FIELD AND LABORATORY TESTS FOR GENETIC RESISTANCE OF PEANUTS TO THE TOBACCO THRIPS, FRANKLINIELLA FUSCA (HINDS)

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TABLE OF CONTENTS

Sections Page

LIST OF TABLES

Table | Page

Table | Page

LIST OF FIGURES

I

FIELD TESTS

INTRODUCTION

The tobacco thrips, Frankliniella fusca (Hinds), is a pest on seedling peanut plants throughout the peanut growing areas of the United States. Immature thrips rasp through the epidermis of young foliar buds causing the resulting open leaflets to be smaller, distorted, and scarred on the upper surface, thus reducing the photosynthetic area. Thrips may also feed in peanut flowers or on open leaves, but the major damage results from their injury of foliar buds. When large numbers of thrips are present, leaf buds may be totally destroyed and seedling plants may be severely stunted. It is not clear at the present time to what extent thrips damage directly reduces the fruit or hay yield. However, it is probable that thrips damage retards development, delaying maturation; and decreases vigor, making plants more vulnerable to disease and other hazards.

Thrips can be controlled with insecticides, but because of the high cost and the growing concern about the continued use of large amounts of toxic chemicals there has been increasing interest in developing alternate methods for protecting crops from insect damage. One such method is the use of plant strains which have genetic resistance against an insect pest species. Genetic resistance is a heritable capacity to escape or to withstand insect damage to a greater degree than other strains of the same species. It is an ideal method of crop protection because it is inexpensive, requires no additional time or effort, and is relatively permanent.

The process of developing resistant crop varieties requires a long period of time. The first step in developing peanut varieties resistant to thrips is to locate germ plasm with such resistance.

Though thrips are not the most important insect pests attacking peanuts, with the rapidly increasing world population, high food value crops such as peanuts may be called upon to produce ever higher and more consistent yields. Each contribution that results in higher yield will be helpful.

The purposes of these studies were to develop techniques for screening peanuts for thrips resistance and to identify germ plasm resistant to thrips.

REVIEW OF LITERATURE

This review of the literature indicated that the first report of thrips damage to peanuts in the United States was published by the Florida Agricultural Experiment Station in 1922 (Watson 1922). Although the damage had been observed before, it was not until a widespread outbreak in the spring of 1919 that thrips were identified as the causal agent. In this early paper, leaf damage was described and some severe stunting of the seedling plants was reported. Apparently, no further studies were reported until the late 1930's.

Farmers recognized the injury and called it "possum ear" referring to the shape of damaged leaves (Wilson and Arant 1949), or more commonly, "pouts" because the young plants refused to grow until they began to bloom (Poos 1941).

In 1938 at a conference attended by agronomists, entomologists, and plant pathologists of the United States Department of Agriculture, it was reported that "pouts" occurred throughout the peanut growing areas of the Southeast, but there was disagreement as to the cause of the condition. Some thought it was a nutrient deficiency or a virus disease. The following year, controlled experiments in which thrips were caged on peanut plants proved that thrips were responsible for the injury known as "pouts" (Shear and Miller 1941).

The term "pouts" is no longer used because it has been mistakenly applied to leafhopper damage which superficially resembles that done by thrips (Shear and Miller 1941).

Thrips collected from injured peanuts in Georgia, Virginia, North Carolina, and South Carolina were identified as Frankliniella fusca (Hinds). Adults of F. tritici (Fitch) were also collected in two localities, but later studies in which immature thrips were collected and reared to adults showed that F. fusca reproduces on peanut leaf buds but F. tritici does not (Poos et al. 1947). F. fusca is also the predominant species attacking peanuts in Alabama (Eden and Brogden 1960) and Texas (Harding 1959).

Adult female tobacco thrips hibernate during the colder parts of the winter, and begin to reproduce early in the spring. The population builds up on weeds, other crops, and early volunteer peanuts (when present); and migrates to the crop seedlings soon after the leaves emerge (Arant 1951, Poos et al. 1947). Eggs are inserted into the tissue of the very young foliar buds. Larvae emerge 4 to 7 days later and feed in the still tightly folded bud, rasping the epidermis and sucking up the exuding sap. The larvae are thigmotropic and always feed inside a folded leaflet, the result being that damage is confined to the upper surface of opened leaflets (Poos 1945).

The most severe damage is done early in the season during the seedling stage. Injury is evident to some extent every year (Eden and Brogden 1960), but varies from only slight scarring and puckering of the leaves to aborted leaves that shrivel and die, turning black as if they had been burned (Poos 1945). Most investigators report severe stunting of seedling peanuts when thrips infestations are high, but there is disagreement as to the long term effect. As the plants become older, usually after blooming begins, thrips damage becomes less acute and plants may recover. However, Poos and Dobbins (1951) found differences in plant size between controls and plants protected with insecticides until the middle of August. When grown on poor soil, unprotected plants had a significantly lower green weight at harvest than insecticide treated plants (Poos et al. 1947).

Numerous studies have been done in which different levels of thrips populations have been established by use of insecticides in order to assess the effect of thrips injury on yield. Results have been inconsistent and contradictory. Eden and Brogden (1960) found a highly significant increase in pod yield of 191 pounds per acre during a four-year study using a systemic insecticide, phorate. However, some evidence indicates that yield was decreased where thrips were controlled with insecticides (Arant and Arthur 1954, Leuck et al. 1967). The latter group of workers attributed larger yields where thrips damage occurred to the fact that worms avoided leaves that were damaged by thrips. Phytotoxicity of some insecticides to peanut plants could also affect results (Howe and Miller 1954).

Leuck et al. (1967) reported that Almeida and Arruda (1962. Bragantia 21 (39): 679-87) found an average yield increase of 45% on plots where thrips were controlled and Poos et al. (1947) found yield increases up to 36% where thrips were controlled with DDT. His data were based on total green weight of the plant and pods because peanuts do not mature at the latitude of Beltsville, Maryland, where the experiments were conducted.

Hyche and Mount (1958) found pod yield increases ranging from

204 to 617 lb/acre when thrips were controlled by use of systemic insecticides.

Poos et al. (1947) found that thrips control increased peanut yields on low fertility soil but not on high fertility soil.

Wilson and Arant (1949) reported that pod yield increases varied from nothing to 92 lb/acre.

The following publications indicated that no consistent significant increases in yield resulted from thrips control: Arant 1954, 1950; Arthur and Arant 1954; King et al. 1961; and Harding 1959).

There are apparently many variables which influence such experiments. Application of insecticides after damage becomes apparent may not increase yield (Eden and Brogden 1960). The variety of peanuts used, and its interaction with thrips and with other insect species may also affect the relationship between thrips population, thrips damage, and yield (Leuck et al. 1967).

Under natural conditions where no insecticide is used, soil fertility, rainfall, and other weather conditions as well as infestation level affect the amount of thrips injury and the extent to which a plant can recover and yield normally (Arant 1941, Poos et al. 1947).

The use of insect resistant crops is not a new concept in pest control. Hessian fly resistant wheat was reported as early as 1792 and by 1931 there were insect resistant varieties of over 100 different crops (Snelling 1941).

The use of resistant varieties is an ideal method of protecting crops from insect damage (Beck 1965). After a resistant variety has been tested and developed, there is little expense or effort required of the individual grower (Packard and Martin 1952). Resistance is usually specific for one species of insect so that it does not interfere with biological controls of other species. In addition, it is relatively permanent compared with most other control measures. Resistance is particularly valuable in countries where farmers do not have the skill or capital to use insecticides. It can also be valuable in protecting that part of a crop that is often sacrificed before chemical control becomes economically feasible (Painter 1951).

Resistance might indeed be the panacea of insect control if a high level of resistance were available for most crops. However, complete immunity of a plant variety for an insect pest is rare. There have been some spectacular successes in which resistance alone is a highly effective means of insect control. Among these are phyloxera resistant grapes , Hessian fly resistant wheat and greenbug resistant barley. Resistant varieties of a large number of crops are known, but their degree of effectiveness varies from near immunity to only a low level of resistance. Varieties having a low level of resistance provide some crop pretection alone and may also be used as a part of an integrated control program.

Resistance has been variously defined. Snelling (1941) used the term to refer to "those characteristics which enable a plant to avoid, tolerate, or recover from attacks of insects under conditions that would cause greater injury to other plants of the same species." Painter (1951) defined resistance as "the relative amount of heritable qualities possessed by the plant which influence the ultimate degree of damage done by the insects." Beck (1965) approached the concept form an ecological rather than an economic point of view. He defined resistance as "the collective heritable characterisitcs by which a plant species, race, . . . may reduce the probability of successful utilization of that plant as a host by an insect species . . ." The empirical working definition to be used in this thesis is that given by Painter (1958). "Plants that are inherently less damaged or less infested than others under comparable environmental conditions in the field have been called resistant."

Many factors affect the interaction between a plant and an insect pest species, and thus affect the degree of resistance or susceptibility. Several reviewers have attempted to classify these factors (Mumford 1931, Snelling1941). The most useful classification is that made by Painter (1951) in which he separated three basic categories--antibiosis, non-preference, and tolerance. Antibiosis includes those characteristics of the plant which adversely affect the biology of the insect. Non-preference factors are those which cause the insect not to be attracted to the plant initially or not to remain on the plant and utilize it as a host. Tolerance includes factors by which the plant can withstand an insect infestation without suffering severe damage.

Resistance and the categories of resistance are relative terms and can be defined only by comparison of a variety with other more susceptible varieties of the same species (Painter 1951).

There are two general methods of evaluating resistance among varieties of a crop. One is some type of measurement of damage caused by the insect and the other is a measurement of the numbers of the insect present on different plant varieties.

Light damage in field experiments is characteristic of all three types of resistance. Lower population levels indicate either non-preference or antibiosis. If both damage and population can be accurately measured, tolerance may be distinguished from antibiosis and non-preference in the field (Painter 1951).

Because of the small size and thigmotrophic nature of many thrips species, measurement of population is difficult. Most workers have collected standard samples of plant material in the field and transported them to a laboratory for counting. Thrips must be extracted from the plant sample and debris, and must be concentrated into a small area for magnification and and counting. Two basic methods of extraction have been employed. Thrips have been washed out of plant crevices with a liquid or forced to crawl out by use of irritating stimuli such as heat, desication, or chemicals.

LePelley (1942) was able to remove thrips from glossy coffee leaves by simply dipping them in ethanol, but Howe and Miller (1954) found it necessary to unfold each leaflet of peanut buds and wash them several times.

Evans (1933) developed a method for driving thrips out of roses by use of turpentine, which was lethal, but acted slowly enough to allow thrips to crawl out of roses and toward a light. Lewis (1960) found a similar technique using turpentine as an agitant to be 85% efficient for extracting adults, but only 67% of the larvae and 19% of pupae were recovered.

Taylor and Smith (1955) compared the number of thrips extracted from rose samples by two methods. They washed samples with detergent water and used turpentine to drive thrips from comparable samples. There was no significant difference between the two methods.

Bondy (1940) used direct sunlight on black cloth at a heat source in a modified Berlese funnel for extracting thrips. Hoerner (1947) and Shirck (1948) also used Berlese funnels. The latter author experimented with different temperatures and found that 115^{o}F was the optimum temperature for forcing onion thrips out of foliage without killing them too rapidly.

