5	0.5	5.0	2.0	5.0	4.0	0.5	5.0	4.0	6.0	3.0
N. Root knot	<u>Meloidogyne hapla</u>											
S. Root knot	<u>Meloidogyne incognita</u>											
Lesion	<u>Pratylenchus</u> spp											
Sting	<u>Belonolaimus</u> spp - etc.											
Other Diseases				T	3.0 ^{1/}		2.4		0.5			0.9 ^{2/} 0.6 ^{2/}
Total Percent Loss		12.75	11.0	21.36	26.02	21.0	23.9	10.04	20.95	18.5	26.5	19.7

1/ GA-Rhizoctonia Limb Rot

2/ VA-Pythium wilt

Compiled by R. V. Sturgeon, Jr., Extension Plant Pathologist, Oklahoma State University
with cooperation of Plant Pathologists and Nematologists from reporting states.

APRES BOARD OF DIRECTORS MEETING

Radisson Plaza Hotel, Charlotte, North Carolina

12 July 1983

President David Hsi called the meeting to order at 7:30 P.M. The following board members were present: David Hsi, D. H. Smith, J. L. Butler, D. F. Wadsworth, D. L. Ketrang, G. W. Harrison, W. H. Birdsong, and G. Zekert. Other persons attending the meeting were O. D. Smith, M. K. Beute, D. M. Porter, R. A. Taber, P. Blankenship, Bill Dickens, H. E. Pattee, A. Mixon, R. E. Pettit, T. Coffelt, A. M. Schubert, and J. Kirby.

J. L. Butler moved that the minutes of the 1982 board meetings be approved as published on pages 127, 128, and 129 of APRES PROCEEDINGS (Volume 14, 1982).

Fred Cox presented the report of the Program Committee. J. L. Butler moved that the report be accepted. Seconded by D. F. Wadsworth. Motion passed.

J. L. Butler presented the report of the Ad Hoc Committee on Revision of APRES By-Laws and described the proposed revisions. J. L. Butler moved that the changes be accepted and recommended for adoption by the members of APRES at the annual business meeting on 15 July 1983. Seconded by W. H. Birdsong. Motion passed.

Olin Smith, Chairman of the Ad Hoc Committee to study the paid positions of APRES, presented the report. J. L. Butler moved that the report be accepted and the recommendations be implemented based on the financial status of APRES. Seconded by Dallas Wadsworth. Motion passed.

Olin Smith presented the report of the Publications and Editorial Committee. Fred Cox moved that the report be accepted, with the exception of financial aspects which are relevant to the report of the APRES Finance Committee. Seconded by Bill Birdsong. Motion passed.

Marvin Beute presented the report of the Finance Committee. J. L. Butler moved that the proposed budget be accepted. Seconded by Dallas Wadsworth. Motion passed.

J. L. Butler moved that the annual meeting registration fee for students be one third of the fee that is paid by APRES members. Seconded by G. Zekert. Motion passed.

Gerald Harrison moved that an additional three dollars per member be allocated to Peanut Science, beginning in the 1983-1984 fiscal year. Seconded by Fred Cox. Motion passed.

The report of the Site Selection Committee was presented by R. E. Pettit and Mike Schubert. The 1984 meeting will be held in Mobile, Alabama, the 1985 meeting will be held in San Antonio, Texas, and the 1986 meeting will be held in Norfolk, Virginia. Bill Birdsong moved that the report be accepted. Seconded by J. L. Butler. Motion passed.

Morris Porter presented the report of the Public Relations Committee. J. L. Butler moved that the report be accepted. Seconded by Bill Birdsong. Motion passed.

Bill Birdsong moved that the APRES Presidents, Bailey Award recipients, Golden Peanut Research and Education Award recipients, and APRES Fellows be listed in each volume of APRES PROCEEDINGS. Seconded by J. L. Butler. Motion passed.

Ruth Taber presented the report of the Peanut Quality Committee. Fred Cox moved that the report be accepted. Seconded by J. L. Butler. Motion passed.

J. L. Butler presented the report of the APRES Fellows Committee. Bill Birdsong moved that the report be accepted. Seconded by D. L. Ketrings. Motion passed.

The report of the Peanut Quality Committee was given by Paul Blankenship. J. L. Butler moved that the report be accepted. Seconded by Fred Cox. Motion passed.

Perry Russ presented the report of the Golden Peanut Award Advisory Committee. Fred Cox moved that the report be accepted. Seconded by D. L. Ketrings. Motion passed.

The report of the APRES Liaison with the American Society of Agronomy was presented. D. L. Ketrings moved that the report be accepted and that appreciation be extended to Ray Hammons for his service. Seconded by Fred Cox. Motion passed. Olin D. Smith will be the new APRES Liaison with the American Society of Agronomy.

The report of the Secretary-Treasurer was given by D. H. Smith. G. Zekert moved that the report be accepted. Seconded by Bill Birdsong. Motion passed.

J. L. Butler presented the report of the Nominating Committee. D. L. Ketrings moved that the report be accepted. Seconded by Dallas Wadsworth. Motion passed.

Fred Cox presented his report as President-Elect of APRES. J. L. Butler moved that the report be accepted. Seconded by Gerald Harrison. Motion passed.

President David Hsi adjourned the meeting at 11:15 P.M.

Minutes of the Regular Business Meeting of the
AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY
Radisson Plaza Hotel, Charlotte, North Carolina, 15 July 1983.

The meeting was called to order at 7:50 A.M. by President David Hsi.

The invocation was given by Leland Tripp.

James L. Butler, Chairman of the Ad Hoc Committee on Revision of APRES By-Laws, presented the changes that were recommended by the committee, and approved by the APRES Directors. Olin Smith moved that the proposed By-Laws revisions be adopted. Seconded by Ray Hammons. Harold Pattee moved that the motion be amended to delete the words "of the public relations staff" from Article 9, Section 3e. Seconded by O. D. Smith. The amendment was passed and the original motion to adopt the changes was then passed.

The Nominating Committee report was presented by J. L. Butler. Charles Simpson moved that the nominees be accepted. Seconded by Gene Sullivan. Motion passed.

Marvin Beute presented the report of the Finance Committee. Ray Hammons moved that the report be accepted. Seconded by Bill Birdsong.

Olin D. Smith presented the report of the Publications and Editorial Committee.

Morris Porter presented the report of the Public Relations Committee.

A. M. Schubert presented the report of the Site Selection Committee. The 1984 meeting of APRES will be held at the Riverview Plaza Hotel in Mobile, Alabama, from 17-20 July 1984.

John Troeger presented the report of the Peanut Quality Committee.

Ray Hammons presented the report of the APRES liaison representative with the American Society of Agronomy.

Fred Cox presented the report of the Program Committee.

The report of the APRES President was given by David Hsi.

Fred Cox, President-Elect of APRES, presented the names of committee members that will be serving during his term as President.

The meeting was adjourned at 9:02 A.M.

AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY
Financial Statement
July 1, 1982 to June 30, 1983

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	10,933.79
3. Yoakum National Bank, Yoakum, TX	10,401.23
B. Savings Accounts	
1. Wallace K. Bailey Fund, Yoakum, TX	946.18
2. Yoakum National Bank, Yoakum, TX	2,403.97

II. Income

A. Balance, July 1, 1982	15,112.76
B. Membership & Registration (Annual Meeting)	15,831.12
C. Proceedings & Reprint Sales	80.77
D. Special Contributions	3,795.00
E. Peanut Science & Technology	23,049.69
F. Peanut Science Page Charges & Reprints	13,311.33
G. Institutional Membership	1,196.50
H. Differential Postage Assessment-Foreign Members	1,375.24
I. Checking Account Interest	1,119.99
J. Saving Account, Wallace K. Bailey Fund	51.60
K. Ladies Activities	18.00
L. Certificates (Principal & Interest)	887.11
M. APRES Methods Book	357.00
	<hr/>
Total:	\$110,871.28

LIABILITIES & EXPENDITURES

III. Expenditures

1. Proceedings - Printing & Reprints	\$ 4,078.54
2. Annual Meeting - Printing	3,045.25
3. Secretarial	3,000.00
4. Postage	1,123.70
5. Office Supplies	913.84
6. Position Bond for \$5,000.00 (Exec. Sec. Treas.)	-
7. Travel - President	-
8. Travel - Executive Sec. Treas.	-
9. Registration - State of Georgia	5.00
10. Miscellaneous	253.60
11. Peanut Science	14,750.00
12. Peanut Science & Technology	21,243.84
13. Bank Charges	72.17
14. Peanut Research	1,107.58
15. Certificate of Deposit	10,000.00
16. Membership	-
17. Secretary-Self Employment Tax	105.06
18. Legal Fees	85.00
19. Saving Account	-
20. APRES Methods Book	618.00
21. Sales Tax, Texas, North Carolina, & Georgia	266.71
	<hr/>
Total:	\$ 60,713.29

AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY

Financial Statement

July 1, 1982 to June 30, 1983

I. Assets

A. Certificates	\$ 31,335.02
B. Saving Accounts	3,350.15

II. Balance

A. Checking Account - July 1, 1982	15,112.76
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III. Income

B,C,D,E,F,G,H,I,J,K,L,&M-July 1, 1982 to June 30, 1983	16,073.35
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Total:	<u>\$110,871.28</u>
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IV. Liabilities

July 1, 1982 to June 30, 1983	<u>60,713.29</u>
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V. Balance, June 30, 1983

\$ 50,157.99

Total Funds, June 30, 1983

Certificates	\$ 31,335.02
Saving Accounts	3,350.15
Checking Account Balance	15,472.82

Total:	<u>\$ 50,157.99</u>
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PRESIDENT'S REPORT
David C. H. Hsi

It has, indeed, been a real privilege and honor serving as your President this past year.

Since our Society's inception in Atlanta, Georgia, 15 years ago, the sum total of the accomplishments have been truly remarkable. Our members have published numerous articles in professional journals and popular printed media, 5 Journals and 9 proceedings of our annual meetings, 18 issues of Peanut Science, 73 issues of Peanut Research, one issue of APRES methods relating to composition and quality of peanuts, and two monumental books, "The Peanut" in 1972 and "Peanut Science and Technology" in 1983. We have greatly improved peanut yield and quality, ingeniously defatted the peanuts while retaining the flavor and nutritive value, and significantly increased consumer's acceptance of our raw, finished and even alternative products. We have even helped to elect, for the first time ever, a peanut producer and processor, Jimmy Carter, to the highest office of the President of the United States of America.

The growth and development of our society have been vigorous and healthy. We now have about 700 members in 37 countries engaging in all disciplines of peanut science and technology. In 1969, when our Society or Association was first organized, we had 183 members. Five years later in 1973, we counted 360 members. Ten years later in 1978 we registered 540 paid members and now 15 years later, we have grown to a membership of 700 as stated previously. Thanks to the diligent efforts of scientific workers in various countries and thanks to the improved international relations, free exchange of information, knowledge, materials and visits has become possible among all countries and principalities, wherever peanuts are being cultivated, or just growing wild since time memorial. Through such generous reporting and sharing of research findings by peanut workers using every conceivable educational means, our society has truly become a fountainhead for scientific inquiries and a clearinghouse for technological solutions relating to all aspects of peanuts and its industry.

Projecting into future, our Society is facing the kind of challenge as never before. Recent developments in high speed global communication and transportation, electronic information storage and instant retrieval, and cell and tissue culture and molecular biology, are going to assist us in reaching the kind of potential and accomplishment considered impossible only a few decades ago. The Chinese long ago called peanuts the longevity fruit and considered it the fruit of good fortune. With our recent knowledge of peanut oil chemistry and high protein value of its meal, we literally substantiated the life-enriching and life-prolonging qualities of peanuts, discovered by ancient Chinese through observations, trials and errors during their long and durable civilization. Let us, not being selfish, publicize ever more of the virtues of peanuts, encourage more consumptive use of raw and manufactured peanut products, so that we and the generations following us can live longer and thus enjoy more of the delicious, flavorful and nutritious peanuts, wonderful but unpredictable as a legume, but assuredly a fruit of longevity and desirability as predestined by our divine providence.

Now it is my distinct pleasure to turn the prestigious office of President to a distinguished soil scientist with North Carolina State University, Dr. Fred Cox. I know that you will give him your full support and cooperation as you have graciously given me this past year. May God bless Fred and our Society fully, always.

PROGRAM COMMITTEE REPORT

The responsibilities for this committee were divided among three sections: (1) Technical Program, (2) Local Arrangements, and (3) Ladies' Program. The membership of each of these sections is listed on the back of the program. These individuals have contributed enormously to the success of this meeting and deserve our heartfelt thanks.

The specific arrangement of the presentations by the Technical Program section is given in the program. There were 89 presentations, including an introduction on international interests, a symposium on Lesser Cornstalk Borer, and two discussion groups on diseases and electronic equipment. We are grateful for the many quality papers presented and to those who presided over the several sessions.

The Local Arrangements section provided the logistical support for the meeting, not only for the registration, paper presentations, and exhibits, but also for the other activities which included the golf tournament, the Diamond Shamrock reception, the Awards Presentations, the Uniroyal Picnic, and our business meeting. The numerous organizations that contributed toward the success of this meeting are also listed on the back of the program. Each of these organizations is to be acknowledged and given our sincere appreciation.

The Ladies' Program section not only provided information on the area but also arranged tours. These included a luncheon tour of places of interest in Charlotte and a trip to Carowinds. A ladies' hospitality room, poolside, was provided, as well as information on shopping.