After obtaining thrips in collecting fluid some workers further extracted thrips from debris by adding detergent, which caused thrips to sink below plant material (Lewis 1960); or adding benzene, which caused thrips to float above inorganic debris making use of the affinity of insect cuticle for benzene (Bullock 1963).

Most of the previously mentioned workers filtered the collecting fluid and counted thrips on the filter under a dissecting microscope with the aid of some type of grid.

Several investigators have measured thrips population on peanuts by counting the number in 10 or 20 terminal buds.

Insect damage to crop plants is usually measured in terms of field reduction. However, in studies of varietal resistance, yield is not a valid measure of insect damage because yield is highly variable among varieties.

In testing thrips resistance among cotton varieties, Ballard (1951) rated damage to leaves of individual cotton plants by use of a 10-point scale.

Leuck et al. (1967) measured thrips damage among peanut varieties by estimating the percentage of leaves showing signs of thrips feeding.

Matlock (1966) scanned plots containing approximately 40 peanut plants each and rated each plot on a 10-point scale for thrips damage. Few reports concerning peanut resistance to thrips have been published. Campbell and Emory (1966) began tests for peanut resistance to thrips in North Carolina in 1960. They found one peanut line with a low level or resistance but did not identify it.

Leuck et al. (1967) found differential thrips feeding on 14 peanut lines in a two-year study at Tifton, Georgia. Starr, Argentine, and NC-2 were found to be less preferred than other entries in the test.

The Catalogue of Seed of the Southern Regional Plant Introduction Station (Langford et al. 1968) lists thrips injury ratings for 332 peanut entries. Entries were rated from 1-4 on the basis of two replications of an experiment, but the method of evaluating damage was not given.

MATERIALS AND METHODS

The peanut entries tested included 872 accessions from the Oklahoma Agricultural Experiment Station collection of peanut germ plasm. This is about 25 to 30% of the world collection of peanut germ plasm. Most entries had been obtained through the United States Department of Agriculture, Agricultural Research Service, New Crops Branch, Southern Regional Plant Introduction Station, Experiment, Georgia. Among these were 14 varieties, 20 selections, two mutants, 11 experimental lines, and 825 plant introductions. Spanish, Valencia, Virginia Bunch, and Runner peanut types were represented. All were of the same species, *Arachis hypogaea* L.

Entries not having commercial variety names will be identified in this paper by plant introduction numbers (P.I.) and Oklahoma peanut numbers (P-No.). In a few cases the P.I. number is not unique to one entry because two or more Oklahoma P-No.'s have been assigned to variants of the same Plant Introduction.

In field experiments, the test insects were natural infestations of thrips which migrated to the peanuts from surrounding crops and weeds. After collecting large numbers of these and examining them in the laboratory it was estimated that usually over 95% were the tobacco thrips, *Frankliniella fusca* (Hinds).

Field experiments were conducted at the Oklahoma Agricultural Research Station, Perkins, Oklahoma, during the summers of 1966 and

1967. Each year plots occupied eleven acres which was divided into ten sections to form ten separate experiments. Although the ten experiments each year were conducted identically as to procdeure, several factors necessitated their not being grouped into one large experiment. First, the evaluation of all experimental units would require a period of time too long to assume uniform plant maturity, weather conditions, and thrips infestations. Second, soil differences were suspected and soil fertility has influenced thrips damage to peanuts in previous experiments (Poos et al. 1947). Third, the different crops which surrounded the experimental area and the prevailing southerly wind could cause marked differential dispersion of thrips over the eleven acre planting.

Each of the ten experiments included a different set of 48 entries and a common commercial check variety, Starr, making a total of 481 entries per year. Ninety entries from the 1966 tests were chosen for re-evaluation along with 391 new entries in 1967.

In 1966 the ten experiments were planted at two locations in the field separated by about 500 feet. The experiments were all contiguous in 1967. The relative positions of the experiments for both years are shown in Figs. 1 and 2.

The statistical design of each experiment was a 7 x 7 balanced lattice with eight replications. Each replication included one plot of each of 49 varieties. A plot consisted of one row 15 feet long containing approximately 40 plants. Plots were separated by 3-ft alleys along the ends of rows and by a row of "Krinkle" leaf mutant (P-151) between experimental plots. The spreader row was included so that all experimental entries would be between two buffer

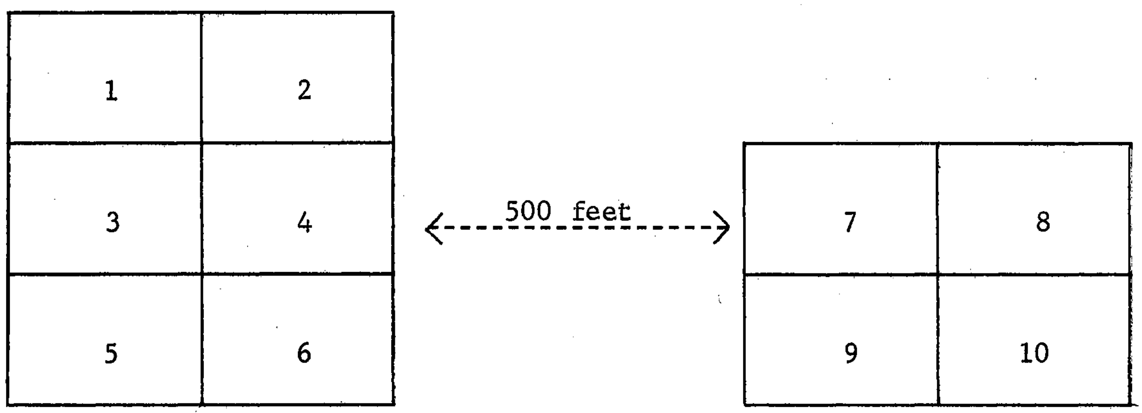

Fig. 1.--Relative positions of ten experiments in 1966.

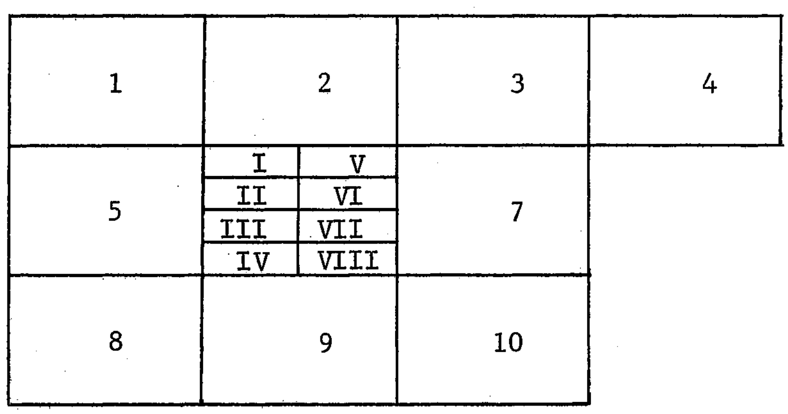

Fig. 2.--Relative position of ten experiments in 1967. Detail within one experiment shows positions of eight replications.

rows which would tend to have a uniform thrips population. Because of its unique appearance, "Krinkle" leaf served as a phenotypic marker so that there was less danger of sampling from the wrong row.

In 1966, thrips population samples were taken from each of 3920 experimental plots. Samples from four replications of each of the 49 varieties in an experiment were collected and processed in one day.

A sample of 20 foliar buds from each plot was collected in a half-pint ice cream carton and transported to the laboratory. Each sample was heated for one hour in a 1-gal Berlese funnel with a 60-watt light bulb to drive thrips into an attached test tube containing 60% alcohol (Fig. 3). The buds and the inside of the funnel were then washed with a fine spray of water to carry adhering thrips into the alcohol.

The alcohol solution was filtered to concentrate the thrips in one plane for counting with a binocular dissecting microscope. The upper portion of the alcohol was first decanted into a filter paper-lined funnel. Then a saturated NaCl solution was added to the test tube causing thrips to float and sand and heavier debris to sink. The upper portion containing thrips was again decanted into the filter paper funnel. A grid was placed over the filter paper for counting thrips under the microscope and a thumb punch tally counter was used to facilitate accurate counting.

In 1967, thrips population was not measured on experimental entries, but samples were taken from the "Krinkle" leaf spreader row in order to evaluate day to day population changes and infestation differences over the field.

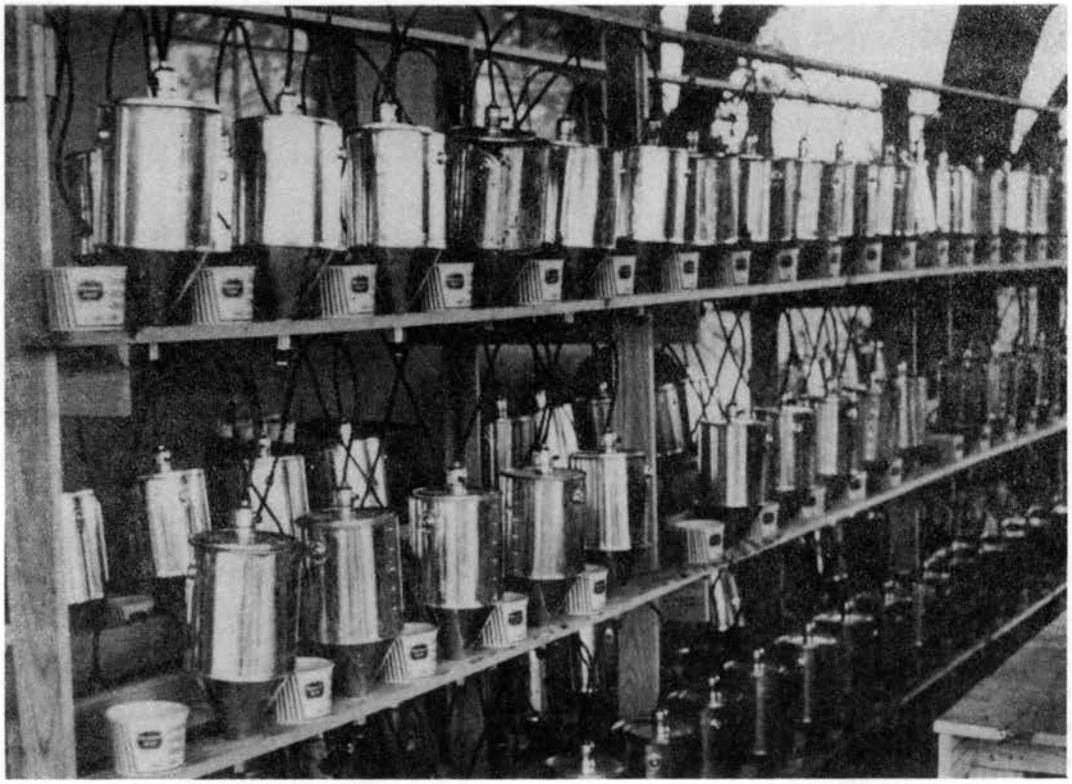

Fig. 3.-- The battery of ninety-eight 1-gal Berlese funnels for extracting thrips from peanut foliage.

A stratified random sampling method was used to obtain an unbiased estimate of the population of thrips each day. Samples were taken from the nine experiments which occupied a rectangular area, while the remaining experiment was excluded because it bordered the others on only one side and was not considered typical (Fig. 2). There were 72 lattice designs in the area from which samples were taken. Thirty-six of these were sampled per day, those in the east half (replications 1-4) or the west half (replications 5-8) of each experiment on alternate days (Fig. 2).