Program Committee:

F. R. Cox, Chairman

Local Arrangements:

D. Hogg, Chairman
J. Bailey
L. Hodges
S. Keel
A. Perry
G. Harrison
G. Sullivan

Technical Program:

J. C. Wynne, Chairman
H. Stalker
T. Coffelt
J. Smith
M. Beute
D. Porter
D. Hallock
W. Campbell
C. Young
J. Steele

Ladies' Program:

E. Cox, Chairman
B. Allison
E. Sugg
J. Thomas
D. Wynne

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

Tuesday, July 12

1:00-8:00 APRES Registration - Foyer
Exhibits - Gold Rooms A & B
Ladies' Hospitality - Radisson Parlor 221
Journal and Book Desk - Foyer

COMMITTEE MEETINGS AND DISCUSSION GROUPS

1:30 Peanut Science Editorial Board - H. E. Pattee, presiding
Finance Committee - M. K. Beute, chairman
Nominating Committee - J. L. Butler, chairman
Ad Hoc Committee to Study Office of Secretary-Treasurer
O. Smith, chairman

3:00 Publication and Editorial Committee - O. Smith, chairman
Peanut Quality Committee - R. A. Taber, chairman
Bailey Award Committee - P. Blankenship, chairman
Fellows Committee - J. L. Butler, chairman

4:30 Golden Peanut Award Advisory Committee - J. W. Dickens, chairman
Site Selection Committee - J. E. Mobley, chairman
Public Relations Committee - D. M. Porter, chairman
Peanut Commodity Advisory Committee on Germplasm - J. Wynne, presiding

7:30 Board of Directors - D. Hsi presiding
Peanut CRSP Participants - D. Cummins, presiding
Ad Hoc Committee to Revise By-Laws - J. L. Butler, chairman

Wednesday, July 13

GENERAL SESSION - D. Hsi, presiding

8:30 Invocation. D. Hsi, APRES President

8:40 Welcome to Charlotte. Mayor Eddie Knox.

8:50 Grower Welcome and Introduction of Guest Speaker. N. L. Sugg, North Carolina Peanut Growers' Association

9:00 Current Trends in the World Supply and Demand of Peanuts. Perry Russ, President, National Peanut Council.

9:25 Announcements. F. R. Cox, Program Chairman

9:30 Break

- 10:00 Peanut Research in Asia and Africa. R. W. Gibbons, ICRISAT, Hyderabad, India.
- 10:30 Peanut Breeding in China, 1982. R. O. Hammons, USDA-ARS, Tifton, GA.
- 11:00 Peanut Diseases in China, 1982. D. M. Porter, USDA-ARS, Suffolk, VA.
- 11:30 Lunch

THREE CONCURRENT SESSIONS

1. Session (A) - Breeding and Genetics
2. Session (B) - Production Technology, Mycotoxins
3. Session (C) - Extension and Industry Discussion

SESSION A. BREEDING AND GENETICS

T. A. Coffelt, USDA-ARS, Suffolk, VA and
R. W. Gibbons, ICRISAT, Hyderabad, India, presiding

- 1:00 Flavonoid Analyses of Colored Testa Peanuts. D. J. Daigle*, W. D. Branch and R. L. Ory. USDA-ARS, New Orleans, LA, and Univ. of Georgia, Tifton
- 1:15 Varietal Characteristics of Peanut Plant Related to Oil Production and Composition. B. Mazzani*, N. Rivas, G. Allievi and J. A. Rojo, Centro Nacional de Investigaciones Agropecuarias, Maracay and Fundacion CIEPE. San Felipe, Venezuela.
- 1:30 Genetic Study of Peanut Photosynthesis. W. D. Branch* and J. E. Pallas, Jr., Univ. of Georgia, Tifton, and USDA-ARS, Watkinsville, GA.
- 1:45 Mass Selection for Yield Among F₂ Progenies of Intra- and Intersubspecific Crosses in Peanuts. R. N. Holley* and J. C. Wynne, North Carolina State Univ.
- 2:00 Parent Offspring Regression Estimates of Heritability for Four Crosses of Virginia-Type Peanuts. C. C. Green*, N. Alwi and J. C. Wynne, North Carolina State Univ.
- 2:15 End-of-Row Effects of Plot Yield Comparisons Among Peanut Cultivars. O. D. Smith*, C. E. Simpson, E. R. Howard and J. E. Davis, Jr., Texas A&M Univ.
- 2:30 Early Attempts at Embryo Culture in Peanuts. D. J. Banks, USDA-ARS, Stillwater, OK.
- 2:45 Germplasm for Use in Genetic Enhancement of Peanut Genotypes. A. C. Mixon*, R. O. Hammons and W. D. Branch, USDA-ARS and Univ. of Georgia, Tifton.
- 3:00 Break
- 3:30 Relative Value of Certain Plant Introductions as Parents in Leafspot Resistance Breeding. D. W. Gorbet*, F. M. Shokes and A. J. Norden. Univ. of Florida and USDA-ARS, Quincy, FL.
- 3:45 Inheritance of Rust Resistance in Peanuts. D. A. Knauff* and A. J. Norden, Univ. of Florida.
- 4:00 Disease Resistance and Agronomic Characters of Wild Species Derivatives. J. P. Moss* and A. K. Singh, ICRISAT, Hyderabad, India.
- 4:15 Introgression of Leafspot Resistance into *Arachis hypogaea* L. C. E. Simpson*, D. H. Smith, W. H. Higgins, Jr., K. E. Woodard and D. L. Higgins, Texas A&M Univ.

- 4:30 Introgression of Early Leafspot Resistance from Arachis cardenasii to Cultivated Peanuts. H. T. Stalker, North Carolina State Univ.
- 4:45 Variations in the Seed Protein Composition Among the Arachis Species. Sheikh M. Basha* and Sunil K. Pancholy, Florida A&M Univ.
- 5:00 Board of Directors - Radisson Parlor 421
- 6:00 Reception
- 7:30 APRES Awards Presentation - Gene Sullivan, Presiding
- SESSION B. PRODUCTION TECHNOLOGY, MYCOTOXINS
A. Perry, North Carolina State Univ. and
A. Allison, Virginia Polytechnic Inst., Suffolk.
- 1:00 Field Performance of Atesta (Bald) vs. Intact Peanut Seed. D. K. Bell* and R. D. Hankinson, Univ. of Georgia, Tifton.
- 1:15 Use of the CASAS (Computerized Automated Seed Analysis System) Dynamic Electrical Conductivity Analysis as an Aid for Quick Quality Control Evaluation of Seed Peanuts. R. D. Keys* and R. Margapuram, North Carolina State Univ.
- 1:30 Effect of Row Spacing, Row Orientation and Gypsum on the Production and Quality of Nonirrigated Florunner Peanuts. J. I. Davidson, Jr.*, P. D. Blankenship, T. H. Sanders, R. J. Cole, R. A. Hill, R. J. Henning and W. R. Guerke, USDA-ARS, Dawson, GA, Univ. of Georgia, Tifton and Georgia Seed Test Laboratory, Atlanta, Ga.
- 1:45 Population and Pod Production. C. S. Kvien*, R. J. Henning, J. E. Pallas and W. D. Branch, Univ. of Georgia, Tifton and USDA-ARS, Watkinsville, Ga.
- 2:00 Yield Response of Ten Peanut Genotypes to Water Management. L. C. Hammond*, J. M. Bennet, K. J. Boote and A. J. Norden, Univ. of Florida.
- 2:15 Effects of a Growth Regulator on the Market Quality of Virginia-Type Peanut Cultivars. R. W. Mazingo* and J. L. Steele, Virginia Polytechnic Institute, Suffolk, and USDA-ARS, Suffolk, VA.
- 2:30 Reduced Tillage for Peanut Production. F. S. Wright. USDA-ARS, Suffolk, VA.
- 2:45 The Role of Field Surveys in Developing Effective Extension Programs for Peanuts in South Carolina. D. T. Gooden*, J. W. Chapin and C. E. Drye, Clemson Univ., Blackville, SC.
- 3:00 Break
- 3:15 Groundnut Research on Sandy Soils in the Interior of Suriname. J. F. Wienk, K. E. Neering* and D. Goense, CELOS, Paramaribo-Zuid, Suriname.
- 3:30 Annual and Perennial Grass Control in Peanuts with Fluazifop-Butyl. J. N. Lunsford, I.C.I. Americas, Inc., Statesboro, GA.
- 3:45 Non-performance and Carryover Problems Associated with Power Driven Rotary Tiller Incorporation of Herbicides. C. W. Swann, Univ. of Georgia, Tifton.
- 4:00 Aflatoxin Production by Aspergillus flavus and A. parasiticus on Visibly Sound Rehydrated Peanut, Corn and Soybean Seed. D. M. Wilson* and D. K. Bell, Univ. of Georgia, Tifton.

- 4:15 Drought Soil Temperature Range for Aflatoxin Production in Preharvest Peanuts. T. H. Sanders*, R. J. Cole, P. D. Blankenship and R. A. Hill, USDA-ARS, Dawson, GA and Univ. of Georgia, Tifton.
- 4:30 Comparing the Amount of Aflatoxin Extracted from Raw Peanuts Using AOAC Methods I and II. T. B. Whitaker* and J. W. Dickens, USDA-ARS, Raleigh, NC.
- 4:45 Inoculation and Infection of Peanut Flowers by *Aspergillus flavus*. C. H. Styer*, R. J. Cole, and R. A. Hill, Univ. of Georgia, Tifton, and USDA-ARS, Dawson.
- 5:00 Board of Directors - Radisson Parlor 421
- 6:00 Reception - Diamond Shamrock - Independence Ballroom
- 7:30 APRES Awards Presentation - Gene Sullivan, presiding

SESSION C. EXTENSION AND INDUSTRY, ELECTRONIC DATA COLLECTION AND ANALYSIS EQUIPMENT
J. E. Bailey, North Carolina State Univ., presiding

- 1:00 Disease Loss Estimates, New Diseases and New Developments from Industry.
- 1:30-2:00 A Prototype Electronic Data Collection Method for IPM Programs in North Carolina - Mike Linker, IPM Coordinator, N.C.S.U.
- 2:00-2:30 The Use of the IBM Computer in Peanut Consulting - John Taylor, J & S Plant Consulting, Skipper, Va.
- 2:30-3:00 Herbicide Evaluation Manager: Microcomputer Program for Small Plot Herbicide Research - Mike Godley, American Agricultural Services, Raleigh, N.C.
- 3:00 Break
- 3:30 Use of Electronic Data Collection and Analysis Equipment.
- 5:00 Board of Directors - Radisson Parlor 421
- 6:00 Reception - Diamond Shamrock - Independence Ballroom
- 7:30 APRES Awards Presentation - Gene Sullivan, presiding

Thursday, July 14

THREE CONCURRENT SESSIONS

1. Session (A) - Plant Pathology
2. Session (B) - Entomology, Lesser Cornstalk Borer Symposium
3. Session (C) - Plant Nutrition and Physiology, Quality, Harvesting and Curing

SESSION A. PLANT PATHOLOGY
M. K. Beute, North Carolina State Univ. and
D. M. Porter, USDA-ARS, Suffolk, VA, presiding

- 8:00 Biological Control of Peanut Leafspot. H. Spurr* and J. Bailey, USDA-ARS, Raleigh, and North Carolina State Univ.
- 8:15 Evaluation of Peanut Genotypes for Resistance to *Cercospora arachidicola* in Field Plots. H. A. Melouk*, D. J. Banks and M. A. Fanous, USDA-ARS, Stillwater, OK and McGill Univ., Quebec, Canada.

- 8:30 Comparison of Peanut Cultivars for Leafspot Susceptibility, Fungicide Requirements and Yield. M. A. Crawford* and P. A. Backman, Auburn Univ., AL.
- 8:45 Equations Relating Yield Loss in Florunner Peanuts to Disease Severity of Either Early or Late Leafspot Infections. P. A. Backman* and M. A. Crawford, Auburn Univ., AL.
- 9:00 Effects of Adjuvants on Foliar Uptake of Propiconazol and Its Efficacy Against Cercospora arachidicola in Peanuts. H. G. Hancock* and J. O. Weete, Auburn Univ., AL.
- 9:15 Deposition of Chlorothalonil on Peanut Foliage. R. H. Littrell*, F. M. Shokes and W. A. Rohde, Univ. of Georgia, Tifton and USDA-ARS, Quincy, FL, and Tifton, GA.
- 9:30 Controlled Droplet Application Compared to Conventional Boom Sprayer for Control of Peanut Leafspot. F. M. Shokes* and R. H. Littrell, USDA-ARS, Quincy, FL and Univ. of Georgia, Tifton.
- 9:45 Virginia's Automated Weather Data Collection Network for Disease Modeling and Forecasting. S. D. Shaffer*, T. Martin, N. L. Powell and J. L. Steele, Virginia Polytechnic Institute, Blacksburg, and USDA-ARS, Suffolk, VA.
- 10:00 Break
- 10:30 Criteria for Effective Utilization of Peanut Leafspot Advisories in Virginia. P. M. Phipps* and N. L. Powell, Virginia Polytechnic Institute, Suffolk and Blacksburg, VA.
- 10:45 Evaluation of the Peanut Leafspot Advisory System in South Carolina. C. E. Drye, Clemson Univ., Blackville, SC.
- 11:00 Transmission of Sclerotinia minor by Florunner Peanut Seed. D. F. Wadsworth* and H. A. Melouk, Oklahoma State Univ. and USDA-ARS, Stillwater, OK.
- 11:15 The Influence of Soil Moisture on the Development of Sclerotinia Blight of Peanut. Ban-Kiat Teo, N. L. Powell* and D. M. Porter, Univ. of Saskatchewan, Saskatoon, Canada; Virginia Polytechnic Inst., Blacksburg, and USDA-ARS, Suffolk, VA.
- 11:30 Tolerance of Sclerotinia minor to Vinclozolin, Iprodione and Dicloran. T. B. Brenneman*, P. M. Phipps and R. J. Stipes, Virginia Polytechnic Inst., Suffolk and Blacksburg, VA.
- 11:45 Occurrence of Pythium myriotylum, Rhizoctonia solani, and Plant-Parasitic Nematodes in Oklahoma Peanut Fields and Their Pathogenicity to Peanut. M. J. Martin* and H. A. Melouk, USDA-ARS, Stillwater, OK.
- 12:00 Lunch
- 1:00 Assessment of Peanut Yield Losses Caused by Meloidogyne arenaria. R. Rodriguez-Kabana*, P. S. King, J. C. Williams and R. A. Shelby, Auburn Univ., AL.
- 1:15 Control of Black Root Rot with Soil Injected Fumigants and the Partially Resistant Variety NC 8C. J. E. Bailey, North Carolina State Univ.
- 1:30 Influence of Calcium Source on Pod Rot, Absorption and Elemental Concentrations in Peanut Fruits. A. S. Csinos*, T. P. Gaines and M. E. Walker, Univ. of Georgia, Tifton.

- 1:45 Colorimetric Evaluation of Pod Disease Severity. T. E. Boswell*, O. D. Smith and W. J. Grichar, Texas A&M Univ., Yoakum and College Station, TX.
- 2:00 Comparison of Three Procedures for Purification of Peanut Mottle Virus (PMV) from *Pisum sativum* cvs. 'Alaska' and 'Little Marvel'. J. L. Sherwood, Oklahoma State Univ.
- 2:15 Effects of *Bacillus subtilis* Seed Treatment on Peanut Plant Phenologies and Chronic Root Infections. J. T. Turner, Jr.*, and P. A. Backman, Auburn Univ., AL.
- 2:30 Groundnut Diseases and Pests at Experimental Farms in the Interior of Suriname. K. E. Neering, CELOS, Paramaribo-Zuid, Suriname.
- 2:45 Suspected Volcanic Ash Damage on Peanut Leaves in South Texas. A. M. Schubert*, T. E. Boswell, D. H. Smith and Vincent Anselmo, Texas A&M Univ., Yoakum and Texas Air Control Board, Austin, TX.
- 3:00 Break
- 3:30 Tour of LANCE, INC. - 8600 South Blvd.
- 5:00 Picnic - UNIROYAL - Heritage USA, Buffalo Park
- 8:00 Board of Directors - Radisson Parlor 421
- SESSION B. ENTOMOLOGY, LESSER CORNSTALK BORER SYMPOSIUM
R. L. Robertson, North Carolina State Univ. and
J. C. Smith, Virginia Polytechnic Inst., Suffolk, presiding
- 8:00 Comparison of In-Furrow Applications and Foliar Sprays of Insecticides for Control of Thrips in On-Farm Peanut Demonstrations. J. R. Weeks, Auburn Univ., Headland, AL.
- 8:15 Southern Corn Rootworm Control in Peanuts with Granular or Spray Insecticides in Virginia. J. C. Smith, Virginia Polytechnic Inst., Suffolk.
- 8:30 Population Ecology of Lesser Cornstalk Borer: Theory and Practice. J. W. Smith, Jr., Texas A&M Univ., College Station.
- 9:00 Lesser Cornstalk Borer: Larval Biology and Behavior. R. E. Lynch, USDA-ARS, Tifton, GA.
- 9:30 Lesser Cornstalk Borer: Adult Biology and Behavior. J. E. Funderburk* and D. C. Herzog, Univ. of Florida, Quincy.
- 10:00 Break
- 10:30 Current Management Strategies for the Lesser Cornstalk Borer in Field Crops. R. C. Berberet, Oklahoma State Univ.
- 11:00 Lesser Cornstalk Borer: Insecticidal Efficacy and Problems Encountered in Control. L. W. Morgan* and M. H. Bass, Univ. of Georgia, Tifton.
- 11:30 Resistance of Peanuts to the Lesser Cornstalk Borer. W. V. Campbell*, H. T. Stalker and J. C. Wynne, North Carolina State Univ.
- 12:00 Lunch
- 1:00 Concepts in Cultural Control for Management of the Lesser Cornstalk Borer. J. M. Chesire, Jr., Univ. of Georgia, Experiment.

- 1:30 The Role of Biological Control in Management of the Lesser Cornstalk Borer. R. C. Berberet* and J. W. Smith, Jr.*, Oklahoma State Univ. and Texas A&M Univ.
- 2:00 Modeling as an Aid in Lesser Cornstalk Borer Management. T. P. Mack, Auburn Univ., AL.
- 2:30 Extension Programs and Problems in Management of the Lesser Cornstalk Borer. H. Womack* and J. C. French*, Univ. of Georgia, Tifton, and Auburn Univ., AL.
- 3:00 Break
- 3:30 Tour of LANCE, INC. - 8600 South Blvd.
- 5:00 Picnic - UNIROYAL - Heritage USA, Buffalo Park
- 8:00 Board of Directors - Radisson Parlor 421
- SESSION C. PLANT NUTRITION AND PHYSIOLOGY, QUALITY, HARVESTING AND CURING
C. T. Young, North Carolina State Univ. and
F. S. Wright, USDA-ARS, Suffolk, VA, presiding
- 8:00 The Effect of Inoculation and Nitrogen Fertilizer on Peanut Yields and Grades. D. Hartzog*, F. Adams and A. E. Hiltbold, Auburn Univ., AL.
- 8:15 Growth and N Uptake and Distribution in N-Fertilized Nodulating and Non-nodulating Peanuts. A. Selamat* and F. P. Gardner, Univ. of Florida.
- 8:30 Response of Nodulating and Non-nodulating Peanuts to Foliar Applied Nitrogen. M. E. Walker*, W. D. Branch and T. P. Gaines, Univ. of Georgia, Tifton.
- 8:45 Effect of N Application on Peanut Leaf Composition. S. K. Pancholy*, Sheikh M. Basha and D. W. Gorbett, Florida A&M Univ. and Univ. of Florida, Marianna.
- 9:00 Metal Content of Peanut Foliage and Plant Performance When Grown in Sludge Contaminated and Amended Soils. R. K. Howell* and L. P. Rose, Jr., USDA-ARS, Beltsville, MD.
- 9:15 Peanut Cultivar Response to Plant Growth Regulators. F. P. Gardner, Univ. of Florida.
- 9:30 Effect of Maturity and Plant Age on Physical Properties of Pods and Seed. E. J. William*, J. S. Dexler and C. S. Kvien, USDA-ARS, Tifton and Univ. of Georgia, Tifton.
- 9:45 Progressive Changes During Peanut Fruit Development. H. E. Pattee*, S. C. Mohapatra and E. K. Agnello, USDA-ARS, Raleigh, NC.
- 10:00 Break
- 10:30 Musty Taste Associated with SMK Droughted Florunner Peanuts. J. E. Pallas, Jr.*, C. T. Young, J. R. Stansell and C. S. Kvien, USDA-ARS, Watkinsville, GA, North Carolina State Univ. and Univ. of Georgia, Tifton.
- 10:45 Heat Inactivation of Antinutrients in Peanut Seeds. E. M. Ahmed, Univ. of Florida.
- 11:00 Evaluation of Raw Peanuts Using the SRRC Volatile Profile Procedure. N. V. Lovegren* and R. W. Parrish, USDA-ARS, New Orleans, LA.

- 11:15 Genotype, Soil-Type and Water Supply Effects on Peanut Quality. J. L. Pearson*, W. D. Branch and T. H. Sanders, USDA-ARS, Dawson, GA, and Univ. of Georgia, Tifton.
- 11:30 Performance of Three Chinese Peanuts Under Irrigated and Non-irrigated Conditions in Virginia. T. A. Coffelt*, F. S. Wright and D. L. Hallock, USDA-ARS, Suffolk, VA, and Virginia Polytechnic Inst., Suffolk.
- 11:45 Discussion
- 12:00 Lunch
- 1:00 Automated Sampling Systems for Shelled Peanuts. J. W. Dickens, USDA-ARS, Raleigh, NC.
- 1:15 Head Space Environment in Mechanically and Naturally Ventilated Peanut Storages. J. S. Smith, Jr.*, J. I. Davidson, Jr., T. H. Sanders and R. J. Cole, USDA-ARS, Dawson, GA.
- 1:30 Potential for Efficiency Improvement in Conventional Peanut Cleaning. P. D. Blankenship* and J. I. Davidson, Jr., USDA-ARS, Dawson, GA.
- 1:45 Chlorpyrifos-Methyl as a Protectant for In-Shell Peanuts. L. M. Redlinger*, H. B. Gillenwater and R. A. Simonaitis, USDA-ARS, Savannah, GA.
- 2:00 Equilibrium Moisture Content of Peanuts. J. L. Steele*, J. H. Young and J. M. Troeger, USDA-ARS, Suffolk, VA, and Tifton, GA, and North Carolina State Univ.
- 2:15 Comparisons of On-Farm Peanut Drying Systems. P. D. Bloome, D. D. Kletke and J. E. Sholar*, Oklahoma State Univ.
- 2:30 Interrupted Airflow and Solar Energy for Peanut Drying. J. M. Troeger, USDA-ARS, Tifton, GA.
- 2:45 Discussion
- 3:00 Break
- 3:30 Tour of LANCE, INC. - 8600 South Blvd.
- 5:00 Picnic - UNIROYAL - Heritage USA, Buffalo Park
- 8:00 Board of Directors - Radisson Parlor 421

Friday, July 15

- 7:30 Breakfast - Tryon & Colonial Rooms
- 8:30 President's Address and Business Meeting
- 10:00 Adjourn

SPONSORS

ACKNOWLEDGEMENT - On behalf of APRES members and guests, the Program Committee wishes to thank the following organizations for their generous contributions:

American Cyanamid Company	Lance, Inc.
Birdsong Peanuts	Nitragin Company, Inc.
Carolina Gypsum Company	N.C. Crop Improvement Association
Ciba-Geigy Corporation	N.C. Peanut Growers Association
Diamond Shamrock	Omnidata International
Dow Chemical Company	Peanut Processors, Inc.
DuPont Company	Peoples Bank & Trust Company
Electro General Corporation	Rohm and Haas Company
FMC Corporation	Seabrook Blanching Corporation
Gandy Company	Uniroyal Chemical
Gustafson, Incorporated	U.S. Gypsum Chemicals Division
Hobbs-Adams Engineering Company	Vertac Chemical Corporation
Keel Peanut Company, Inc.	Williamston Peanut Company

FINANCE COMMITTEE REPORT

This Finance Committee met at 1:30 p.m. on July 12, 1983. 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, 1983, to June 30, 1984, and submitted the following recommendations to the Board of Directors.

- (1) It was proposed that the Board of Directors of APRES create a special registration fee rate equal to one-third (1/3) of regular registration. The proposal was approved by the Board.
- (2) It was proposed and approved that the Board of Directors of APRES allocate an additional three dollars per membership (610 currently) for fiscal year 1983-1984 to Peanut Science journal to meet anticipated expenses for this year (total of \$8.00 per membership per year).

Finance Committee Members Present:

D. T. Bateman
T. E. Boswell
W. V. Campbell
H. A. Melouk
W. E. Dykes, Vice-chairman
M. K. Beute, Chairman

AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY
Proposed Budget July 1, 1983, to June 30, 1984.

I. Assets

A. Certificates of Deposit

1. Yoakum Federal Savings & Loan Association, Yoakum, TX	\$ 21,335.02
2. Cuero Federal Savings & Loan Association, Cuero, TX	10,000.00
B. 1. Wallace K. Bailey Fund, Yoakum National Bank, Yoakum, TX	946.18
2. Savings at Yoakum National Bank, Yoakum, TX	2,403.97

II. Income

A. Balance Carried Forward	15,112.76
B. Annual Meeting	
1. Memberships and Registration	20,000.00
C. Sale of Publications	
1. Proceedings and Reprints	100.00
2. Peanut Science Page and Reprint Charges	13,800.00
a. Differential Postage Assessment	2,400.00
b. Institutional Memberships & Subscriptions	4,475.00
3. Peanut Quality - Methods Book Sales	2,500.00
4. Peanut Science and Technology Presales	
5. Peanut Science and Technology Postsales	45,000.00
D. Miscellaneous	
1. Checking Account Interest	250.00
2. Certificates (Interest)	2,500.00

III. Expenditures and Liabilities

A. Secretary-Treasurer

1. Secretarial Services	3,150.00
2. Postage	1,500.00
3. Office Supplies	1,000.00
4. Travel	600.00
5. Self-Employment Tax	250.00
6. Miscellaneous	500.00

B. Peanut Science

1. Editorial Assistant	3,150.00
2. Postage	3,200.00
3. Office Supplies	500.00
4. Printing Cost - Peanut Science	12,000.00
5. Reprint Costs - Peanut Science	3,800.00
6. Miscellaneous	250.00

C. Other Publications	
1. Annual Meeting Proceedings (Printing and Reprints)	5,000.00
2. Peanut Research Newsletter	1,500.00
3. Peanut Quality - Experimental Methods	2,000.00
4. "Peanut Science and Technology" (Book)	25,000.00
a. Promotional Material	500.00
b. Labor for Handling and Packaging	500.00
c. Indexing	
5. Sales Tax (Texas, North Carolina, Georgia, Oklahoma)	300.00
D. Annual Meeting Costs	3,500.00
E. Miscellaneous	
1. Travel for President to Annual Meeting	600.00
2. Bank Charges	100.00
3. Certificate of Deposit	20,000.00
F. Legal Fees	250.00
G. Audit Fees	<u>200.00</u>
Total Assets and Income	\$140,822.93
Total Expenditures and Liabilities	<u>89,350.00</u>
	51,472.93

PUBLICATION AND EDITORIAL COMMITTEE

A noteworthy contribution to scientific literature and to the peanut industry has been achieved through the completion of the Society's newest two publications: Peanut Science and Technology and "Quality Methods". Expressions of appreciation should go to many people who have contributed to these achievements, but special gratitude is due Editors Harold Pattee and Clyde Young for Peanut Science and Technology, and Clyde Young for "Quality Methods".

About 2900 good copies of the book have been printed at a final cost to be determined but estimated at \$65,000. The book is being sold at \$45.00 per copy plus postage and handling and tax, where applicable. Postage and handling costs have been established at \$2.50 per book via UPS within the U.S., and \$3.50 for foreign delivery via surface mail. Notification of shipment to foreign destinations will be made but delivery cannot be guaranteed by the Society. Airmail shipments will be made upon direction, and at the expense of the purchaser.

"Quality Methods", a Publication of the American Peanut Research and Education Society, contains 24 methods and is available at a cost of \$25.00 plus \$5.00 for shipping and handling. Two additional methods are in review and three more have been reviewed. The stated price, as approved previously, will cover charges for the first 50 methods printed.

Request was made and authorization was granted by our Board of Directors to develop and print a colorful brochure bearing an order form for both Peanut Science and Technology and "Quality Methods". All book orders should be made through our Secretary-Treasurer who will handle all funds and transmit orders to Clyde Young for delivery.