One sample consisted of 28 foliar buds from 105-feet of "Krinkle" leaf running the length of a lattice. Four buds were collected from each of the seven plot-sized row segments.

The selection of a row within each lattice to sample each day was made by a random method without replacement. In this way, each "Krinkle" leaf row was sampled once in 14 sampling days. IBM cards bearing row identification numbers and nine-digit random numbers were randomized rapidly by use of a card sorter. The lattice and row numbers to be sampled each day were printed directly from the cards to gum-backed labels which were then affixed to collecting containers.

In 1967, buds were collected in 45-dram plastic vials. The centers of the vial lids were cut out and replaced with fine meshed cloth to prevent moisture from condensing and drowning the thrips. Vials were transported to the laboratory immediately after the buds were collected and thrips were extracted by use of Berlese funnels. The procdeure was similar to that previously described for 1966. However, after the buds had been emptied into a funnel the same vial in which the buds had been stored was filled with 60% alcohol and used to collect thrips at the bottom of the Berlese funnel. There were two advantages of this procedure over the previous method. Thrips adherring to the vial when the foliage was removed were not lost, and the collection vial label remained with the sample to avoid recopying error.

Differential counts of larvae and adults were made for each sample.

The Damage Rating Scale

Damage was evaluated by rating leaves on an eight-point scale where "1" was no thrips damage and "8" was complete destruction of the leaf. Figs. 4 through 11 show peanut leaves which illustrate each category of the scale used in 1966. The colored picture scale helped to increase consistency among the ratings of several technicians. Studies on judgment scales have shown that 7 or 8 is the maximum number of categories that most individuals can reliably and efficiently discriminate (Bruner 1959, Miller 1956). The 8-point scale included the category "no damage" and 7 degrees of damage.

Fig. 4--Leaf damage rating, No. 1.

Fig. 5--Leaf damage rating, No. 2.

Fig. 6--Leaf damage rating, No. 3.

Fig. 7--Leaf damage rating, No. 4.

Fig. 8--Leaf damage rating, No. 5.

Fig. 9--Leaf damage rating, No. 6.

Fig. 10--Leaf damage rating, No. 7.

Fig. 11--Leaf damage rating, No. 8.

The 1966 scale was modified in 1967 to make the intervals along the damage continuum more equivalent. The category "3" had included a wide spectrum of damage while 5 and 6 were ambiguous. Therefore, the old categories 5 and 6 were combined and designated "6" while 4 and 5 were shifted toward the lighter end of the scale.

Single-leaf Method

In both years, seedling plants were evaluated by rating the youngest opened leaf of 20 plants per plot. Thumb-punch tally counters were used to cumulate the ratings of the twenty leaves and the total number of damage points for each plot was recorded. This method of evaluation will be referred to as the "single-leaf" method.

Selection of Samples

In 1966 single leaf tests, 20 plants within a plot were selected by taking one step into the row and rating leaves on the next 20 consecutive plants. In all subsequent tests plants were selected by the use of plot-length ropes having the desired number of uniformly spaced knots. The ropes were stretched along the crowns of the plants and the plant closest to each knot was selected. This provided objective plant selection and better representation of the whole plot.

Variation Among Technicians' Ratings

In 1966, five technicians evaluated rows composed of a set of seven plots, but no record was made of which technician rated each row. Any variation among the ratings of different technicians was thus confounded with row effect and was only partially removed by the statistical design. In 1967, eight workers were employed, and each rated one replication of each experiment. Variation among raters was thus removed with replication effect.

The increased number of personnel also allowed each experiment to be completed in one day. This reduced variation due to thrips population changes, weather, and other factors which influenced ratings from day to day.

1966 Multiple-leaf Method

By the latter part of July, 1966, the plants were large and the thrips population per foliar bud was lower. Damage was re-evaluated on all plots by rating all the leaves on the central stalk of 10 plants per plot. The total number of damage points and the number of leaves rated were recorded for each plant. This method was designed to measure the plants' responses over a period of differing thrips population levels. This procedure will be called the "multiple-leaf" method of rating damage.

1967 Multiple-leaf Method

After analyzing the 1967 single-leaf data, approximately half of the entries in each experiment were chosen for re-evaluation. About 20 less damaged entries and three or four susceptibles from each experiment were selected. The thrips population had been lower than the previous year, and by late July many of the younger leaves were only slightly damaged. Therefore, a method was devised to measure the plants' response during only the periods of heaviest infestation. The seven youngest leaves on the central stalk were examined and the two most heavily damaged leaves were rated on each of 10 plants per plot.

Late Season Seedling Evaluation

In August, 1966, 78 entries were planted to obtain more data from the seedling stage where thrips damage is normally most severe. The entries were chosen on the basis of the single-leaf ratings for the 481 entries planted earlier in the season. Sixty-one of them had been lightly damaged and 17 heavily damaged previously. The commercial check variety, Starr, was also included in each experiment.

Entries were tested in three randomized complete block experiments with 27 entries each. There were eight replications.

In September when the plants were in the five-leaf stage, the youngest three leaves of ten plants per plot were rated. The total damage points for each plot was recorded and the average damage rating per leaf was computed.

In 1967 a group of selected entries were again planted for late season evaluation but thrips infestation failed to develop in this test.

Check Variety Evaluation for Comparing Damage Level Among Experiments

Since the ten experiments were rated at different times, infestations, plant age, and weather at the time of rating varied among experiments. In order to obtain a comparison of damage levels among the ten experiments in 1966, all plots of the check variety (Starr) were rated in one day. Ten plants were rated from each of the 80 plots. All the leaves on the central stalk of each plant were examined and the rating for each leaf was recorded. In this way measurements comparable to those from either the single-leaf or multiple-leaf method could be extracted. Therefore, the average damage levels of leaves of corresponding ages could be compared among the ten experiments.

RESULTS AND DISCUSSION

Population data on peanut entries in 1966 were analyzed statistically for each balanced lattice design as described by Cochran and Cox (1957). Adjusted means were then compared using the Duncan's New Multiple Range Test (Duncan 1955).

There were significant differences in numbers of thrips collected from two or more pairs of entries in each experiment. Differences among means were large. In each experiment the highest entry mean was more than twice as large as the lowest entry mean. However, the variances were also large and in most experiments only a moderate number of pairs of entries could be declared significantly different.

For eight of the experiments, coefficients of variation were approximately 20% while the C. V. for Experiment No. 6 was 50% and Experiment No. 4 was 7.4%.

In Experiment No. 4, seven entries had significantly ($p \leq .05$) lower populations of thrips than Starr and 12 entries had significantly higher populations than Starr. P.I. 268823 had significantly fewer thrips than 42 other entries.

In each of the other nine experiments, the entry with the lowest thrips population was significantly different ($p \leq .05$) from 2 to 16 of the more heavily infested entries. None of these entries had significantly fewer thrips than Starr, but 19 had more.

A complete tabulation of the entries in Experiment 4, showing mean number of thrips per bud and significant difference among entry means, is presented in the appendix (Table 1). Results of each of the other nine experiments are presented by tabulating the entries at the high and low ends of the population range and indicating whether or not a significant difference was found between each pair of entries (Tables 2 to 10). Entries included in the experiment, but not in these tables, are given with the 1966 damage results in the appendix (Tables 11 to 20).

In summary Table 21 the entry in each experiment that had the lowest average thrips population is tabulated and the number of entries with significantly more thrips is shown. The experiment mean, Starr mean, and the highest mean are also given for each experiment.

The number of thrips from Starr was lower than the mean in each experiment.

"Krinkle" leaf, the spreader row, was included as an experimental entry in Experiment No. 1 and its population mean was very similar to that of Starr. They ranked 11th and 12th (low to high) among the 49 entries in the experiment (Table 2).

In 1967 thrips population counts of stratified random samples from "Krinkle " leaf spreader rows were analyzed to determine time and location effects. Highly significant differences were found among the nine experimental areas sampled. The number of larvae increased significantly from south to north and from east to west across the 3 x 3 arrangement of nine experiments. The south to north differences may have been caused by the prevailing southerly wind.

Table 21.--Mean number of thrips per bud in ten experiments, 1966.

Exp. No.	Entry having least thrips: P.I. No.	No. entries with more thrips*	$\bar{X}$	Starr $\bar{X}$	Exp. $\bar{X}$	Highest $\bar{X}$
1	261984	15	1.6	2.0	2.3	3.3
2	NRM 1	9	1.5	2.1	2.3	3.7
3	268832	6	2.8	3.5	4.1	6.0
4	268823	42	3.2	4.8	5.1	7.9
5	268678	14	2.2	3.0	3.6	5.8
6	290581	6	1.6	2.1	2.6	4.1
7	268641	11	1.9	2.4	2.9	4.2
8	259745	4	1.4	2.1	2.3	3.5
9	290599	16	0.9	2.3	2.3	3.7
10	268689	2	1.9	2.4	2.8	3.9

* $p \leq .05$

Highly significant differences were also found among populations on different days. The analysis of variance is shown in Table 22.

Large population changes over time were found in both 1966 and 1967. The daily average number of thrips per bud for both years is shown in Fig. 12.

Since samples in 1966 were taken only from a portion of one experiment each day, the effects of time and location are confounded. In 1967, data showed that both location and time significantly influenced numbers of thrips infesting peanut plants in the tests.

Table 22.--Analysis of variance of larval populations on "Krinkle" leaf spreader rows, 1967.

Source	d.f.	M.S.	F
North vs South	2	8848.82	18.12***
East vs West	2	3315.58	6.79**
Latitude x Longitude	4	1706.01	3.49*
Error	54	488.47	
Days	13	30114.18	75.50***
Days x Locations	104	660.88	1.66***
Error	351	398.87	

*** $p \leq .001$
** $p \leq .01$
* $p \leq .05$

This information supported the decision to divide entries into ten experiments, each of which could be planted in a small area and evaluated in a short period of time.

Population counts, averaged over the first 22 sampling days each year, were 1.60 thrips per bud in 1967 compared with 3.03 in 1966. The difference may have been even greater than the data indicated because tighter containers were used for collecting samples in 1967 than in 1966. Several factors may have contributed to this difference. The 1966 average was based on samples from only "Krinkle"

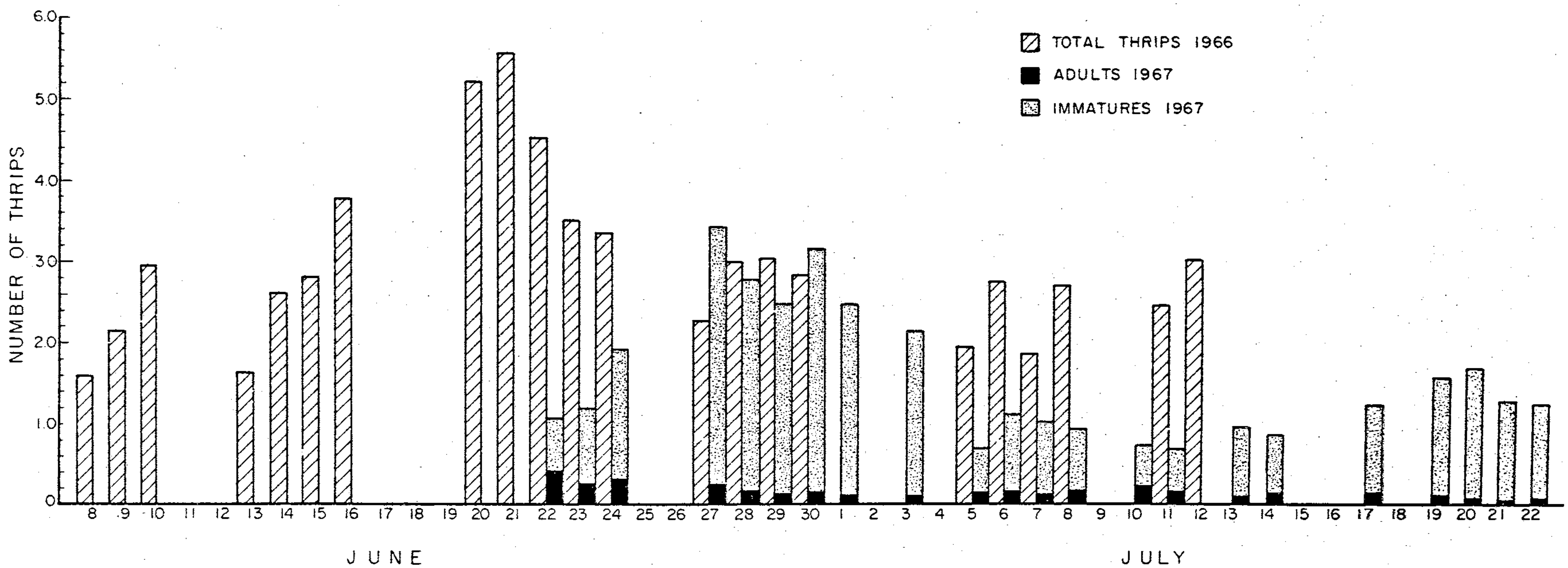

Fig. 12.--Average daily number of thrips per foliar bud, 1966 and 1967.

leaf. As previously mentioned, "Krinkle" leaf had a population mean slightly lower than Starr's in 1966 entry comparisons. "Krinkle" leaf ranked 11th and was significantly different ($p \leq .05$) from six of the entries in its experiment (Table 2), indicating a low level of non-preference or antibiosis. This could have biased the 1967 population estimates downward.

Higher rainfall in 1967 may have influenced the thrips population. From the time of planting through the first 22 sampling days, plots received 8.64 inches of rain in 1967 compared with 3.78 inches in 1966.

Damage Evaluations of Check Plots

Damage ratings, taken on one day from all the 1966 Starr check plots, were analyzed to determine whether there were differences in damage levels in different experiments when time factors were held constant. No significant differences were found among the ten experiments by the single-leaf or multiple-leaf method of rating. This could be interpreted in two ways. The population dispersion over the field was more homogeneous in 1966 than in 1967, or population differences of the magnitude measured did not produce measurable differences in damage.

Damage Evaluations of Balanced Lattice Experiments 1966

Damage ratings for entries in each balanced lattice experiment in 1966 were analyzed as described by Cochran and Cox (1960) and adjusted means were compared by use of Duncan's New Multiple Range Test.

Significant differences were found among entries in all experiments by both single-leaf and multiple-leaf methods of evaluation. Starr, the check variety, was among the least damaged in most experiments.

The variance was much greater for multiple-leaf evaluations than for single-leaf tests. Coefficients of variation were two or three times larger in nine of the ten experiments. This indicated that there was more variation among plot averages based on 70 leaves of different ages (in multiple-leaf tests) than among plot averages based on 20 leaves of the same age (in single-leaf tests). Therefore, the single-leaf evaluations yielded more reliable information and will be given more emphasis in this discussion.

The results from each method of evaluation of all experiments are summarized by tabulating the top ranking ten entries from each experiment. The mean damage rating for each entry and the number of entries significantly more damaged than each of these are given. Each experiment mean, highest mean, Starr mean, and the coefficient of variation are shown for each experiment (Tables 23 and 24).

The reader can determine which were the better entries in separate evaluations of each experiment by referring to the summary Tables 23 and 24. The following discussion will indicate statistically significant differences and point out briefly the entries which were outstanding in both evaluations.

P.I. 268661 (Experiment 6) was significantly better than Starr in both evaluations. It was significantly better than 32 and 44 other entries in the single-leaf and multiple-leaf tests, respectively.

P.I. 290599 and P.I. 158838 ranked first and second, respectively,

Table 23.--Mean single-leaf damage ratings of top 10 peanut entries in each of ten experiments, 1966.

P.I. No.	Rating	No. ent. more damaged*	P.I. No.	Rating	No. ent. more damaged*
Exp. 1: Exp. $\bar{X}$, 2.866; High, 3.638; Starr, 2.715; C.V., 6.1%			Exp. 4: Exp. $\bar{X}$, 3.008; High, 3.711; Starr, 2.712; C.V., 5.7%		
268769	2.327	33	268729	2.610	20
268723	2.411	22	271022	2.626	19
Strat. Span.[a]	2.475	18	268654	2.654	19
259771	2.491	17	268737	2.658	19
268738	2.530	15	268823	2.684	19
261927	2.626	10	268704	2.712	13
268706	2.638	10	Starr	2.712	13
259800	2.644	10	268778	2.716	13
268704	2.664	9	268817	2.727	12
OICB 1272	2.670	9	268711	2.764	10
Exp. 2: Exp. $\bar{X}$, 2.779; High, 3.319; Starr, 2.510; C.V., 6.5%			Exp. 5: Exp. $\bar{X}$, 2.947; High, 3.556; Starr, 2.568; C.V., 5.4%		
268764	2.380	21	268678	2.416	33
268600	2.452	12	268699	2.471	33
248762A	2.456	12	247378	2.558	21
268724	2.476	11	Starr	2.568	21
268741	2.484	10	268808	2.590	18
268789	2.500	10	268787	2.612	17
Starr	2.510	10	268773	2.657	14
270804	2.536	10	259671	2.678	12
261985	2.544	10	268742	2.762	10
268801	2.561	9	268739	2.772	10
Exp. 3: Exp. $\bar{X}$, 2.895; High, 3.517; Starr, 2.646; C.V., 5.6%			Exp. 6: Exp. $\bar{X}$, 2.962; High, 3.734; Starr, 2.836; C.V., 6.2%		
261959	2.364	36	268661	2.384	32
268734	2.532	17	268777	2.501	21
268720	2.542	17	268716	2.613	14
259860	2.566	17	268599	2.621	14
268746	2.592	17	268747	2.621	14
268804	2.626	17	NRM 6	2.685	13
268828	2.646	16	268726	2.696	12
Starr	2.646	16	268636	2.700	12
268791	2.685	13	268791	2.722	12
268691	2.686	13	268794	2.727	12

Table 23. (Continued)

P.I. No.	Rating	No. ent. more damaged*	P.I. No.	Rating	No. ent. more damaged*
Exp. 7: Exp. $\bar{X}$, 2.989; High, 3.463; Starr, 2.662; C.V., 5.7%			Exp. 9: Exp. $\bar{X}$, 2.820, High, 3.456; Starr, 2.386; C.V., 7.2%		
270857	2.517	25	290599	2.024	42
161300	2.623	18	158838	2.130	39
Starr	2.662	16	299468	2.216	38
268711	2.689	15	Starr	2.386	16
268824	2.744	11	259756	2.894	16
259812	2.746	11	161868	2.460	12
268790	2.749	11	234420	2.474	11
268717	2.758	11	268777	2.525	9
259579	2.764	11	268721	2.590	7
268781	2.768	11	268740	2.593	6
Exp. 8: Exp. $\bar{X}$, 3.150; High, 3.822; Starr, 2.878; C.V., 5.9%			Exp. 10: Exp. $\bar{X}$, 2.759, High, 3.344; Starr, 2.388; C.V., 11.5%		
259745	2.588	29	268767	2.294	34
259834	2.762	19	268597	2.319	27
P-35-1-1660	2.787	19	Starr	2.388	22
Argentine	2.836	14	268766	2.419	20
268598	2.860	14	268725	2.475	15
268735	2.868	14	268708	2.475	15
268711	2.872	14	299469	2.519	11
Starr	2.878	13	259821	2.538	10
268660	2.896	11	268689	2.550	10
268706	2.900	11	270850	2.600	6

* $p \leq .05$

[a]Stratford Spanish

Table 24.--Mean multiple-leaf damage ratings of top ten peanut entries in each of ten experiments, 1966.

P.I. No.	Rating	No. ent. more damaged*	P.I. No.	Rating	No. ent. more damaged*
Exp. 1: Exp. $\bar{X}$, 2.966; High, 3.635; Starr, 2.843; C.V., 12.1%			Exp. 4: Exp. $\bar{X}$, 2.870; High, 3.038; Starr, 2.766; C.V., 26.0%		
229553	2.684	5	268644	2.552	30
268795	2.688	5	268632	2.631	19
Strat. Span.[a]	2.714	5	268679	2.660	13
259774	2.722	5	268823	2.675	11
268733	2.753	4	259827	2.706	6
290608	2.768	4	268812	2.724	6
268774	2.774	4	268778	2.749	0
268738	2.786	4	268697	2.754	0
268595	2.836	4	268654	2.762	0
Starr	2.843	4	Starr	2.766	0
Exp. 2: Exp. $\bar{X}$, 2.822; High, 3.243; Starr, 2.690; C.V., 24.8%			Exp. 5: Exp. $\bar{X}$, 2.843; High, 3.252; Starr, 2.696; C.V., 27.4%		
270804	2.475	28	162541	2.556	16
248762A	2.560	19	268678	2.587	12
268764	2.571	19	161317	2.667	7
268724	2.581	19	268773	2.688	6
290536	2.583	19	276776	2.689	6
268679	2.604	18	Starr	2.696	5
268741	2.613	18	268728	2.716	4
268805	2.634	17	268818	2.724	3
268807	2.638	17	268787	2.738	3
268789	2.661	14	268694	2.748	3
Exp. 3: Exp. $\bar{X}$, 3.038; High, 3.595; Starr, 2.954; C.V., 26.8%			Exp. 6: Exp. $\bar{X}$, 2.863; High, 3.114; Starr, 2.767; C.V., 7.4%		
268791	2.860	3	290581	2.354	45
268701	2.860	3	268621	2.480	44
268703	2.877	3	268661	2.501	44
268746	2.892	3	276105	2.524	42
268691	2.913	3	268777	2.643	21
259860	2.916	3	268791	2.741	9
Dixie Giant	2.918	3	268797	2.745	9
268690	2.919	3	268793	2.760	7
268698	2.924	3	268726	2.764	6
268698	2.937	3	Starr	2.767	6

Table 24. (Continued)

P.I. No.	Rating	No. ent. more damaged*	P.I. No.	Rating	No. ent. more damaged*
Exp. 7: Exp. $\bar{X}$, 2.864; High, 3.129; Starr, 2.701; C.V., 23.0%			Exp. 9: Exp. $\bar{X}$, 2.788; High, 3.093; Starr, 2.563; C.V., 25.3%		
277197	2.537	35	290599	2.377	38
F416-2	2.542	35	158838	2.494	34
259603	2.673	13	268828	2.502	34
290633	2.678	13	268724	2.510	33
270857	2.680	13	299468	2.529	31
268706	2.688	13	234420	2.560	22
Starr	2.701	11	Starr	2.563	21
268616	2.710	10	268637	2.571	20
259579	2.721	10	161868	2.613	12
161300	2.732	10	259756	2.631	10
Exp. 8: Exp $\bar{X}$, 2.844; High, 3.090; Starr, 2.782; C.V., 21.7%			Exp. 10: Exp. $\bar{X}$, 2.774; High, 3.176; Starr, 2.541; C.V., 25.3%		
229553	2.639	15	Starr	2.541	15
268833	2.698	9	268767	2.571	13
259745	2.701	9	299469	2.579	13
268692	2.723	4	259753	2.585	12
268826	2.738	4	268730	2.606	8
268706	2.740	3	299471	2.607	8
268798	2.743	3	268633	2.609	8
268784	2.743	3	268739	2.611	7
268768	2.757	3	259805	2.629	6
Argentine	2.776	2	268597	2.630	6

* $p \leq .05$

[a] Stratford Spanish

in Experiment 9 by both methods of evaluation. The former was significantly less damaged than over 79% of the other entries and the latter was significantly better than over 71% of the entries in both tests. In this experiment (No. 9), the top seven entries by the single-leaf rating method were all among the top ten by the multiple-leaf method.