Peanut Science

The July-December 1982, issue consisted of 15 articles and the annual index. The January-June 1983, issue contains 14 papers and is ready for shipment. Twenty-seven articles are in various stages of review for the fall issue. Funds were adequate for publication of Peanut Science during the past year with an ending balance of about \$250.00. Projections by Editor Harold Pattee for the coming year show an anticipated deficit of \$2200.00 by June 30, 1984. The committee recommends that an additional \$3.00, bringing to a total of \$8.00, of the annual dues be allocated to Peanut Science publication and that future annual dues notices reflect this amount as subscriptions.

The committee recognizes the need for a longer term plan for financing this journal and will make investigation and recommendation of a plan to our Board a matter of priority for 1984.

New Associate Editors for Peanut Science with their areas of responsibility are: Bill Branch - Plant Breeding and Genetics, Marvin Beute - Plant Pathology, and Tim Sanders - Plant Physiology.

Peanut Research

Editor Aubrey Mixon reports that four quarterly issues were compiled and published during the year. Circulation was made to approximately 700 in the U.S. and other countries.

Peanut Research focused on news of people, grants, research thrusts and other matters of interest. One hundred seventy-six references and 29 theses and dissertations were cited. All information from APRES officers were included.

Assistance in gathering news for "Peanut Research" was discussed and reporters from varied states are being recruited by the committee. Names of these individuals will be published in Peanut Research.

Proceedings

The proceedings of the 1982 meetings were printed and mailed to the membership in December. Committee reports, papers, and abstracts relevant to this 1983 annual meeting which have not been delivered to the Program Committee should be sent to Dr. Terry Coffelt at the Tidewater Research Center by August 15.

One editorial change relevant to future Society publications was made by the committee. Quotation marks surrounding the first appearance of both cultivar names and registered germplasm identifications will no longer be required.

The committee, in behalf of the Society, expresses appreciation to our editors, authors, and other contributors to our Society publications

Publication and Editorial Committee:

Norfleet Sugg
E. B. Browne
Terry Coffelt
Leland Tripp
W. T. Mills, Vice Chairman
Olin Smith, Chairman
Harold Pattee, Ex-officio
Aubrey Mixon, Ex-officio

PEANUT QUALITY COMMITTEE REPORT

The following subjects were considered during the 1983 meeting:

- (1) Responsibilities of members of the committee.
- (2) Availability of the new Methods Manual (\$25 + handling + tax where applicable). The committee supported Clyde Young's suggestion to the effect that single copies of individual methods be sold at \$1.50 per method.
- (3) Bacterization of peanut seed. Kyle Rushing (Gustafson, Inc.) reported on 1982 field testing. Treated seed showed 12% increase in yield over yields in untreated plots (limited acreage). Plantings for 1983 involve 800,000 lbs of seed. He also reported on a new insecticide "Reldan" (for peanuts in storage).
- (4) Standardization of free fatty acid-iodine level tests. Walton Mozingo expressed his concern on standardization and possibility for publishing appropriate methods in the Methods Manual.
- (5) Max Grice gave a report on committee activities (Southwest Quality Committee). The quality committee is composed of growers, shellers, research, and extension staff and is in the process of organizing a team of experts from the National Peanut Laboratory and Texas-Oklahoma research and extension staff to evaluate procedures. He reported that the committee has had temperature tests conducted during the buying season in order to put out the best quality product possible - and has sent out to the buying stations a "Code of Good Practices" to be followed. Ted Marolla (M & M Mars, Snackmaster Division) reported on company intentions to hold in-house taste panel tests and other tests to determine the flavor of peanuts purchased by their company.
- (6) Effect of seed size and storage time on flavor. Harold Pattee presented experimental results showing a flavor change between 16/64 screen and 17/64 screen and the fact that the flavor seems to be enhanced after 120 days of storage.

Peanut Quality Committee:

Walton Mozingo
Tyron Spearman
J. W. Dickens
J. M. Troeger
Leland Tripp
G. M. Grice
H. E. Pattee
S. K. Panchohy
R. E. Worthington
R. A. Taber, Chairman
Clyde Young, Ex-Officio

Report of the Public Relations Committee

This committee, in order to bring further recognition to the recipients of the Society's prestigious awards and to also further the public relations of the Society as a whole, prepared news releases for the Bailey Award recipients and the elected Fellows. These releases plus photographs will be forwarded to hometown newspapers and other interested media.

Resolutions were not prepared by the Committee. No deaths were reported during the past year.

The Public Relations Committee recommends that an APREA Archive be established, that the Executive Officer maintain such an Archive, that the Publicity Committee prepare and forward annually to the Executive Officer the following information:

1. Name(s) of the Bailey Award recipient(s)
Name(s) of the Fellow(s) elected
Name(s) of the Golden Peanut Award Recipient(s)
and
2. Photographs of the recipients of the above awards
and
3. Photographs of incoming officers.

Public Relations Committee:

Sidney Fox
Kay McWatters
Al Norden
Bill Flannigan
Gene Sullivan
Morris Porter, Chairman

REPORT OF SITE SELECTION COMMITTEE

As a follow-up to the approval of Mobile, Alabama, as the site for the APRES, a hotel has been contracted with for the dates of July 17-20, 1984. The hotel is the River View Plaza, completed and opened in June 1983 with 390 rooms. The hotel has reserved 160 rooms for the meeting at a flat rate of \$55 per day for each room with a maximum of four persons per room. One complimentary room will be provided for each 40 rooms occupied by APRES members. The local Chamber of Commerce in Mobile has staff available for help in registration at no cost to the Society. The cut-off date for hotel registration is June 17, 1984.

In addition the Site Selection Committee recommends San Antonio as the site for the 1985 annual meeting. Several hotels have been contacted for housing the meeting. July is the slow tourist season in San Antonio; thus we have an advantage in terms of room costs. Two hotels, the Four Seasons and El Tropicano, are under consideration with other potential hotels.

The site selection committee recommends Norfolk, Virginia, as the site for the 1986 meeting. Again the committee is active in working with the hotels to obtain the best facilities at a reasonable cost.

Site Selection Committee:

Walton Mazingo

John French

A. M. Schubert

R. E. Pettit, Vice-Chairman

J. E. Mobley, Chairman

1983 APRES AWARDS COMMITTEE REPORT

The 1982 Bailey Award Recipients, C. S. Kvien, J. E. Pallas, D. W. Maxey, and J. Evans were selected by the Awards Committee for their manuscript entitled "Nitrogen Fixation and Translocation in the Peanut".

The following process was used to select the 1982 recipients:

- (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 1982 APRES meeting at Albuquerque, New Mexico.
- (c) All nominees (14) for the Bailey Award were informed of their selection by mail on August 17, 1982. Eleven manuscripts were received by the December 31, 1982, deadline.
- (d) Members of the Awards Committee were sent copies of the manuscripts and score sheets on February 1, 1983.
- (e) The score sheets were returned by April 4, 1983. The scores produced a distinct winner.
- (f) On April 8, 1983, President David Hsi and Executive Secretary-Treasurer Don Smith were notified that the Bailey Award recipient had been selected.

The session moderators were notified of the new screening procedure for the 1983 APRES meeting in Charlotte, North Carolina, which requires 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 are 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 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:

Kay McWatters (alternate for Charles Simpson)
John Troeger (alternate for J. L. Steele)
Kenneth Garren
Ron Henning
R. H. Schmidt
R. F. Hooks
Paul D. Blankenship, Chairman

REPORT OF THE 1982-83 NOMINATING COMMITTEE

The Nominating Committee nominates the following to fill the positions identified:

President-Elect	Gale A. Buchanan Auburn University
Executive Officer	J. Ron Scholar Oklahoma State University

Board of Directors:

Industry Representatives:

Shelling, Marketing and Storage	- G. Max Grice
Manufactured Products	- Terry Grinstead

1982-83 Nominating Committee:

Donald Banks
H. Ray Smith
J. L. Butler, Chairman

FELLOWS COMMITTEE

The Fellows Committee nominates the following persons for election to fellowship by the American Peanut Research and Education Society:

Leland Tripp
Harold Pattee

Fellows Committee:

Darold Ketring
Ron Henning
Kenneth Garren
Dallas Wadsworth
J. L. Butler, Chairman

FELLOWS - 1983
American Peanut Research and Education Society

Dr. Harold E. Pattee, Chemist, USDA-ARS, Professor of Botany, North Carolina State University, Raleigh, North Carolina, has been active in peanut research for 20 years. He has authored or co-authored over 90 scientific and professional papers. His research has been concerned with studying biochemical changes in the peanut seed during maturation, post-harvest handling and storage; identifying flavor constituents of peanuts; and characterizing the lipoxygenase-linoleic acid system of peanuts. His contributions have included isolating and positively identifying "off-flavor" components from high-temperature-cured raw peanuts as well as compounds responsible for "normal-flavor" in raw peanuts. In collaborative studies, he found that beta-carotene and lutein were responsible for peanut-oil color and their concentrations were inversely proportional to maturity, but that oil color was not reliable as a maturity indicator. He demonstrated that an after-ripening process occurs in peanuts during storage, which produces pentane and methanol. He has studied the effects of pentane on peanut seed and its formation, including the enzyme responsible (lipoxygenase) and has isolated isozymes of the peanut lipoxygenase. He developed a peanut maturity index based upon the changing relationship between the seed and hull weights called the seed-hull ratio.

Dr. Pattee has served APRES as Editor of Peanut Science since 1976, Associate Editor of Peanut Science, Nominating Committee Chairman, Registration Committee Chairman, Technical Program Committee Chairman, Ad-hoc Committee to evaluate Peanut Science, Ad-hoc Committee Chairman to convert APREA to APRES, and a Co-Editor of Peanut Science and Technology.

Dr. Pattee is recognized as an outstanding chemist. He is a recognized writer, speaker, and organizer.

Dr. Leland D. Tripp, Agronomist, Texas Agricultural Extension Service, Texas A & M University, College Station, Texas, has been active in extension for 30 years. He has authored or co-authored 40 publications, including two book chapters on peanut production. He communicates effectively and is held in high esteem by farmers, agents, agri-business representatives, and professional colleagues and peers. He strongly believes in the team approach, planning and working effectively with other Specialists and County Extension Agents by providing leadership, training, and information. He demonstrates unique abilities in analyzing and instructing producers and seedsmen in how to solve problems and to apply new innovations and cultural modifications, making use of and designing on-farm demonstrations to facilitate understanding. He has been a leader in utilizing radio and T.V. programs for effective extension programs as evidenced by his assistance in developing the "4-H on Parade" T.V. series, which drew attention to the Oklahoma 4-H program and the opportunities it provides. He collected and increased peanut germplasm from Peru from which several germplasm releases have been made.

Dr. Tripp was one of the organizers of APRES and has served the organization as President (1976-1977), President-elect, Executive Secretary-Treasurer (1969-1974), a member of the Board of Directors (two terms), Associate Editor of Peanut Science, member Publications and Editorial Committee, and a member of the Peanut Quality Committee.

Dr. Tripp is recognized nationally and internationally as a highly competent and effective educator in many facets of peanut production.

GOLDEN PEANUT AWARD ADVISORY COMMITTEE REPORT

Nominations for the Golden Peanut Research and Education Award are forwarded by the National Peanut Council to individual members of the Golden Peanut Research and Education Award Advisory Committee for evaluation. Each member of the Committee evaluates the nominations and ranks them accordingly. Each individual's evaluation is returned directly to the National Peanut Council which selects the recipients for the award. Members of this committee do not coordinate their evaluations and we recommend that the committee should continue to function this way.

Golden Peanut Award Advisory Committee:

Bill Dickens
Tom Whitaker
Ken Garren
Gale Buchanan
Jim Butler
Frank McGill

REPORT OF THE AD HOC COMMITTEE TO REVISE BY-LAWS

This Committee submitted a revision of the By-Laws to the Board of Directors of APRES on April 9, 1983, for their comments and suggestions. These were presented, accepted by the Board of Directors at the Board Meeting on July 12, 1983, and approved, with minor changes, at the Annual Business Meeting on July 15, 1983.

Ad Hoc Committee to Revise By-Laws:

W. M. Birdsong
J. S. Kirby
E. B. Browne
J. L. Butler, Chairman

REPORT OF APRES AD-HOC COMMITTEE
RELATIVE TO SECRETARY-TREASURER POSITION

The committee, after considerable thought and discussion, recommends changes in the duties of Society offices with increased services by a paid employee to facilitate the expanded operations of the Society. Such increased non-volunteer services will increase the Society's financial obligations in terms of salary, equipment, and supplies for effective operation.

The committee recommends the retitling of the current office termed Secretary-Treasurer to that of Executive Vice-President. The duties of the Executive Vice-President would include:

- a) Counter-sign all deeds, leases, and conveyances executed by the Society and affix the seal of the Society thereto and to such other papers that shall be required or directed to be sealed;
- b) Assume the directional responsibility of the Secretary-Treasurer in the accomplishment of duties necessary under Article 7, Section 7, B - D of the current By-Laws;
- c) Serve as the Society's professional member designee to supervise and administer the duties of the Secretary-Treasurer.

The committee further recommends that the Society employ on a half-time basis a Secretary-Treasurer competent for the handling of routine Society operations in accordance with the proposed job description which is attached. Recognizing the financial limitations of the Society, the committee would encourage consideration of employing a competent individual for this office with space available for an office at his or her residence. Such space should be adequate to maintain the Society office equipment, record files, and minimal quantities of Society brochures, publications, and etc. Extra storage for large items as books, old files and etc. might be rented at the expense and approval of the Association Board of Directors in commercial facilities.

The committee further recommends that compensation for a competent half-time individual, and office space in the home or elsewhere, be budgeted beginning with the 1983-84 fiscal year; the estimated amount not to exceed \$7,500. Employment of a Secretary-Treasurer and arrangement for office space would be administered by the Executive Vice-President with the concurrence of the APRES Board of Directors. Consideration of additional funds for the purchase of a word processor to expedite the work of the half-time employee in areas as correspondence, proceedings preparation, and membership file maintenance is strongly encouraged.