Analysis of the Multiple-leaf evaluation of Experiment 6 indicated that four entries (P.I. 290581, P.I. 268621, P.I. 268661, and P.I. 276105) were significantly less damaged than Starr and 41 other entries. It was not that Starr was more heavily damaged in this experiment than it was in other experiments; the variance was smaller and, therefore, smaller differences were significant.

P.I. 299468 had significantly less damage than 38 entries in the single-leaf rating and less ($\underline{p} \leq .05$) than 30 entries in multiple-leaf evaluation (Experiment 9).

P.I. 268767 ranked first and second in the two evaluations and was significantly better than 34 and 13 other entries in single-leaf and multiple-leaf tests (Experiment 10).

P.I. 268678 ranked first and second in its two evaluations. It was significantly less damaged than 33 and 12 entries in its experiment by the single-leaf and multiple-leaf methods, respectively (Experiment 5).

P.I. 259745 ranked first and thrid in its evaluations and was significantly better than 29 and 9 other entries in single-leaf and multiple-leaf ratings, respectively (Experiment 8).

P.I. 268777 was significantly less damaged than 21 other entries in both evaluations. It ranked second and fifth in single-leaf and multiple-leaf evaluations, respectively (Experiment, 6).

Stratford Spanish ranked third in its experiment (No. 1) by both methods of evaluation. It was significantly better than 18 and 5 other entries, respectively, in the two tests.

The commercial variety, Argentine, ranked fourth and tenth. It was significantly less damaged than 14 entries in the single-leaf evaluation but significantly better than only 2 entries in the multiple-leaf tests (Experiment 8).

Complete lists of all entries tested in each experiment, with damage ratings by both methods of evaluation, are shown in the appendix (Tables 11 to 20). All nonsignificant ranges are indicated so that comparisons can be made between all pairs of entries in each experiment. No direct comparisons could be made between entries in different experiments. However, the damage levels of Starr provide an approximate index for comparisons across experiments.

Late Season Experiments, 1966

The results of the 1966 late season experiments tended to confirm the earlier results despite low damage levels. Fifteen of the 17 entries chosen as susceptible checks were significantly more damaged than the best entry in their respective experiments. All of the susceptible checks had mean damage ratings below the grand mean of their experiments.

Significant differences were also declared among some of the better entries chosen for retesting. Three entries P.I. 268711, P.I. 259800, and P.I. 268794 were significantly less damaged than Starr and ten of the other 23 entries in Experiment A. P.I. 268804 and P.I. 268769 were significantly less damaged ($p \leq .05$) than over half of the other entries in Experiment B. P.I. 268777 was signifi-catnly better than five entries in Experiment C.

The least damaged ten entries in each of the three experiments are listed together with the mean leaf damage rating and the number of entries significantly more damaged than each of these in Table 25.

A complete tabulation of all entries in each test and the mean damage rating of each is shown in the appendix (Tables 26 to 28). All nonsignificant ranges are shown so that comparisons may be made between each pair of entries within each experiment. The late planted experiments occupied less than one acre and were rated by two technicians within 24 hours. The experiment means of the three experiments were similar as were the Starr check means and the ranges. Therefore, least significant difference values were computed to provide comparisons among entries planted in different experiments. The L.S.D. values for comparing entries from each pair of experiments are as follows: Experiments A and B, 0.2163; Experiments A and C, 0.2859; and Experiments B and C, 0.2731. By use of these tests for significance the reader may make any desired comparison between any two entries included in the three experiments.

Damage Evaluations, 1967

In 1967, germination was poor for a few entries in nine of the ten experiments. Twenty-four entries which failed to germinate in three or more of their eight replicates were eliminated from the tests.

Table 25.--Mean leaf damage ratings of top ten peanut entries in three late season experiments, 1966.

P.I. No.	Rating	No. ent. more damaged*	P.I. No.	Rating	No. ent. more damaged*
Exp. A: Exp. $\bar{X}$, 1.621; High, 1.934; Starr, 1.661; C.V., 10.3%			Exp. C: Exp. $\bar{X}$, 1.356; High, 1.895; Starr, 1.895; C.V., 16.6%		
268711	1.439	11	268777	1.356	5
259800	1.454	11	268721	1.433	2
268794	1.452	11	NRM 6	1.483	1
268766	1.480	8	268790	1.484	1
268597	1.496	5	268802	1.486	1
268708	1.507	4	268781	1.487	1
268823	1.521	3	Strat. Span.[a]	1.491	1
268706	1.526	3	268716	1.526	1
Argentine	1.530	3	268678	1.526	1
270857	1.573	3	268661	1.530	1
Exp. B: Exp. $\bar{X}$, 1.616; High, 1.829; Starr, 1.521; C.V., 8.9%					
268804	1.424	13			
268769	1.429	13			
259834	1.498	9			
268767	1.511	8			
268734	1.516	7			
Starr	1.521	7			
268741	1.522	7			
268711	1.536	7			
270857	1.551	5			
259771	1.554	5			

* $p \leq .05$

[a] Stratford Spanish

Since there were missing plots in almost every lattice, all experiments were treated as randomized block designs where each lattice was a block (Fig. 3).

Three entries which germinated in six or seven replicates were included in Experiments 5 and 6. Means within these experiments were compared by Kramer's (1956) extension of the multiple range test, which accomodates unequal numbers of replications. In the other eight experiments comparisons among means followed Duncan's (1955) procdeure.

Coefficients of variation were approximately 10% in all 1967 experiments.

Significant differences ($\underline{p} \leq .05$) were found among entries in all experiments by both methods of evaluation.

The results of the multiple-leaf ratings substantiated the ranking of entries by the single-leaf test. In five experiments all of the better entries chosen for re-evaluation were less damaged than all the susceptible entries re-evaluated. In each of the other five experiments only one entry deviated from this pattern.

Five entries ranked best in their experiments by both methods of measuring leaf damage. These were P.I. 268771, P.I. 259594, P.I. 268770, P.I. 280688, and P.I. 306223. P.I. 280688 was the only entry significantly ($\underline{p} \leq .05$) better than Starr in 1967 experiments. It was significantly less damaged according to both methods of evaluation. It was significantly less damaged than all other entries in its single-leaf experiment and significantly less damaged than 83% of the entries included in its multiple-leaf test. P.I. 268771 was significantly better than 25 and 9 other entries in single-leaf and multiple-leaf tests, respectively. (Recall that approximately half of the entries, those previously showing average to heavy damage, were not included in the 1967 multiple-leaf tests). P.I. 259594 was better ($p \leq .05$) than 7 entries in its single-leaf test and 13 entries in its multiple-leaf test. P.I. 268770 was significantly better than 27 and 4 entries in its two evaluations. P.I. 306223 was significantly better than 25 and 9 other entries.

Four additional entries were significantly less damaged than over half of the other entries in their respective single-leaf tests. These were P.I. 268772, Starr, P.I. 311264, and P.I. 299468. The last mentioned entry also ranked second in its multiple-leaf evaluation.

P.I. 298877 ranked first and seventh and significantly excelled 21 and 1 entries in the two evaluations.

The ten least damaged entries in each of the ten experiments according to both evaluation methods are listed in Tables 29 and 30. The mean damage rating and the number of entries significantly more damaged are shown for each of these entries. The experimental mean, Starr mean, highest mean, and coefficient of variation for each experiment are also given.

All entries tested in 1967 are listed in the appendix, in numerical order according to P.I. numbers within each experiment. Damage ratings from both evaluations are shown (Tables 31 to 40). All nonsignificant ranges are indicated so that significant differences among entries can be ascertained.

The entries chosen as possible "resistants" in 1966 did not, as a group, have much less damage than other entries in 1967. This

Table 29.--Mean single-leaf damage ratings of top tne peanut entries in each of ten experiments, 1967.

P.I. No.	Rating	No. ent. more damaged*	P.I. No.	Rating	No. ent. more damaged*
Exp. 1: Exp. $\bar{X}$, 2.359; High, 2.831; Starr, 2.275; C.V., 10.3%			Exp. 4: Exp. $\bar{X}$, 2.440; High, 2.781; Starr, 2.231; C.V., 8.4%		
268771	1.994	25	268772	2.162	25
298843	2.112	17	Starr	2.231	16
NC-5	2.119	16	259777	2.238	16
268677	2.131	14	268708	2.238	16
162524	2.38	13	290607	2.244	16
259860	2.150	13	Argentine S.[a]	2.250	16
206228	2.150	13	268713	2.269	13
298871	2.169	13	300591	2.288	10
298840	2.181	10	Argentine[b]	2.294	10
Va56R	2.200	9	Tifton Span.[c]	2.300	10
Exp. 2: Exp. $\bar{X}$, 2.449; High, 2.862; Starr, 2.275; C.V., 11.9%			Exp. 5: Exp. $\bar{X}$, 2.710; High, 3.281; Starr, 2.456; C.V., 9.7%		
298877	2.075	21	268770	2.806	27
248760	2.150	18	295987	2.450	15
268766	2.181	16	Starr	2.456	15
268723	2.188	14	262076	2.475	14
268724	2.231	10	268794	2.475	14
306358	2.244	8	306224	2.481	14
268790	2.262	7	270804	2.488	14
P-761	2.275	7	298848	2.519	14
Starr	2.275	7	300589	2.538	10
268777	2.281	7	234420	2.575	6
Exp. 3: Exp. $\bar{X}$, 2.475; High, 2.756; Starr, 2.362; C.V., 11.6%			Exp. 6: Exp. $\bar{X}$, 2.817; High, 3.281; Starr, 2.806; C.V., 10.6%		
259594	2.256	7	280688	2.056	47
268721	2.262	7	268740	2.488	22
295983	2.262	7	268644	2.519	20
268804	2.269	6	268703	2.531	19
295989	21269	6	306225	2.538	19
229553	2.275	6	298866	2.550	17
162659	2.306	6	Spanette	2.606	9
306222	2.319	4	306226	2.606	9
268689	2.325	4	295984	2.612	9
268668	2.338	4	259834	2.619	9

Table 29. (Continued)

P.I. No.	Rating	No. ent. more damaged*	P.I. No.	Rating	No. ent. more damaged*
Exp. 7: Exp. $\bar{X}$, 2.918; High, 3.237; Starr, 2.600; C.V., 8.4%			Exp. 9: Exp. $\bar{X}$, 2.552, High, 2.988; Starr, 2.331; C.V., 9.4%		
Starr	2.600	25	Argentine S[a]	2.269	18
Argentine S[a]	2.606	22	268771	2.281	18
T-437	2.612	20	268626	2.294	17
290597	2.681	14	298869	2.300	17
Va 462	2.719	10	Starr	2.331	17
268701	2.769	9	268716	2.338	15
270817	2.775	9	298872	2.356	13
268821	2.775	9	161868	2.362	13
259745	2.781	9	NC-4X	2.369	11
230328	2.788	9	295973	2.375	11
Exp. 8: Exp. $\bar{X}$, 2.591; High, 2.938; Starr, 2.494; C.V., 8.5%			Exp. 10: Exp. $\bar{X}$, 2.514; High 3.081; Starr, 2.356; C.V., 10.3%		
299468	2.262	27	306223	2.156	25
311264	2.294	25	259767	2.250	15
298847	2.325	21	268734	2.352	13
185632	2.344	19	298876	2.352	13
121298	2.375	18	300246	2.352	13
OICB-1271	2.381	18	290599	2.306	12
298863	2.388	18	295986	2.344	11
280689	2.394	18	Spanette	2.350	11
261970	2.425	17	Starr	2.356	11
259728	2.431	17	268654	2.375	9

* $p \leq .05$

Table 30.--Mean multiple-leaf[a] ratings of top ten peanut entries in each of ten experiments, 1967.

P.I. No.	Rating	No. ent. more damaged*[b]	P.I. No.	Rating	No. ent more damaged*[b]
Exp. 1: Exp. $\bar{X}$, 2.448; High, 2.788; Starr, 2.419; C.V., 10.6%			Exp. 4: Exp. $\bar{X}$, 2.647; High, 3.025; Starr, 2.462; C.V., 7.7%		
268771	2.169	9	268711	2.438	6
259860	2.206	7	268708	2.456	6
300244	2.281	4	Starr	2.462	6
Va56R	2.306	3	121070-1	2.481	6
306228	2.312	3	Argentine[c]	2.491	5
298840	2.325	2	268768	2.531	5
268769	2.356	2	268713	2.531	5
162524	2.381	2	268661	2.544	5
290606	2.400	1	268701	2.562	4
268677	2.412	1	121070-3	2.594	4
Exp. 2: Exp. $\bar{X}$, 2.582; High, 3.088; Starr, 2.431; C.V., 10.9%			Exp. 5: Exp. $\bar{X}$, 2.656; High, 3.150; Starr, 2.550; C.V., 8.8%		
268777	2.281	8	268770	2.444	4
268823	2.375	5	268830	2.519	3
268766	2.400	5	259662	2.538	3
268723	2.431	2	306224	2.538	3
Starr	2.431	2	Starr	2.550	3
248760	2.456	1	268497	2.556	3
298877	2.469	1	295987	2.562	3
259536	2.475	1	298848	2.562	3
161300	2.512	1	280690	2.575	3
268829	2.531	1	268764	2.575	3
Exp. 3: Exp. $\bar{X}$, 2.697; High, 3.238; Starr, 2.606; C.V., 8.4%			Exp. 6: Exp. $\bar{X}$, 2.600; High, 3.000; Starr, 2.488; C.V., 9.8%		
259594	2.400	13	280688	2.194	19
268678	2.425	10	306226	2.319	8
268706	2.475	7	279481	2.319	8
306222	2.475	7	Argentine	2.400	6
268721	2.506	5	298855	2.431	5
229553	2.569	3	Starr	2.488	4
268804	2.575	3	Spanette	2.531	4
Florigiant	2.594	3	268740	2.544	2
Starr	2.606	3	298837	2.569	2
268791	2.657	3	270857	2.575	2

Table 30. (Continued)

P.I. No.	Rating	No. ent. more damaged*[b]	P.I. No.	Rating	No. ent. more damaged*[b]
Exp. 7: Exp. $\bar{X}$, 2.858; High, 3.319; Starr, 2.575; C.V., 9.3%			Exp. 9: Exp. $\bar{X}$, 2.764; High, 3.394; Starr, 2.581; C.V., 10.0%		
290597	2.562	11	298872	2.494	6
Starr	2.575	11	298869	2.506	6
Va462	2.631	7	268778	2.531	4
Argentine S[d]	2.656	5	OACP58-16	2.556	4
259745	2.675	5	Starr	2.581	4
268721	2.688	5	OICRB	2.612	3
T-437	2.712	5	268771	2.644	3
290599	2.738	5	NC-4X	2.662	3
T-400-1	2.744	5	295973	2.675	3
298852	2.756	5	268716	2.675	3
Exp. 8: Exp. $\bar{X}$, 2.600; High, 3.200; Starr, 2.569; C.V., 9.0%			Exp. 10: Exp. $\bar{X}$, 2.828; High, 3.231; Starr, 2.744; C.V., 6.7%		
298863	2.375	4	306223	2.569	9
299468	2.394	3	298839	2.644	6
185632	2.462	3	259767	2.669	6
162538	2.469	3	295986	2.694	6
121298	2.475	3	Spanette	2.700	6
275497	2.500	3	268734	2.738	5
298847	2.506	1	298846	2.744	5
268725	2.531	1	Starr	2.744	5
OICB-1271	2.538	1	259774	2.775	4
295971	2.550	1	300246	2.775	4

* $p \leq .05$

[a] The two most heavily damaged leaves per plant were rated.

[b] Twenty-four entries per test--four which previously showed high damage and 20 with low damage.

[c] Mass selection

[d] Argentine selection

may have resulted from the lower thrips populations and damage levels present in 1967. Most of the re-tested entries were less damaged than they had been the previous year, but other entries were also lightly damaged. Thus, fine discrimination among better entries was not probable. There was a trend, however, for the repeated entries to have less damage than the average for their experiments. Fifty-six were not significantly more damaged than the best entry in each experiment.

The susceptible entries chosen in 1966 were again more heavily damaged in 1967. Some of the susceptible entries which were heavily damaged in five evaluations of three plantings included P.I. 145045, P.I. 155053, P.I. 268633, P.I. 259591, P.I. 268649, P.I. 221708, and P.I. 262000.

It appears that there are a few entries which are highly susceptible while the majority are only slightly susceptible. There are approximately 30 entries which give some indication of a low level of resistance. These entries are being re-evaluated under heavy thrips infestations and subjected to breeding experiments before genetic resistance can be established.

SUMMARY

Eight hundred seventy-two peanut entries were tested for resistnace to thrips by measuring leaf damage and thrips population.

In 1966, 481 entries were tested in ten 7 x 7 balanced lattice experiments. Thrips populations were measured and leaf damage was evaluated by two methods for each entry. Significant differences ($p \leq .05$) were found among entries in each experiment. In August, 79 entries from both ends of the damage spectrum were planted and seedling plants were evaluated for leaf damage. These data ranked entries chosen as "resistants" above those chosen as "susceptibles" in most cases.

In 1967, 89 entries were re-evaluated along with 391 new entries. Thrips populations were not measured on experimental entries, but random samples were taken from "Krinkle" leaf spreader rows to gauge thrips population differences at different times and positions. The thrips population was much lower in 1967 than in 1966. After leaf damage was evaluated once and analyzed, entries from both ends of the damage spectrum were re-evaluated. Significant ($p \leq .05$) differences in leaf damage among entries were found in all experiments. The better entries re-tested from the 1966 list failed to show outstandingly low damage levels in 1967. Most of the susceptible entries re-tested had consistently heavy damage.

A few entries showed some indication of a low level or resistance.

Among these were P. I. 280688 and P. I. 268661.

II

LABORATORY TESTS

INTRODUCTION

The results of field experiments reported in Part I of this thesis indicated that there were differences in degree of resistance or susceptibility to thrips among the 872 peanut entries tested. It was desirable, therefore, to further examine the more promising entries under controlled conditions in the laboratory to determine their general mechanisms of resistance--non-preference, antibiosis, or tolerance.

There had been little statistical discrimination among the better entries in each field experiment and little basis of comparison of entries in different field experiments. Therefore, a decision was made to screen several dozen entries in the laboratory rather than to do intensive testing of a few entries.

Antibiosis was measured by confining a known number of thrips larvae on leaves of each peanut entry and counting the number that survived for 1 week.

Tolerance was estimated by rating the amount of damage sustained by leaves to which 30 thrips larvae had been confined for 1 week.

Thrips preference among peanut entries was evaluated by exposing potted plants of several entries to adult female thrips in a circular rotating cage and counting the number of thrips on each plant at the end of the testing period.

Laboratory experiments were not designed to confirm or reject field results. The plant or the insect may behave differently in the environment of the laboratory than it does in the field (Painter 1954). The objective of these preliminary laboratory experiments was to test a number of peanut entries under controlled conditions to detect measurable differences among entries in the effects of preference, antibiosis, and tolerance.

REVIEW OF THE LITERATURE

Each of the general mechanisms of resistance discussed in Part I of this thesis, may operate through morphological, chemical, or physiological characteristics of the plant (Jones et al. 1934). Preference for food or oviposition sites may depend on visual, tactile, gustatory, or olfactory stimuli which attract or repell the insect. Antibiosis may result from physical characteristics of the plant or chemical factors, whether toxins, lack of nutrients, or other necessary behavior stimulants. Tolerance is affected by growth hormones as well as gross morphology and tissue structure of the plant (Block 1941, Painter 1951).

A number of studies have been done on host selection and nutrition of phytophagous insects. Results have indicated that a very complex interaction of factors may influence resistance (Thorsteinson 1960, Beck 1965).

This review of the literature revealed no reports on laboratory studies of thrips resistance in peanuts. However, a number of methods have been developed for determining the basis of resistance in other insect-plant associations. There are also some reports of techniques for manipulating and caging thrips.

More resistance experiments have involved aphids than any other insect group. This is probably due to the large number of species that are economic pests and the relative ease of studying them (Painter 1951).

Antibiosis of small grain seedlings against greenbugs has been measured by confining one adult on each plant and counting the progeny at the end of one week (Dahms et al. 1955, Chada et al. 1961). Dahms et al. also recorded the amount of damage to the same plants as a measure of tolerance.

Harvey and Hackerott (1956) caged alfalfa leaves with dialysis tubing and inoculated each cage with 20 nymphal or adult aphids. They were able to count the insects through the transparent tubing without removing the cage, thus obtaining several measurements of antibiosis at different times.

Cartier and Painter (1956) caged sorghun leaves in a similar manner and counted the progeny of one aphid as a measure of antibiosis.

Poos and Smith (1931) measured leafhopper development on different varieties of host plants by inoculating each plant with first instar nymphs. The number maturing and rate of maturation were recorded.

Klement and Randolph (1960) inoculated alfalfa seedlings with one apterous aphid per plant. At three-day intervals, they counted the number of aphids on randomly selected leaflets as a measure of antibiosis. Tolerance was measured on the same plants by rating entire plants on a 9-point damage scale where nine indicated death of the plant. Significant differences were found among damage levels of several varieties by this method.

Chada et al. (1961) tested tolerance of small grains to greenbugs. Sprouted seeds of several varieties, including resistant and susceptible checks, were planted in a flat, caged in transparent cellulose nitrate plastic. Each plant was inoculated with five greenbugs and evluated 10 to 14 days later. Ratings were on a scale or zero to five, based on the percentage of leaf area damaged.