Ad-Hoc Committee Relative to Secretary-Treasurer Position:

A. H. Allison
J. L. Butler
Olin Smith, Chairman

JOB DESCRIPTION
Secretary-Treasurer
American Peanut Research and Education Society

The office of the Secretary-Treasurer is the primary center for operation of the business of the Society. Routine operations of the Society are managed by the occupant of the position unless otherwise stipulated. The Secretary-Treasurer serves under the supervision and direction of the Executive Vice-President of APRES subject to annual affirmation of the Board of Directors. The duties of the Secretary-Treasurer include but are not limited to the following:

- 1) Handle all correspondence relative to the Society operations;
- 2) Receive, maintain, and make disbursement of all Society finances maintaining appropriate financial records in accordance with the APRES By-Laws, and as approved by the Board of Directors;
- 3) Prepare and mail dues notices to all prospective members for all membership classes of the Society;
- 4) Prepare and distribute to the Board of Directors and Finance Committee Chairman quarterly and annual financial reports;
- 5) Maintain APRES membership lists;
- 6) Prepare and distribute minutes of all APRES Board of Directors and Society Business Meetings;
- 7) Prepare and file tax returns;
- 8) Assist in the coordination of preparations for annual meetings;
- 9) Distribute programs in advance of annual meetings;
- 10) Prepare name tags of advanced registrants for annual meetings;
- 11) Assist in management and supervision of registration desk during annual meetings;
- 12) Assist in follow-up in action taken by the Board of Directors or Society during business meetings;
- 13) Collect, assemble, and prepare with the cooperation of authors, Society officers and committee chairmen the Proceedings of annual meetings;
- 14) Manage the distribution of all Society publications except Peanut Science and Peanut Research;
- 15) Maintain all files and records of the Society;
- 16) Maintain files of committee and officers' duties and responsibilities and send to committee chairmen and new officers upon election;
- 17) Implement action as directed by the President and Board of Directors regarding preparations of awards;
- 18) Assist as a facilitator in the preparation and distribution of advertisements in regard to the Society functions and publications;

The conduct of the above mentioned and other duties is intended to enhance Society operations in cooperation with but not in the place of other Society officers or committees.

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.

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

The Diamond Jubilee of the American Society of Agronomy was celebrated at the 1982 annual meeting in Anaheim, California. Membership has reached an all-time high of 11,923.

R. A. Briggs has succeeded Matt Stelly as Executive Vice-President-Treasurer, and has overall direction of the headquarters staff and the three societies: ASA, CSSA, and SSSA.

C. F. Eno was installed as President and K. J. Frey as President-elect. D. G. Cummins, manager for the Peanut CRSP, began a 3-year term as Technical Editor - Crops for Agronomy Journal.

Eleven papers in the joint sessions were devoted to research investigation with peanut and seven of these were authored (or co-authored) by APRES members.

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

Washington, DC, hosts the 1983 meetings of the American Society of Agronomy in mid-August.

Ray O. Hammons has completed six years of service, and Olin D. Smith has been selected to succeed him in the Liaison capacity.

Respectively submitted:

Ray O. Hammons

June 30, 1983

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

ARTICLE I. NAME

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

ARTICLE II. PURPOSE

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

ARTICLE III. MEMBERSHIP

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

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

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

c. Organizational memberships: Industrial or 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 : \$ 15.00
- b. Institutional membership : \$ 15.00
- c. Organizational memberships: \$ 25.00
- d. Sustaining membership : \$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 registration fee approved by the Board of Directors will be assessed at all regular meetings of the Society. The registration fee for student members shall be one-third that of members.

ARTICLE V. MEETINGS

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

Section 2. Additional meetings may be called by the Board of Directors, either on its own motion or upon request of one-fourth of the members. In either event, the time and place shall be fixed by the Board of Directors.

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

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

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

ARTICLE VI. QUORUM

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

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

ARTICLE VII. OFFICERS

Section 1. The officers of this Society shall consist of the president, the president-elect, the immediate surviving past-president and the executive officer

of the Society who may be appointed secretary and treasurer and given such other title as may be determined by the Board of Directors.

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

Section 3. The officers and directors shall be elected by the members in attendance at the annual general meeting from nominees selected by the Nominating Committee or members nominated for this office from the floor. The president, president-elect, and surviving past-president shall serve without monetary compensation.

Section 4. The executive officer may serve consecutive yearly terms subject to re-election by the membership at the annual meeting. The tenure of the executive officer may be discontinued by a two-thirds majority vote of the Board of Directors, who then shall appoint a temporary executive officer to fill the unexpired term.

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

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

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

ARTICLE VIII. BOARD OF DIRECTORS

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

- a. The president
- b. The most immediate past president able to serve
- c. The president-elect
- d. State employees' representative - this director is one whose employment is state sponsored and whose relation to peanuts principally concerns research, and/or educational, and/or regulatory pursuits.
- e. United States Department of Agriculture representative - this director is one whose employment is directly sponsored by the USDA or one of its agencies, and whose relation to peanuts principally concerns research, and/or education, and/or regulatory pursuits.
- f. Three Private Peanut Industry representatives - these directors are those whose employment is privately sponsored and whose principal activity with

peanuts concerns: (1) the production of farmers' stock peanuts (2) the shelling, marketing, and storage of raw peanuts; (3) the production or preparation of consumer food-stuffs or manufactured products containing whole or parts of peanuts.

g. The president of the National Peanut Council.

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

Section 2. Terms of office for the directors' positions set forth in Section 1, paragraphs d, e, and f, shall be three years with elections to alternate from reference years as follows: e, 1972; d and f(1), 1973; and f(2) and f(3), 1974.

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

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

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

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

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

ARTICLE IX. COMMITTEES

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

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

Section 3. The existing committees of the Society are:

a. Finance Committee: This committee shall include at least four members, one each representing State and USDA and two from Private Business segments of the peanut industry. This committee shall be responsible for preparation of the financial budget of the Society and for promoting sound fiscal policies within the Society. They shall direct the audit of all financial records of the Society annually, and make such recommendations as they deem necessary or as requested or directed by the Board of Directors. The term of the chairman

shall close with preparation of the budget for the following year, or with the close of the annual meeting at which a report is given 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. Publication and Editorial Committee: This committee shall consist of at least three members for three-year terms, one each representing State, USDA, and Private Business segments of the peanut industry. The members will normally serve two consecutive three-year terms, subject to approval by the Board. Initial election shall alternate from reference years as follows: private business, 1983; USDA, 1984; and State, 1985. This committee shall be responsible for the publication of Society-sponsored publications as authorized by the Board of Directors in consultation with the Finance Committee. This committee shall formulate and enforce the editorial policies for all publications of the Society subject to the directives from the Board of Directors.

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

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

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

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

(3) Necrology: Proper recognition of deceased members.

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

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

recipient at least sixty days prior to the annual meeting following the one at which the paper was presented. The president shall make the award at the annual meeting.

g. Fellows Committee: This committee shall consist of six members, two representing each of the three major geographic areas of peanut production and with balance among state, USDA and private business. Terms of office shall be for three years with initial terms as outlined in Section 1 of this ARTICLE. The committee shall select from nominations received, according to procedures adopted by the Society (P148-9 of 1981 Proceedings of APRES), qualified nominees for approval by the Board of Directors.

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

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

ARTICLE X. DIVISIONS

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

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

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

ARTICLE XI. AMENDMENTS

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

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

Amended at the Annual Business Meeting of the American Peanut Research and Education Society, Inc., July 11, 1983, Charlotte, North Carolina

LIST OF MEMBERSHIP BY TYPE

SUSTAINING MEMBERS

AL PEANUT PRODUCERS ASSN
J. E. MOBLEY, PRES.
P. O. BOX 1282
DOTHAN, AL 36301
2057926482

ANDERSON'S PEANUTS
JAMES B. ANDERSON
P.O. BOX 619
OPP, AL 36467

BEST FOODS DIVISION
CPC INTERNATIONAL
ROBERT E. LANDERS
PO BOX 1534
UNION, NJ 07083
2016889000

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 36301
2057924104

ELI LILLY & CO.
ELANCO PRODUCTS CO.
JOHN A. KEATON
PO BOX 628
NORCROSS, GA 30091
4044494920

FISHER NUT COMPANY
HAROLD FEDER
2327 WYCLIFF STREET
ST. PAUL, MN 55114

FLORIDA PEANUT PROD. ASSOC
PO BOX 447
GRACEVILLE, FL 32440

FRITO-LAY RES. LIBRARY
CLEM KUEHLER
C/O KATHY MALONE
900 NORTH LOOP 12
IRVING, TX 75061
2145792271

GA AGRICULTURAL COMMODITY
COMMISSION FOR PEANUTS
T. SPEARMAN
110 EAST 4TH STREET
TIFTON, GA 31794
9123863470

GUSTAFSON, INC.
KYLE W. RUSHING
PO BOX 220065
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2149318899

HERSHEY CHOCOLATE COMPANY
CLARENCE J. CROWELL
PLANT QUALITY ASSURANCE
19 EAST CHOCOLATE AVE.
HERSHEY, PA 17033
7175344595

ICI AMERICAS INC.
R. A. HERRETT
PO BOX 208
GOLDSBORO, NC 27530
9197363030

KEEL PEANUT COMPANY INC.
RUFUS KEEL
P.O. BOX 878
GREENVILLE, NC 27834
9197527626

LILLISTON CORPORATION
WILLIAM T. MILLS
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9128835300

NATL PEANUT COUNCIL
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PAUL HATTAWAY CO.
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STANDARD BRANDS INC.
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3123214399

VA PEANUT GROWERS ASSN.
RUSSELL C. SCHOOLS
CAPRON, VA 23829
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BRYANT SHUMPERT, SALES
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16901 VALLEY VIEW
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ANHEUSER BUSCH, INC.
EAGLE SNACKS
STEVE GALLUZO
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CSIRO LIBRARY
DIV OF TROP. CROPS & PAST.
CUNNINGHAM LAB
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GA FARM BUREAU FEDERATION
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GEORGE F. HARTNETT
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GILLAM BROS PEANUT SHELLER
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HARRINGTON MANF. CO., INC.
C. B. GRIFFIN, JR.
PO BOX 269
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HERSHEY FOOD
DR. GIOVANNI BIGALLI
HERSHEY FOODS TECH. CENTER
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HERSHEY, PA 17033

HOBBS-ADAMS ENG. CO.
OLIVER K. HOBBS
P.O. BOX 1833
SUFFOLK, VA 23434
8045390231

HOFER-KINCAID BROKERAGE
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HOME BRANDS
DIVISION OF PEAVEY CO.
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INSTITUT DE RECHERCHES
POUR LES HUILES &
OLEAGINEUX-SERV. DOC.
11 SQUARE PETRARQUE
75016 PARIS, FRANCE

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KIM MUMFORD
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9197372851

NEW MEXICO CROP IMPROVEMNT
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LAS CRUCES, NM 88003
5056464125

NORTH AMERICAN PLANT BREED
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PRINCETON, IL 61356
8158752426

NUTTA PRODUCTS (QLD) PTY.
W.B. RUDDLE
PO BOX 21
ZILLMERE. QLD. 4034
AUSTRALIA

OILSEEDS CONTROL BOARD
P.O. BOX 211
PRETORIA 0001
REPUBLIC OF SOUTH AFRICA

OKLA CROP IMPROVEMENT ASSN
F.E. LEGRAND
OKLA. STATE UNIVERSITY
STILLWATER, OK 74078

OLIN
AGRICULTURE DIVISION
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LITTLE ROCK, AR 72203
5013783737

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DUBLIN, NC 28332

PEERLESS MANF. CO.
W.E. DYKES
U.S. HIGHWAY 82 EAST
SHELLMAN, GA 31786
9126795353

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EDENTON, NC 27932

POND BROTHERS PEANUT CO.
RICHARD POND
P.O.BOX 1370
SUFFOLK, VA 23434

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W.G. FRICK
251 GBRALTAR ROAD
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ROBERT E. AKIN GOLD KIST PEANUTS PO BOX 488 600 2ND ST. N.E. MOULTRIE, GA 31768	3	CARROLL D. APPLEWHITE FMC CORP RT 3 BOX 61A TIFTON, GA 31794	3
ROBERT P. ALLEN BRACH, E. J. & SONS BOX 802 CHICAGO, IL 60690	9	SUSAN ARRENDELL METHOD ROAD, UNIT 2 NC STATE UNIV. RALEIGH, NC 27650	4
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JAMES L. AYERS GOLD KIST INC. PO BOX 2210 ATLANTA, GA 30301	3	DAVID T. BATEMAN RT. 1 BOX 168B TYNER, NC 27980 9192214777	3
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JACK BAILEY DEPT. OF PLANT PATHOLOGY 1414 GARDNER HALL NC STATE UNIVERSITY RALEIGH, NC 27650 9197372711	3	ALLEN E. BAYLES BOX 2007 AIKEN, SC 29801 8036496297	3
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DONALD BANKS AGRONOMY DEPT. OKLA. STATE UNIVERSITY STILLWATER, OK 74078 4056244124	3	JERRY M. BENNETT BLDG. 164 UNIVERSITY OF FLORIDA DEPT. OF AGRONOMY GAINESVILLE, FL 32611 9043926180	3
GARLAND G. BARR RHONE - POULENC CHEM. CO. PO BOX 446 CORSICANA, TX 75110 2148722826	3	G. LEE BENSON MAAG AGROCHEMICALS PO BOX X VERO BEACH, FL 32960	3
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GIOVANNI BIGALLI HERSHEY FOOD HERSHEY FOODS TECH. CENTER 1025 REESE AVE. HERSHEY, PA 17033	9	BOBBY BORDEN BORDEN PEANUT CO., INC. PO BOX 28 PORTALES, NM 88130 5053568545	9
T. H. BIRDSONG III BIRDSONG PEANUTS PO BOX 698 GORMAN, TX 76454 8177342266	9	JOE BOSWELL TEXAS PEANUT PRODUCERS BD P.O. BOX 398 GORMAN, TX 76454 8177345853	9
W. M. BIRDSONG, JR. BIRDSONG PEANUTS P.O. BOX 776 FRANKLIN, VA 23851 8045623177	3	T. E. BOSWELL TEXAS A & M UNIVERSITY PO BOX 755 PLANT DISEASE RES. STATION YOAKUM, TX 77995 5122936326	3
MARK C. BLACK NC STATE UNIV. DEPT. PLANT PATHOLOGY BOX 5397 RALEIGH, NC 27650 9197373306	3	WILLIAM D. BRANCH DEPT. OF AGRON. COASTAL PLAIN EXP. STA. TIFTON, GA 31793 9123863561	3
F.P.C. BLAMEY DEPT. OF AGRICULTURE UNIV. OF QUEENSLAND ST. LUCIA, QLD 4067 AUSTRALIA 07-377-3829	3	JOHN M. BRANDT PLANTERS PEANUTS 200 JOHNSON AVE. SUFFOLK, VA 23434 8045392343	3
PAUL BLANKENSHIP NATL PEANUT RESEARCH LAB. 600 FORRESTER DRIVE DAWSON, GA 31742 9129954481	3	BARRY J. BRECKE UNIVERSITY OF FLORIDA AGR. RESEARCH CENTER ROUTE 3 JAY, FL 32565 9049945215	3
MYRON BLISS DIAMOND SHAMROCK 1100 SUPERIOR AVE. CLEVELAND, OH 44114 2166945087	3	TIMOTHY BRENNEMAN DEPT. OF PLANT PATHOLOGY PRICE HALL, VPI & SU BLACKSBURG, VA 24061	4
PETER D. BLOOME OKLAHOMA STATE UNIVERSITY 216 AGRICULTURE HALL STILLWATER, OK 74078 4046245425	3	SAMUEL BROWN ROUTE 1, BOX 97 ROCHELLE, GA 31079 9123657189	3
HAROLD U. BLYTHE HOBBS-ADAMS ENGR. CO. 1100 HOLLAND RD. SUFFOLK, VA 23434 8045390231	3	E. BROADUS BROWNE ROOM 107, CONNER HALL UNIVERSITY OF GEORGIA ATHENS, GA 30602	3
JIM BONE ICI AMERICAS, INC. AG CHEM DIV PO BOX 208 GOLDSBORO, NC 27530 9197361401	3	GERALD BRUSEWITZ AG. ENGINEERING DEPT. OKLA. STATE UNIVERSITY STILLWATER, OK 74078 4056245428	3
KENNETH J. BOOTE AGRONOMY DEPT. 304 NEWELL HALL UNIVERSITY OF FLORIDA GAINESVILLE, FL 32611 9043921811	3	CHRISTOPHER F. BRUTON PO BOX 1614 BANGKOK, 5, THAILAND 233-5606	3

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GALE A. BUCHANAN DEAN FOR RES. & DIR. AES 107 COMER HALL AUBURN UNIV. , AL 36849	3	D. CARTER NATL. PEANUT CORPORATION PLANTERS PEANUTS 200 JOHNSON AVENUE SUFFOLK, VA 23434 8049346200	9
P. M. BUCKINGHAM UB (FOODS) LTD. EASTWOOD TRADING ESTATE ROTHERHAM, SOUTH YORKSHIRE S65 1TD ENGLAND	9	W. RANDOLPH CARTER VA-CA PEANUT ASSN. LOCK DRAWER 499 SUFFOLK, VA 23434 8045392100	9
ROGER C. BUNCH PO BOX 248 TYNER, NC 27980	3	SAM R. CECIL 1119 MAPLE DRIVE GRIFFIN, GA 30223 4042288835	3
JAMES L. BUTLER SOUTHERN AGR. ENERGY CENT. COASTAL PLAIN EXPT. STA. TIFTON, GA 31793 9123863585	3	SIMSON CHAN CANADA PACKERS INC. 3 OVEREND ST. TORONTO, ONTARIO CANADA, M5A 3R2 4163664671	9
EVERETT BYRD NC PEANUT GROWERS ASSOC. PO BOX 1709 ROCKY MOUNT, NC 27801 9194468060	3	FLORENCE CHANAKIRA C/O DR. H. MELOUK PLANT PATHOLOGY DEPT OKLAHOMA STATE UNIV. STILLWATER, OK 74078	3
ELISEO P. CADAPAN DEPT. OF ENTOMOLOGY UNIV. OF THE PHILIPPINES COLLEGE, LAGUNA 3720 PHILIPPINES	3	GARVIN CHANDLER CHANDLER ENTERPRISES W. STAR RT. BOX 93 PORTALES, NM 88130 5053568088	3
JOHN S. CALAHAN, JR. DEPT. BIOLOGICAL SCIENCES TARLETON STATE UNIVERSITY STEPHENVILLE, TX 76402 8179684158	3	JAY W. CHAPIN COLLEGE OF AGR. SCI. CLEMSON UNIVERSITY PO BOX 247 BLACKVILLE, SC 29817 8032843344	3
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W. V. CAMPBELL DEPT. OF ENTOMOLOGY N.C. STATE UNIVERSITY BOX 5215 RALEIGH, NC 27650 9197372833	3	JOHN CHERRY ERRC, ARS-USDA 600 E. MERMAID LANE PHILADELPHIA, PA 19118	3
CHARLES S. CANNON RT. 2 BOX 171 ABBEVILLE, GA 31001 9124672042	3	J.M. CHESHIRE, JR. UNIVERSITY OF GEORGIA GEORGIA STATION EXPERIMENT, GA 30212	3
ROLAND L. CARGILL RHONE-POULENC INC. PO BOX 125 MONMOUTH JUNCTION, NJ 08852 2012970100	9		

L. C. COBB P. O. BOX 698 MARIANNA, FL 32446 9044822064	3	F.R. COX SOIL SCIENCE DEPT. N.C. STATE UNIVERSITY RALEIGH, NC 27650 9197372388	3
JACK COCKEY, JR. JACK COCKEY BROKERAGE CO. P. O. BOX 1075 SUFFOLK, VA 23434	9	MARK A. CRAWFORD DEPT OF BOTANY, PLT PATH & MICRO. AUBURN UNIVERSITY AUBURN, AL 36849	3
TERRY A. COFFELT TRACEC P.O.BOX 7098 SUFFOLK, VA 23437 8046576744	3	CLARK CRENSHAW THE COLUMBIAN PEANUT CO. BOX 389 NORFOLK, VA 23501	3
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RICHARD COLE NATIONAL PEANUT RES LAB 600 FORRESTER DRIVE DAWSON, GA 31742 9129954441	3	ALEX CSINOS DEPT PLANT PATHOLOGY COASTAL PLAIN EXP STA TIFTON, GA 31793 9123863370	3
JAMES R. COLLINS MOBAY CHEMICAL CO. PO BOX 1569 TIFTON, GA 31794 9123828675	3	DAVID G. CUMMINS GEORGIA EXP. STATION AGRONOMY DEPT. EXPERIMENT, GA 30212 4042287279	3
RAYMOND D. COLTRAIN SUPERINTENDENT PEANUT BELT RES.STA. LEWISTON, NC 27849 9193482213	3	JOEL E. CURTIS CENOK INC. BOX 143 CHICKASHA, OK 73018 4052248015	3
DANIEL L. COLVIN AUBURN UNIVERSITY DEPT. AGRONOMY & SOILS 202 FUNCHESS HALL AUBURN UNIVERSITY, AL 36849	4	LARRY M. CURTIS AGR. ENGR. DEPT. AUBURN UNIVERSITY AUBURN, AL 36849	3
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CLYDE C. DOWLER USDA-SEA-AR COASTAL PLAIN EXP. STA. TIFTON, GA 31793 9123863351	3	GARY EILRICH DIAMOND SHAMROCK CORP. 1100 SUPERIOR AV. CLEVELAND, OH 44114 2166946019	3
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HAROLD FEDER FISHER NUT COMPANY 2327 WYCLIFF STREET ST. PAUL, MN 55114	9	WOODROE FUGATE P.O. BOX 114 WILLISTON, FL 32696 9045285871	3
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RALPH FINKNER PLAINS BRANCH STATION STAR ROUTE CLOVIS, NM 88101 5059852292	3	FRANK GARDNER AGRONOMY DEPT. UNIVERSITY OF FLORIDA GAINESVILLE, FL 32611 9043926187	3
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GLENN FORRESTER RR 2, BOX 114B COLUMBIA, AL 36319 2056963394	3	ROBERT P. GARDNER NATIONAL PEANUT CORP. 200 JOHNSON AVE. SUFFOLK, VA 23434 8045392343	3
SIDNEY W. FOX UNIROYAL CHEMICAL RR 3 DONALSONVILLE, GA 31745 9125242724	3	KENNETH H. GARREN 408 KINGSLE ROAD HOLLAND STATION SUFFOLK, VA 23437 8046576549	3

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NATHANIEL GIBBS CANADA LTD. 505 CONSUMERS RD, SUITE603 WILLOWDALE,ONTARIO,CANADA M2J 4V8	3	BILLY J. GRIFFIN PO BOX 280 WINDSOR, NC 27983 9197943194	3
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IGNACIO GODOY SEC. OLEAGINOSAS INSTITUTO AGRONOMICO CP28 13 100 - CAMPINAS-S.P. BRAZIL	3	TERRY GRINSTED SNACK-MASTER PO BOX 3289 ALBANY, GA 31706 9128834000	9
DEWITT GOODEN CLEMSON UNIVERSITY BOX 247 EDISTO EXP. STATION BLACKVILLE, SC 29817 8032843345	3	HUP P. GUOK 840 METHOD RD UNIT 3 RALEIGH, NC 27607	4
DANIEL W. GORBET AGR. RES. CENTER RT 3, BOX 493 MARIANNA, FL 32446 9045943241	3	AUSTIN HAGAN 208 EXTENSION HALL AUBURN UNIVERSITY AUBURN, AL 36849 2058264940	3
WILLIAM H. GRADIS ICI AMERICAS, INC. PO BOX 208 GOLDSBORO, NC 27530 9197315200	3	BILL HAIRSTON GUSTAFSON, INC. BOX 220065 DALLAS, TX 75222	3
CINDY GREEN 2507 VANDERBILT AVE. RALEIGH, NC 27607 9197373281	4	SIDNEY P. HALL, JR. RT 2, BOX 124 GREENWOOD, FL 32443 9045692687	3
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J. E. HAMM CAMILLA HWY. SYLVESTER, GA 31791 9127762032	3	DALLAS HARTZOG AGRONOMIST-PEANUTS AUBURN UNIVERSITY PO BOX 217 HEADLAND, AL 36345 2056932010	3
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R. O. HAMMONS USDA-SEA/AR BOX 748 TIFTON, GA 31793 9123863561	3	ROB HEILMANN SHELL DEVELOPMENT CO. 320 INTERSTATE N.PARKWAY SUITE 200 ATLANTA, GA 30339	3
GARY HANCOCK RT. 2, BOX 203C HAMILTON, GA 31811	3	LEWIE D. HELMS DOTHAN OIL MILL CO. PO BOX 458 DOTHAN, AL 36301 2057924104	3
H. GARY HANCOCK DEPT. BOTANY, PLANT PATH. & MICROBIOLOGY AUBURN UNIVERSITY AUBURN, AL 36849	4	RONALD HENNING UNIVERSITY OF GA COOP. EXT. SERVICE P.O. BOX 48 TIFTON, GA 31793 9123863430	3
JOHN HANEY THE NESTLE COMPANY, INC. FULTON, NY 13069	3	R. A. HERRETT ICI AMERICAS INC. PO BOX 208 GOLDSBORO, NC 27530 9197363030	9
RICHARD K. HANRAHAN RHONE-POULENC INC. PO BOX 125 MONMOUTH JCT, NJ 08852 2012970100	3	EDWIN T. HIBBS DEPT. OF BIOLOGY GEORGIA SOUTHERN COLLEGE STATESBORO, GA 30458 9126815487	3
ZACKIE HARRELL GATESVILLE, NC 27938 9193571400	3	G.L. HILDEBRAND 5 POWYS LANE NORTWOOD PO MT. PLEASANT HARARE ZIMBABWE	3
HENRY C. HARRIS 3020 SW 1ST AVENUE GAINESVILLE, FL 32607 9043731651	3	ROBERT A. HILL PLANT PATH DEPT. COASTAL PLAIN EXP STA TIFTON, GA 31793 9129954441	3
GERALD W. HARRISON DIAMOND SHAMROCK CO. 2506 REDWOOD CT. #1 ALBANY, GA 31707 9128830764	3	JAMES T. HINTLIAN LEAVITT CORPORATION P.O. BOX 31 100 SANTILLI HIGHWAY EVERETT, MA 02149	9
GEORGE F. HARTNETT GEORGE F. HARTNETT & CO. 540 FRONTAGE ROAD NORTHFIELD, IL 60093	9		

OLIVER K. HOBBS HOBBS-ADAMS ENG. CO. P.O. BOX 1833 SUFFOLK, VA 23434 8045390231	9	DAVID C.H. HSI NEW MEXICO STATE UNIV. MRG BRANCH STATION 1036 MILLER ST., SW LOS LUNAS, NM 87031 5058654684	3
LARRY L. HODGES 1214 AIRLEE AVE. KINSTON, NC 28501 9195221747	3	MING-TEH FRANK HUANG DEPT OF AGRONOMY OKLAHOMA STATE UNIV. STILLWATER, OK 74078	4
CLIFFORD HOELSCHER ENTOMOLOGY BLDG. RM. 411 TEXAS A&M UNIVERSITY COLLEGE STATION, TX 77843	3	PIERRE HUCL CROP SCIENCE & PLANT ECOL UNIV. OF SASKATCHEWAN SASKATOON, SASK S7N 0W0 CANADA 3063433496	4
DAVID M. HOGG UNITED STATES GYPSUM CO. BOX 10811 RALEIGH, NC 27605 8006219529	3	R. F. HUDGINS PAUL HATTAWAY CO. P.O. BOX 669 CORDELE, GA 31015	9
R.N. HOLLEY NC STATE UNIVERSITY DEPT. OF CROP SCIENCE PO BOX 5155 RALEIGH, NC 27650	4	JAN HULSEY HULSEY SEED LABORATORY, INC PO BOX 132 DECATUR, GA 30031	3
VERNON M. HOLLOWAY 1206 N. BUENA VISTA AVE ORLANDO, FL 32808	3	G. HUTCHINSON PO BOX 592 HARARE, ZIMBABWE	3
RONALD F. HOOKS NEW MEXICO STATE UNIV 1036 MILLER STREET, S.W. LOS LUNAS, NM 87031 5058657340	3	YASUYUKI ISHIDA AGRONOMY LABORATORY FACULTY OF EDUCATION SAITMA UNIVERSITY URAWA, JAPAN	3
MICHAEL W. HOTCHKISS DEPT. OF PLANT PATH. UNIVERSITY OF MINNESOTA 304 STAKMAN HALL ST. PAUL, MN 55108 6123768142	3	KOW-CHOY IU C/O AGRICULTURE & FISHERIE CANTON RD. GOVT. OFFICES 393 CANTON ROAD KOWLOON, HONG KONG	3
ALLAN HOVIS 226 SCHAUB HALL NC STATE UNIVERSITY RALEIGH, NC 27650 9197372965	3	CURTIS JACKSON ICRISAT/AGINSP INST. OF INTERN. EDUC. 809 UNITED NATIONS PLAZA NEW YORK, NY 10017	3
JAMES S. HOW NC STATE UNIV. DEPT OF FOOD SCIENCE SCHAUB HALL RALEIGH, NC 27650	4	J.O. JACKSON 2120 AVENUE B N.W. SEMINOLE. TX 79360	3
P. W. HOWARD 412 DECATUR ROAD JACKSONVILLE, NC 28540	3	ROLF JESINGER 513 NOVEMBER DR DURHAM, NC 27712 9193832396	3
ROBERT K. HOWELL BARC-WEST BELTSVILLE, MD 20705 3013443143	3	BECKY JOHNSON BOTANY DEPT. 318 LIFE SCIENCES EAST OKLAHOMA STATE UNIV. STILLWATER, OK 74078	3