Ivanoff (1945) compared seedling cucurbits for tolerance by inoculating them with equal numbers of aphids. Susceptible entries showed a marked curling of the leaves while resistant ones did not.

Dahms et al. (1955) tested greenbug preference of small grains by releasing nymphs in the center of caged 6-inch pots containing single plants of eight different varieties. The number of greenbugs on each plant was counted for four consecutive days. The same plants were later rated for tolerance on a five-point scale.

Poos and Smith (1931) tested leafhopper preference for legume varieties by exposing adults to two potted plants of each of two entries in a glass cage. Adults were allowed to oviposit from 1 to 5 days, then were killed by fumigation. The nymphs were counted and removed as they hatched.

Cartier and Painter (1956) measured preference of the corn leaf aphid for different sorphum entries by exposing insect-free plants in an infested greenhouse. Every two or three days the adult aphids on each plant were counted and removed.

The specific methods to be used in determining which type of resistance a plant possesses depend upon the insect and the level of resistance (Painter 1951).

Because of their small size, thigmotrophic nature, and the difficulty of handling them, thrips require special methods for laboratory testing (Bryan and Smith 1956). In order to be thrips-tight, a cage should have no openings larger than 0.0025 inch, but ventilation must be provided to prevent condensation of moisture (Sakimura 1961, Munger 1942). Bailey (1931) tested transparent, permeable cellulose films for this purpose. He reported that cages of this material were very satisfactory for providing humidity and temperature similar to those outside the cage.

George (1961) caged thrips on whole potted plants by use of polyethylene bags which were ventilated by forced air. The air outlets were covered with fine cloth and pressure was maintained at a level sufficient to keep the bags inflated. A number of other cages have been designed but are not suitable for use on intact leaves on a plant.

The most often used technique for manipulating thrips has been to pick them up individually with a small moistened brush (Bailey 1933, Samuel et al. 1930, Bryan and Smith 1956) or to brush groups of anesthetized thrips off leaves with a powdered brush (Munger 1942). George (1961) transferred thrips from one cage to another with an aspirator.

As an adjunct to another study, Wardle (1927) measured thrips infestations on uncaged cotton plants of five varieties. They found differences in degree of susceptibility among the varieties, but did not attempt to discriminate between preference and antibiosis effects. Wardle and Simpson (1927) studied feeding lesions in detail and concluded that the thickness of the epidermis would affect the degree of injury to the plant. They did not test varietal reactions to damage.

Callan (1943) conducted laboratory tests to measure antibiosis and preference of thrips on field-resistant cacao plants. He confined 50 to 100 thrips on an isolated cocao leaf and counted the number alive after three, five, and seven days. He was apparently able to observe thrips on the large flat leaves without disturbing them. He tested preference in two ways. Larvae were exposed to 4.8 cm leaf discs of two varieties arranged in a 4 x 4 alternating pattern. In the second test 500 larvae were placed on an uncaged plant and the number remaining there were counted at 24 hour intervals.

METHODS AND MATERIALS

Fifty-nine peanut entries which appeared resistant in field experiments were tested in the laboratory in an attempt to determine the general mechanisms of resistance. Eight highly susceptible entries as well as Starr variety were included as controls.

Peanut seeds were treated with Arasan seed protectant to inhibit mold growth. To facilitate germination, seeds were placed between layers of moist paper toweling on a piece of Seran plastic food wrap and rolled into a cylinder. The plastic prevented evaporation and adhered to itself keeping the cylinder intact. The temperature was maintained at 80°F. After 2 or 3 days when the seeds had radicles approximately 1 inch long, they were ready for transplanting to 4-inch plastic pots filled with a 50-50 mixture of peat moss and perlite. Each pot was saturated with a nutrient solution containing 3 oz of Peter's 20-20-20 fertilizer in 20 gallons of water. Subsequently, 6 oz of the same nutrient solution was added to each pot at weekly intervals. Plants were maintained in a greenhouse and watered daily until they were ready to be used in resistance tests.

The thrips used in resistance tests were *Frankliniella fusca* reared in the laboratory as described by Kinzer (1968).

All experiments were conducted in a room where light and temperature were controlled. Temperature was maintained at 80 ± 2°F.

Daylight flourescent bulbs provided 2000 foot-candles of light for 12 consecutive hours of each 24 hour period.

Antibiosis-Tolerance Tests

Sixty-one peanut entries were compared in an experiment designed to measure antibiosis and tolerance. Thirty thrips larvae were caged on a leaf of each peanut entry for 7 days. The number of thrips surviving was recorded as an index of antibiosis and the damage to the leaf was rated as a measure of tolerance. The statistical design was a randomized complete block where one set of 61 entries tested at the same time was one block. There were seven blocks.

The fifth or sixth leaf on each plant was used for testing soon after it was completely unfolded. Two of the four leaflets on a leaf were removed to facilitate caging.

The cage was a 5-inch segment of dialysis tubing sealed at both ends with Scotch brand filament tape (Fig. 13). The dialysis tubing was 0.00010 inches thick and had a flat width of 1.73 inches.

Cages were constructed in the following manner. A small ring of strip caulking compound was molded around the petiole about ½ inch below the axial leaflet then the dialysis tubing was placed over the leaf and gently pressed against the caulking compound. A small incision was made into the tubing and caulking compound and the tubing was folded over the depth of the cut. A similar fold was made at the other end of the cage after thrips were introduced into it. In this way the adhesive surface of the tape was not exposed to the interior of the cage and

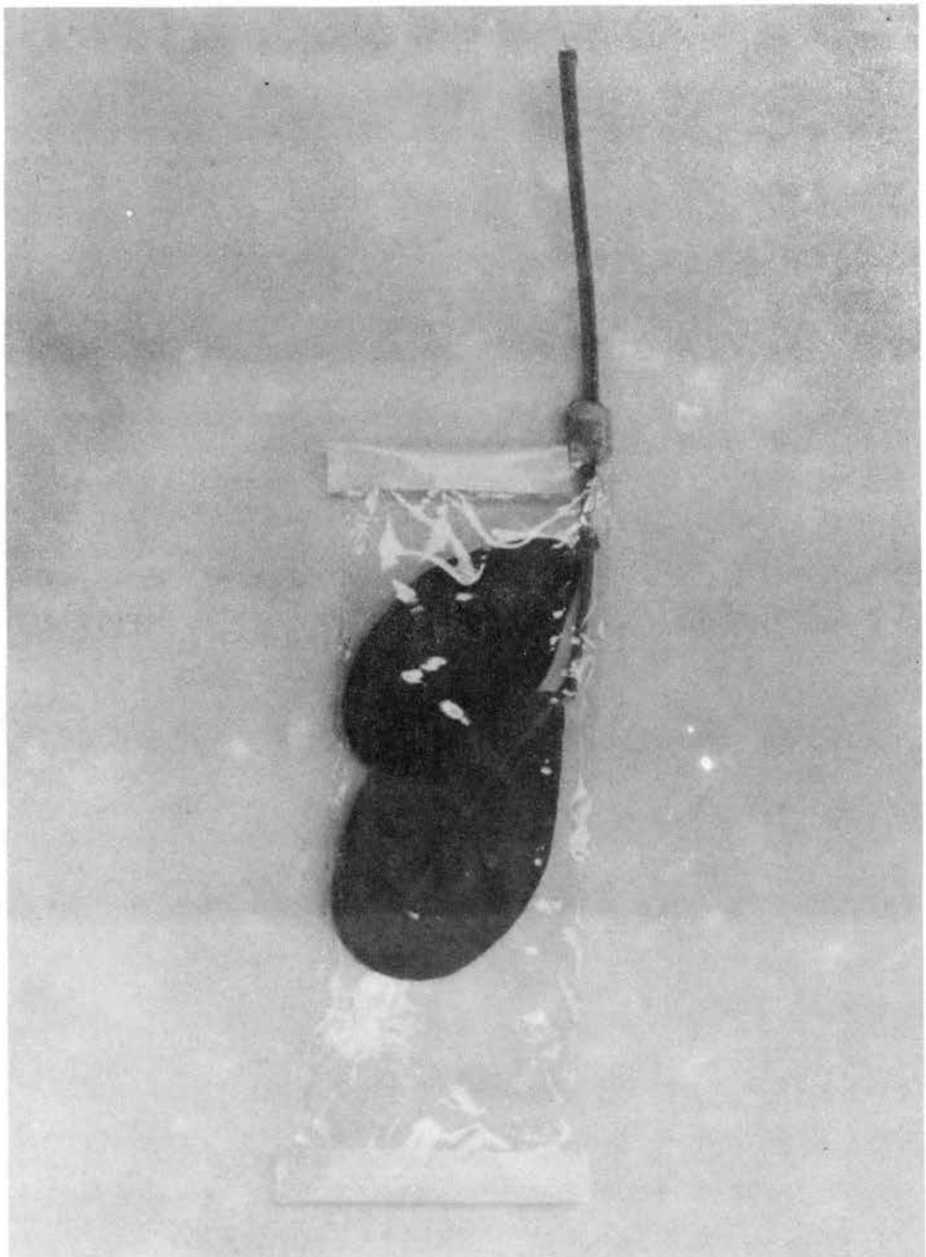

Fig. 13.-Dialysis tubing cage for confining thrips on peanut leaflets.

thrips did not become trapped in it.

Larvae were used for infesting caged leaves 8 days after oviposition (2 or 3 days after hatching). The leaves on which they were feeding were shaken over a smooth black surface. Larvae were then counted and transferred to test cages in groups of ten by use of an aspirator operated by a slight vacuum. The aspirator hose was attached to a piece of copper tubing ¼-inch in diameter, the end of which was covered with a piece of hard finish, 100 mesh fabric. This small rigid aspirator tip could be manipulated accurately to pick up one larva at a time. The electric motor of the vacuum apparatus (Fig. 14) could be turned off and on with a foot switch so that the operator had both hands free to manipulate the aspirator tip and the caged peanut leaves. The larvae were held on the fabric by the vacuum until the tip was inserted into the leaf cage, then the vacuum was turned off and the tube gently tapped to dislodge larvae from the fabric.

After 7 days, each cage was cut open and the number of live thrips were counted by removing each one with a fine sable brush. Both surfaces of both leaflets were rated for damage on an 8-point scale where the absence of feeding marks was "1" and scarring of the entire surface was "8." Two judges made independent ratings of the four surfaces and the average of the eight ratings was treated as a unit observation.

Preference Tests

In order to test preference among peanut entries, potted plants were exposed to adult female thrips in a cylindrical rotating cage

(Fig. 15) and the number of thrips on each entry at the end of the testing period were counted. The rotating cage was designed to equalize light intensity and direction and cancel any other biasing factors.