CHARLES S. JOHNSON DEPT. OF PLANT PATHOLOGY 2515 GARDNER HALL NORTH CAROLINA STATE UNIV. RALEIGH, NC 27650	4	ROBERT D. KEYS NC STATE UNIV. DEPT. CROP SCIENCE BOX 5155 RALEIGH, NC 27650 9197373027	3
DAVID J. JUDD UNIROYAL CHEMICAL CO. CHELTENHAM ROAD EVESHAM, WARCS, WR11 6LW ENGLAND	3	CHAUDHARY W. KHAN 110 PATTERSON HALL NORTH CAROLINA STATE UNIV. RALEIGH, NC 27650	3
RODRIGUEZ KABANA BOTANY & MICROBIOLOGY DEPT AUBURN UNIVERSITY AUBURN, AL 36849 2058264830	3	LAKHO L. KHATRI SWIFT & COMPANY 1919 SWIFT DRIVE OAK BROOK, IL 60521 3123259320	3
NOBLE S. KEARNEY, JR. PO DRAWER 1849 UVALDE, TX 78801	3	DOUGLAS W. KINCAID, JR. HOFER-KINCAID BRODERAGE PO BOX 1356 SUFFOLK, VA 23434 8045390291	9
JOHN A. KEATON ELI LILLY & CO. ELANCO PRODUCTS CO. PO BOX 628 NORCROSS, GA 30091 4044494920	9	JAMES KIRBY AGRONOMY DEPT. OKLA. STATE UNIVERSITY STILLWATER, OK 74078 4056246417	3
RUFUS KEEL KEEL PEANUT COMPANY INC. P.O. BOX 878 GREENVILLE, NC 27834 9197527626	9	IVAN W. KIRK SOUTHERN REG. RES. CENTER PO BOX 19687 NEW ORLEANS, LA 70179 5045897512	3
M. KEERATI-KASIKORN FACULTY OF AGRICULTURE KHON KAEN UNIVERSITY KHON KAEN THAILAND 40002	3	K.R. KISHNA ICRISAT/AGINSP INST. OF INTERN. EDUC. 809 UNITED NATIONS PLAZA NEW YORK, NY 10017	3
DAVID L. KENDALL BOX 5576 NC STATE UNIVERSITY RALEIGH, NC 27650	3	CHARLES T. KISYOMBE NC STATE UNIVERSITY PLANT PATHOLOGY DEPT. GARDNER HALL RALEIGH, NC 27650	4
DONALD S. KENNEY ABBOTT LABORATORIES 36 OAKWOOD RD. LONG GROVE, IL 60047 3126343280	3	CHARAS KITBAMROONG OKLAHOMA STATE UNIVERSITY 33-6 N. UNIVERSITY PL. STILLWATER, OK 74075	4
THOMAS J. KERR DEPT. OF MICROBIOLOGY UNIVERSITY OF GEORGIA ATHENS, GA 30602	3	DAVID KNAUFT AGRONOMY DEPT. 2183 MCCARTY HALL UNIVERSITY OF FLORIDA GAINESVILLE, FL 32611 9043921823	3
DAROLD L. KETRING AGRONOMY DEPARTMENT OKLAHOMA STATE UNIVERSITY STILLWATER, OK 74078 4056247059	3	FLORRIE KOHN SOUTHEASTERN PEANUT FARMER PO BOX 706 TIFTON, GA 31794 9213863471	3

J. GARY KRUMMEN GARY'S PEANUTS, INC. 2105 CENTRAL AVE. CINCINNATI, OH 45214 5136212105	3	JOHN LEIDNER PROGRESSIVE FARMER PO BOX 1603 TIFTON, GA 31794 9123860778	3
THOMAS A. KUCHARAK UNIVERSITY OF FLORIDA INST FOOD & AG SCI GAINESVILLE, FL 32611	3	WILLIAM R. LEIGH PENT-A-VATE CORP. 966 W. PALM ST. LINDSAY, CA 93247	3
CLEM KUEHLER FRITO-LAY RES. LIBRARY C/O KATHY MALONE 900 NORTH LOOP 12 IRVING, TX 75061 2145792271	9	WILLIAM LINDEMANN DEPT. OF CROPS & SOIL BOX 3Q NEW MEXICO STATE UNIV. LAS CRUCES, NM 88001	3
CRAIG KVIEN DEPT. OF AGRONOMY UNIV. OF GEORGIA COASTAL PLAIN EXPT. STA. TIFTON, GA 31793	3	H. MICHAEL LINKER 401 HAZEL DR. BURLINGTON, NC 27215	3
PERCIE LAMAR TOM'S FOODS PO BOX 60 COLUMBUS, GA 31902	3	ROBERT LITRELL UNIV. OF GEORGIA COASTAL PLAIN EXP. STA. DEPT. OF PLANT PATHOLOGY TIFTON, GA 31793	3
ANDREW J. LAMBERT EXTENSION SPECIALIST VPI&S SEITZ HALL BLACKSBURG, VA 24061	3	ELBERT J. LONG SEVERN PEANUT CO. PO BOX 28 SEVERN, NC 27877	3
A.N. LAMPANG DEPT. OF AGRICULTURE KASSETSART UNIV. CAMPUS BANGKHEN, BANGKOK 9 THAILAND	3	NORMAN LOVEGREN USDA SOUTHERN REG RES CENT BOX 19687 NEW ORLEANS, LA 70179 5045897593	3
ROBERT E. LANDERS BEST FOODS DIVISION CPC INTERNATIONAL PO BOX 1534 UNION, NJ 07083 2016889000	9	JAMES N. LUNSFORD ICI AMERICAS INC. 101 LADD CIRCLE STATESBORO, GA 30458	3
JOHN LANSDEN NATL PEANUT RESEARCH LAB. 600 FORRESTER DRIVE DAWSON, GA 31742 9129954441	3	EDMUND LUSAS TEXAS A&M UNIVERSITY FOOD PROT. R&D CENTER OILSEED PRODUCTS BLDG. COLLEGE STATION, TX 77843	3
THOMAS LEE, JR. P.O.BOX 1177 STEPHENVILLE, TX 76401 8179655071	3	ROBERT E. LYNCH USDA SOUTHERN GRAIN INS RES LAB TIFTON, GA 31793	3
F. E. LEGRAND OKLA CROP IMPROVEMENT ASSN OKLA. STATE UNIVERSITY STILLWATER, OK 74078	9	JOHN MACFARLANE GUSTAFSON, INC. PO BOX 220065 DALLAS, TX 75222 2149318899	3
		TIMOTHY P. MACK ZOOLOGY-ENT. DEPT. AUBURN UNIVERSITY AUBURN UNIVERSITY, AL 36849 2058264850	3

KAZUMI MAEDA FACULTY OF AGRICULTURE KOCHI UNIVERSITY NANKOKU KOCHI, JAPAN, 783	3	DUANE MELTON PO BOX 2524 VALDOSTA, GA 31601 9122472316	3
RAGHAVENDRA MARGAPURAM 1112 WILLIAMS HALL NCSU RALEIGH, NC 27650	4	THOMAS E. MICHAELS DEPT. OF CROP SCIENCE UNIV. OF GUELPH GUELPH, ONTARIO N1G1B6 CANADA	3
COKE MARKHAM RT. 5 BOX 303 DUNNELLON, FL 32630 9044894839	3	K. J. MIDDLETON QUEENSLAND DEPT PRIM. IND. PO BOX 23 KINGAROY, QUEENSLAND 4610 AUSTRALIA 716213555	3
B. E. MARKS, JR. PEANUT GROWERS COOPERATIVE MARKETING ASSN. FRANKLIN, VA 23851	9	FRANK MCGARVEY MICRON CORP. PO BOX 19698 HOUSTON, TX 77024 7139321405	3
ROBERT W. MARLOWE GA FARM BUREAU FEDERATION PO BOX 7068 MACON, GA 31204	9	J. FRANK MCGILL FIELD CONSULTANT M/M MARS PO BOX 81 TIPTON, GA 31794 9123826912	3
TED MAROLLA M&M MARS SNACK MASTER DIV PO BOX 3289 ALBANY, GA 31706 9128834000	3	FOIL W. MCLAUGHLIN NC CROP IMPROVEMENT ASSN. 3709 HILLSBOROUGH ST RALEIGH, NC 27607 9197372851	9
N.D. MARSHALL CANADA LTD. 505 CONSUMERS RD SUITE 603 WILLOWDALE, ONTARIO, CANADA M2J 4V8	3	AITHEL MCMAHON HOXBAR RT #19 TOWN & COUNTRY CIRCLE ARDMORE, OK 73401 4052233505	3
CLIFFORD K. MARTIN 412 DIXIE TR. RALEIGH, NC 27607 9198343917	3	WM. S. MCNAMEE SOUTHEAST FARM PRESS PO BOX 1217 CLARKSDALE, MS 38614	3
MARSHA MARTIN DEPT. OF PLANT PATH LIFE SCIENCES EAST OSU STILLWATER, OK 74074	3	DAVID MCNEAL USDA/ES 5547-S WASHINGTON, DC 20250	3
GERALDINE E. MASSOTH U. S. GYPSUM CO. 101 SOUTH WACKER DRIVE CHICAGO, IL 60606 3123214399	9	KAY MCWATTERS FOOD SCIENCE DEPT. GA STATION EXPERIMENT, GA 30212 4042287284	3
BRUNO MAZZANI CENIAP, AGRONOMIA MARACAY, VENEZUELA 043-830994	3	HASSAN A. MELOUK USDA DEPT. PLANT PATHOLOGY OKLAHOMA STATE UNIVERSITY STILLWATER, OK 74078 4056245644	3
GARLAND D. MCCULLEN PO BOX 569 WHITEVILLE, NC 28472	3		

LAWRENCE I. MILLER DEPT PLANT PATH & PHY VPI & SU BLACKSBURG, VA 24061 7039615024	3	ARISTIDES MOSCISRO 1500 HILLSIDE COLLEGE STATION, TX 77840	4
ROBERT H. MILLER 801 CHALFONTE DRIVE ALEXANDRIA, VA 22305 2024478839	3	J.P. MOSS ICRISAT/AGINSPO INST OF INTERN EDUC 809 UNITED NATIONS PLAZA NEW YORK, NY 10017	3
WILLIAM T. MILLS LILLISTON CORPORATION BOX 3930 ALBANY, GA 31702 9128835300	9	ROBERT B. MOSS UNIV. OF GEORGIA SOUTHWEST BRANCH EXP. STA. PLAINS, GA 31780	3
NORMAN A. MINTON COASTAL PLAIN EXP STA TIFTON, GA 31793 9123863372	3	WALTON MOZINGO TRACEC SUFFOLK, VA 23437 8046576450	3
STEVEN MITCHEL, JR. SPRAYING SYSTEMS CO. NORTH AVE. AT SCHMALE RD. WHEATON, IL 60187	9	JAMES W. MULLINS MOBAY CHEMICAL CORP. 6225 DONNYBROOK DR RALEIGH, NC 27606	3
AUBREY MIXON USDA-SEA/AR COASTAL PLAIN EXP. STATION TIFTON, GA 31793 9123863561	3	KIM MUMFORD J. M. SMUCKER COMPANY PO BOX 187 NEW BETHLEHEM, PA 16242 8142751323	9
J. E. MOBLEY AL PEANUT PRODUCERS ASSN P. O. BOX 1282 DOTHAN, AL 36301 2057926482	9	DON S. MURRAY DEPARTMENT OF AGRONOMY OKLAHOMA STATE UNIV. STILLWATER, OK 74078	3
S.C. MOHAPATRA NC STATE UNIVERSITY DEPT. OF BIOL. & AGR. ENGR BOX 5906 RALEIGH, NC 27650	3	U. R. MURTY INDIAN AGRICULT. RES INST REGIONAL STA, RAJENDRANAGAR HYDERABAD-500030, INDIA	3
EDGARDO MONTEVERDE-P. 3145 A KING'S COURT RALEIGH, NC 27606 9198513296	4	ROGER MUSICK CROP-GUARD, INC. BOX 232 EAKLY, OK 73033	3
RUTH J. MOORE J. R. JAMES BROKERAGE CO. P. O. BOX 220 300 EXECUTIVE COURT SUFFOLK, VA 23434 8049343211	9	TOMMY NAKAYAMA FOOD SCIENCE DEPT. GA EXP. STA. EXPERIMENT, GA 30212 4042287284	3
LOY W. MORGAN EXPERIMENT STATION TIFTON, GA 31793 9123863374	3	RICHARD NASH RT. 4 BOX 633 TIFTON, GA 31794 9123827994	3
R. HARVEY MORRIS PO BOX 248 ELIZABETHTOWN, NC 28337 9198624591	3	K. E. NEERING CENTRE FOR AG. RES. PO BOX 1914 PARAMARIBO-ZUID SURINAME, SOUTH AMERICA	3

JAMES S. NEWMAN TEXAS AGR. EXP. STATION TEXAS A & M UNIVERSITY P.O. BOX 292 STEPHENVILLE, TX 76401	3	JAMES PALLAS USDA-SEA/AR BOX 555 WATKINSVILLE, GA 30677 4047695631	3
S.N. NIGAM ICRISAT/AGINSP INST OF INTERN EDUC 809 UNITED NATIONS PLAZA NEW YORK, NY 10017	3	HORACE PALMER JEWETT & SHERMAN CO PO BOX 218 WAUKESHA, WI 53186	3
A. J. NORDEN 402 NEWELL HALL UNIVERSITY OF FLORIDA GAINESVILLE, FL 32611 9043921811	3	S. K. PANCHOLY BOX 29 FLORIDA A&M UNIVERSITY TALLAHASSEE, FL 32307 9045993119	3
BRUCE E. NOWLIN CROP-GUARD, INC. PO BOX 232 EAKLY, OK 73033 4057973213	3	ROY C. PARKER RR # 1, BOX 24-A2 LEXINGTON, SC 29072	3
BILL NUNLEY RT. 1 MARLOW, OK 73055 4056583896	3	JERALD K. PATAKY DEPT. OF PLANT PATHOLOGY UNIV. OF ILLINOIS 1102 S. GOODWIN AVE. URBANA, IL 61801 2173331524	3
GRAHAM R. O'BERRY COLUMBIAN PEANUT CO. PO BOX 279 AULANDER, NC 27805	3	ARAN PATANOTHAI HEAD, PLANT SCIENCE DEPT. KHON KAEN UNIVERSITY FACULTY OF AGRICULTURE KHON KAEN, THAILAND	3
WILLIAM C. ODLE DIAMOND SHAMROCK CORP. 1039 HUNTERS POINT CORDOVA, TN 38018	3	HAROLD PATTEE BOX 5906 N.C. STATE UNIVERSITY RALEIGH, NC 27650 9197373121	3
LI LIN ONG 84 GARDNER ST APT 27 ALLSTON, MA 02134 6177827396	4	DONALD R. PATTERSON 6328 RALEIGH LA GRANGE RD MEMPHIS, TN 38134	3
ROBERT L. ORY SOUTHERN REG. RES. LAB. P.O. BOX 19687 NEW ORLEANS, LA 70179 5045897075	3	JERRY PAULEY DIAMOND SHAMROCK CORP 711 HILLWOOD DR. STATESBORO, GA 30458 9127649853	3
ABDELRAHMAN KHIDIR OSMAN W. SUDAN AG. RES. PROJ. PO BOX 5141 KHARTOUM, SOUTH SUDAN	4	JOHN C. PAULSON MINERAL RES. & DEV. CORP. 4 WOODLAWN GREEN SUITE 232 CHARLOTTE, NC 28210	3
JACK OSWALD FLA. FOUND. SEED PRODUCERS P.O. BOX 309 GREENWOOD, FL 32443	3	JOHN H. PAYNE DEPT. OF PLANT PATHOLOGY UNIVERSITY OF FLORIDA GAINESVILLE, FL 32611	4
CHINTANA OUPADISSAKOON DEPT. PRODUCT DEV. COLLEGE OF AGRO-INDUSTRY KASETSART UNIVERSITY BANGKOK 9, THAILAND	3	JAMES R. PEARCE 1404 CAPTAINS ROAD TARBORO, NC 27886	3

JACK PEARSON NATL PEANUT RESEARCH LAB. 600 FORRESTER DRIVE DAWSON, GA 31742 9129954441	3	JOSEPH POMINSKI SO. REG. RES. LAB. P.O. BOX 19687 NEW ORLEANS, LA 70179 5045897012	3
CLYDE PEEDIN BOX 37 HALIFAX, NC 27839 9195835161	3	RICHARD POND POND BROTHERS PEANUT CO. P.O. BOX 1370 SUFFOLK, VA 23434	9
NORMAN D. PEETS OLIN CORP. 479 KINGSWOOD COURT ALBANY, GA 31707	3	J. MATHEW POPE HANCOCK PEANUT COMPANY BOX 198 COURTLAND, VA 23837	3
T. C. PERKINS NEW MEXICO CROP IMPROVEMNT BOX 3 CI, N.M.S.U. LAS CRUCES, NM 88003 5056464125	9	MORRIS PORTER TRACEC SUFFOLK, VA 23437 8046576744	3
ASTOR PERRY 1901 PINEVIEW DRIVE RALEIGH, NC 27606 9198514714	3	DANNY POWELL GUSTAFSON INC. PO BOX 220065 DALLAS, TX 75222 2149318899	3
NAT K. PERSON, JR. AGR. ENGINEERING DEPT. TEXAS A & M UNIVERSITY COLLEGE STATION, TX 77843 7138451131	3	NORRIS L. POWELL DEPT. OF AGRONOMY VPI & SU BLACKSBURG, VA 24061 7039515741	3
ROBERT PETTIT PLANT SCIENCE DEPT. TEXAS A & M UNIVERSITY COLLEGE STATION, TX 77843 7138457311	3	BILL PRYOR 1098 MEADOWBROOK DR BEDFORD, VA 24523	3
LARRY J. PHILLIPS 9034 E. 60TH ST. TULSA, OK 74145 9182525169	3	STEVEN G. PUEPPKE DEPT OF PLANT PATHOLOGY UNIVERSITY OF FLORIDA GAINESVILLE, FL 32611	3
PATRICK M. PHIPPS VPI & SU TRACEC SUFFOLK, VA 23437	3	S.M. RAJU DEPT. OF FOOD SCENCE NC STATE UNIVERSITY PO BOX 5992 RALEIGH, NC 27650	4
JAMES B. PICARD NM WINDHAM CTR. ONTARIO, CANADA NOE-2A0 5194266700	3	V. RAMANATHA RAO ICRISAT/AGINSPO INST OF INTERN EDUC 809 UNITED NATIONS PLAZA NEW YORK, NY 10017	3
ROY PITTMAN 3701 N. MONROE STILLWATER, OK 74074 4056243936	3	JOHN T. RATLIFF NATIONAL PEANUT CORP. 200 JOHNSON AVE. SUFFOLK, VA 23434 8045392343	3
SIDNEY L. POE DEPT OF ENTOMOLOGY PRICE HALL VPI & SU BLACKSBURG, VA 24061 7039616341	3	FRED RATTUNDE ROOM 3, AGRONOMY IOWA STATE UNIVERSITY AMES, IA 50011	4

MICHAEL J. READ PO BOX 26 PEANUT MARKETING BD KINGAROY, QUEENSLAND AUSTRALIA	3	KEN RILEY INST. OF AGRICULTURAL RES. HOLETTA STATION PO BOX 2003 ADDIS ABABA, ETHIOPIA	3
S. C. REAGAN 10 DUNCANNON COURT GLEN LAKES DALLAS, TX 75225 2146923332	3	WILLIAM V. RITCHIE ALL AMERICAN NUT CO. 16901 VALLEY VIEW CERRITOS, CA 90701	9
SYDNEY C. REAGAN SW PEANUT SHELLERS 10 DUNCANNON CRT. GLENN LK. DALLAS, TX 75225	9	DENNIS ROBBINS DOTHAN OIL MILL CO. PO BOX 458 DOTHAN, AL 36302 2057924104	3
D. V. RGAHAVA REDDY ICRISAT/AGINSPO INST OF INTERN EDUC 809 UNITED NATIONS PLAZA NEW YORK, NY 10017	3	ROY ROBERSON 300 S. CEDARBROOK DR AUBURN, AL 36830	3
LEONARD REDLINGER 734 BEECHWOOD DR. SAVANNAH, GA 31406 9122337981	3	A. STERETT ROBERTSON DOW CHEMICAL CO SUITE 600 12700 PARK CENTRAL PL DALLAS, TX 75251 2143872211	3
EDILBERTO D. REDONA INST. OF PLANT BREEDING UNIV. OF THE PILIPPINES COLLEGE, LAGUNA 3720 PHILIPPINES	3	ROBERT L. ROBERTSON 2309 GARDNER HALL NC STATE UNIVERSITY RALEIGH, NC 27650 9197372703	3
JOSEPH M. REIDHART KOCIDE CHEMICAL CORP. PO BOX 45539 12701 ALMEDA RD. HOUSTON, TX 77045 7134336404	3	LOUIS RODRIGUE DUPONT BIOCHEMICALS 1010 QUEENSFERRY RD CARY, NC 27511	3
KHEE-CHOON RHEE PROTEIN CHEMISTRY LAB. TEXAS A & M UNIVERSITY COLLEGE STATION, TX 77843 7138455521	3	BENNY ROGERSON UNIROYAL 158 WINDCHIME CT RALEIGH, NC 27612	3
MARK D. RICKER NC STATE UNIV. DEPT. OF PLANT PATHOLOGY BOX 5397 RALEIGH, NC 27650 9197372753	4	E. W. ROGISTER, JR. COUNTY EXT. CHAIRMAN PO BOX 606 JACKSON, NC 27845 9195342711	3
JOSEPH M. RIEDHART PO BOX 45539 12701 ALMEDA RD HOUSTON, TX 77045	3	FRANKLIN ROSALES IICA PO BOX 349 KINGSTON 6, JAMAICA	3
MICHAEL RIFFLE 303 NEWELL HALL GAINESVILLE, FL 32611	4	ROBERT L. ROTH UNIV. OF ARIZONA 6425 W. EIGHTH STREET YUMA, AR 85364 6027823836	3
		ROBERT ROY TOBACCO RES. STATION BOX 186 DELHI, ONTARIO N4B2WG CANADA 5195822861	3

O.E. RUD TRACEE VPI & SU SUFFOLK, VA 23437 8046576450	3	RUSTICO B. SANTOS ISABELA STATE UNIVERSITY ECHAGUE, ISABELA 1318 PHILIPPINES	4
W. B. RUDDLE NUTTA PRODUCTS (QLD) PTY. PO BOX 21 ZILLMERE. QLD. 4034 AUSTRALIA	9	DOUG SAROJAK BASF WYANDOTTE CORP. 100 CHERRY HILL ROAD PO BOX 181 PARSIPPANY, NJ 07054 2012630200	9
RICHARD RUDOLPH MOBAY CHEMICAL CORP. 105 SAWLEAF LANE PEACHTREE CITY, GA 30269 4044877468	3	TIM SCHILLING USAID NORTH CAMEROON LIAISON OFFICE BP 146 MAROUA, CAMEROON	3
V. RUMORE PLANTERS DIVISION 200 JOHNSON AVE. SUFFOLK, VA 23434 8045392343	3	RUSSELL C. SCHOOLS VA PEANUT GROWERS ASSN. CAPRON, VA 23829 8046584573	9
KYLE W. RUSHING GUSTAFSON, INC. PO BOX 220065 DALLAS, TX 75222 2149318899	9	A.M. SCHUBERT PLANT DISEASE RES. STATION TEXAS A & M UNIVERSITY PO BOX 755 YOAKUM, TX 77995 5122936326	3
PERRY RUSS NATL PEANUT COUNCIL SUITE 506 1000 SIXTEENTH ST. NW WASHINGTON, DC 20036 2027750450	9	MAX C. SCONYERS VERO BEACH LABS P.O. BOX 1508 VERO BEACH, FL 32960 3055626549	3
HALIM K. SAAD 1429 LAKELAND AVE. LAKEWOOD, OH 44107 2162263768	3	JAMES A. SCOZZIE DIAMOND SHAMROCK CORP TR EVANS RESEARCH CENTER PO BOX 348 PAINESVILLE, OH 44077	3
RAMESH D. SAMPAT, D.D.S. 323 1/2 E.CASS ST JOLIET, IL 60432 8157221444	3	KELLY SEARS 1117 JEFFERSON DR. PLAINVIEW, TX 79072 8062934775	3
L. E. SAMPLES COOP. EXT. SERVICE COLLEGE OF AGRICULTURE TIPTON, GA 31793 9123863442	3	MAURICE L. SEATON 207 WHARTON ST APT. #7 BLACKSBURG, VA 24060	4
JOE SANDERS DOTHAN OIL MILL COMPANY PO BOX 458 DOTHAN, AL 36301 2057924104	9	EDWARD B. SEIFRIED CIBA-GEIGY PO BOX 4314 MCALLEN, TX 78501 5126875796	3
TIMOTHY H. SANDERS NATL PEANUT RES. LAB. 600 FORRESTER DRIVE DAWSON, GA 31742 9129954441	3	JOHN L. SHERWOOD DEPT. OF PLANT PATH. OKLAHOMA STATE UNIV. STILLWATER, OK 74078	3

F. M. SHOKES UNIVERSITY OF FLORIDA AG. RES. & ED. CENTER QUINCY, FL 32351 9046279236	3	WHIT O. SLAY NATL PEANUT RESEARCH LAB. 600 FORRESTER DRIVE DAWSON, GA 31742 9129954481	3
JAMES R. SHOLAR 376 AG HALL OKLAHOMA STATE UNIV. STILLWATER, OK 74078 4056246423	3	C. B. SMITH, PRESIDENT C.B.S. INTERNATIONAL INC. PO BOX M EDENTON, NC 27932 9194827766	3
ROBERT A. SHORT, SR. US GYPSUM CO. PO BOX 442 ALBANY, GA 31702 9128882440	3	D. H. SMITH TEXAS A & M UNIVERSITY P.O.BOX 755 YOAKUM, TX 77995 5122936326	3
RAY SHORTER DEPT OF PRIMARY IND. PO BOX 23 KINGARROY, QLD. 4610 AUSTRALIA	3	H. RAY SMITH 1100 SUPERIOR AVE DIAMOND SHAMROCK AG CHEM DIV CLEVELAND, OH 44114 2166945208	3
BRYANT SHUMPERT ALFORD REFRIG. WAREHS INC P.O. BOX 5088 DALLAS, TX 75222	9	HARLAN SMITH 2700 BRYAN PLACE ALEXANDRIA, VA 22302 7036831829	3
FERNANDO SILVA ESTACION EXPER. GUANIPA APARTADO 212 EL TIGRE-EDO. ANZOATEGUI VENEZUELA	3	JAMES W. SMITH DEPT. ENTOMOLOGY TEXAS A&M UNIVERSITY COLLEGE STATION, TX 77843 7138452516	3
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