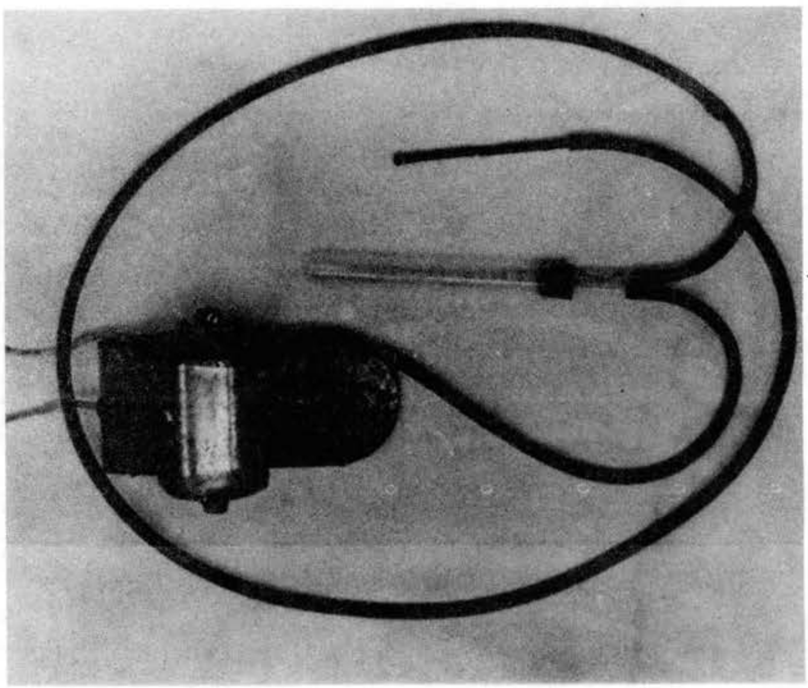

Fig 14.-Aspirator, powered by electric Hudson duster, for transferring thrips larvae to testing cages.

The cage was 36 inches in diameter and 14 inches high. The bottom of the cage was of masonite, the walls were of transparent cellulose nitrate plastic, and the top was glass. The walls were supported by two circular metal rims at the top and bottom. The glass top was removable and was sealed to the top metal rim with strip caulking compound during testing.

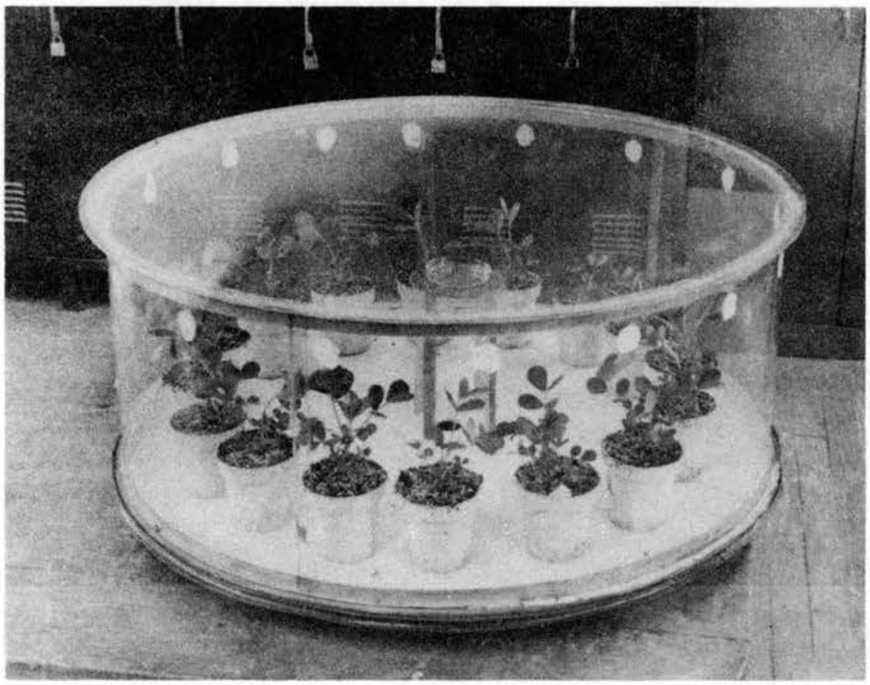

Fig. 15.-Rotating cage used in comparing thrips preference for peanut entries.

The cage was continuously ventilated by a squirrel cage fan which forced air through a 2-inch pipe in the center of the cage floor. The air outlets were 16 cloth-covered holes evenly spaced around the top of the cage walls. The cage was mounted on a turntable which rotated at 1/8 rpm.

Plants were tested when they were about 3 weeks old and in the five-leaf stage of growth. An attempt was made to select plants of uniform size for each replication (block) of the experiment. One plant of each of 16 entries was tested in the cage at the same time. They were arranged in a circle so that all were equidistant from the center and from the adjacent plants. Relative positions of the entries were randomized for each replication of the experiment.

Four hundred adult female thrips were released from a petri dish on a platform in the center of the cage (Fig. 15). The lid was then sealed in place and the cage was allowed to rotate for 2 days. The lid was then removed and each plant was cut off at the crown and placed in a 1-gal Berlese funnel. The methods of extracting and counting the thrips were the same as described earlier in Part I.

Two preference experiments were conducted using these methods. In the first experiment four entries which were susceptible in field experiments were placed at 90-degree intervals in the circular cage. The other 12 entries were randomized among them for each of six replications of the experiment.

In the second experiment two entries which were preferred in the first preference experiment were included as susceptible checks and placed opposite each other (180 degrees) in the cage. The Starr variety and four other entries were also repeated.

Difficulties

It was necessary to test plants that were healthy, uniform, insect free, and insecticide-free. Peanut plants were usually easy to raise, but occasionally all the foliar buds would turn brown and die. Other workers in a separate greenhouse had peanut plants with similar symptoms. The pH of the water supply did not vary with the condition and the difficulty could not be attributed to any variation in procedure. Plants were also sensitive to lack of light and became etiolated during periods of cloudy weather. They would not tolerate shading and, therefore, could not be caged to screen out insect pests.

It was necessary to raise three or four times as many plants as were tested to insure having one satisfactory plant of each entry for a complete block. All plants that were visibly aberrant were discarded.

Plants in the greenhouse became infested with leaf-rolling pyralid caterpillars, two-spotted spider mites, and aphids at various times during the tests. When infestations occurred it was necessary to discard all plants and fumigate the greenhouse.

It was also difficult to keep the greenhouse and the testing room free from insecticides when experiments involving insecticides were carried on nearby. At one time the entire thrips culture was killed in one day. Eggs within the plant tissue were not harmed and the culture was re-established.

Finally, it was difficult to plan thrips rearing efforts so that adequate numbers of larvae of the proper age were available when each set of plants was ready for testing.

RESULTS AND DISCUSSION

Analysis of variance of antibiosis tests indicated that there were highly significant differences among blocks despite attempts to maintain uniform environmental conditions and test procedures.

The average number of thrips surviving on different entries ranged from 5 to 19, but the coefficient of variation was 58% and only a few entries were significantly different.

Seven of the eight entries which had been susceptible in field tests, supported no more thrips than entries which appeared better in the field. Two consistent field-susceptible entries P.I. 268649 and P.I. 221708 had significantly fewer surviving larvae than P.I. 268654 and P.I. 268661 which had appeared resistant in the field. There was a significantly higher thrips survival on P.I. 268661 than on sixteen other entries. Its field resistance probably did not result from antibiosis.

Argentine had significantly fewer thrips than five entries. In two of the seven replications no thrips survived on Argentine.

Six other entries, P.I. 268706, P.I. 268734, P.I. 268767, P.I. 268768, P.I. 268769, and P.I. 268804 had significantly fewer thrips than P.I. 268654, P.I. 268708, and P.I. 268661. The mean number of thrips on each entry and all non-significant ranges are shown in Table 41.

Table 41. - Mean number of surviving thrips and mean leaf damage ratings of entries in antibiosis and tolerance test .

Entry (P.I. Number)	Okla. P-No.	$\bar{X}$ No. Surviving Thrips	Signif. $p \leq .05$*	$\bar{X}$ Leaf Damage	Signif. $p \leq .05$*
268649	376	5.1	a	2.95	abc
Argentine	2	5.7	ab	2.75	abc
268706	400	6.4	abc	2.77	abc
268734	656	6.6	abc	2.61	a
268769	428	6.9	abc	2.64	ab
221708	912	6.9	abc	2.82	abc
268767	334	7.4	abc	2.66	abc
268678	610	7.7	abc	2.62	ab
268804	723	8.1	abc	3.02	abc
NRM 6	486	8.9	abcd	2.73	abc
268777	695	8.9	abcd	3.13	abc
268769	685	9.0	abcd	3.20	abc
268598	349	9.3	abcd	2.96	abc
Starr	6	9.7	abcd	2.70	abc
161868	148	9.7	abcd	2.89	abc
268725	648	9.9	abcd	2.75	abc
268726	649	10.1	abcde	2.64	abc
268778	696	10.1	abcde	3.25	abc
268781	712	10.1	abcde	2.73	abc
268746	669	10.3	abcde	3.02	abc
268597	565	10.4	abcde	3.02	abc
262000	810	10.4	abcde	3.04	abc
268741	663	10.7	abcde	2.59	a
268773	691	10.9	abcde	3.12	abc
259834	898	11.0	abcde	2.95	abc
248762A	551	11.1	abcde	2.73	abc
259771	784	11.3	abcde	2.75	abc
268633	844	11.3	abcde	2.89	abc
161300	17	11.4	abcde	2.70	abc
268791	707	11.4	abcde	3.11	abc
259745	779	11.4	abcde	3.17	abc
268716	410	11.7	abcde	2.90	abc
268711	631	11.9	abcde	2.86	abc
299469	967	12.1	abcde	2.71	abc
158838	977	12.1	abcde	3.05	abc
268823	445	12.3	abcde	2.82	abc

Table 41. (Continued)

Entry (P.I. Number)	Okla. P-No.	$\bar{X}$ No. Surviving Thrips	Signif. $p \leq .05$*	$\bar{X}$ Leaf Damage	Signif. $p \leq .05$*
268648	849	12.3	abcde	3.14	abc
145045	979	12.3	abcde	3.14	abc
259800	332	12.4	abcde	2.70	abc
270857	772	12.9	abcde	2.92	abc
268748	672	13.0	abcde	3.00	abc
268787	704	13.0	abcde	3.02	abc
155053	973	13.0	abcde	2.86	abc
Strat. Span.[a]	11	13.1	abcde	2.98	abc
268708	403	13.1	abcde	2.73	abc
268740	418	13.1	abcde	2.59	a
268711	407	13.3	abcde	2.80	abc
268802	720	13.3	abcde	3.15	abc
234420	40	13.4	abcde	2.82	abc
259860	791	13.6	abcde	3.09	abc
268724	647	13.9	abcde	2.98	abc
290599	949	13.9	abcde	3.30	bc
268790	435	14.1	abcde	2.77	abc
268764	681	14.1	abcde	3.07	abc
268772	688	14.4	bcde	3.18	abc
259753	780	14.6	bcde	2.99	abc
268721	642	15.1	cde	3.08	abc
268729	652	15.4	cde	2.75	abc
268654	379	17.6	de	3.21	abc
268708	629	19.1	e	3.14	abc
268661	971	19.1	e	3.32	c

* Means not followed by the same letter are significantly different.

[a] Stratford Spanish

Tolerance

Analysis of variance of damage rating and comparison of means by Duncan's New Multiple Range Test indicated that there were significant differences among a few entries. P.I. 268740, P.I. 268741, and P.I. 268734 were less damaged that P.I. 290599 and P.I. 268661. However, damage evaluations were not independent of population counts since early death of thrips in a cage would preclude heavy damage to the leaf. Analysis of covariance was not used to adjust for infestation differences because the relationship between the two factors was not linear.

Direct comparisons of damage and population measures for individual entries indicated that three entries--P.I. 268729, P.I. 268740, and P.I. 268790--supported somewhat higher numbers of thrips, yet were less damaged than most other entries. P.I. 268741 had nearly average numbers of thrips but was very lightly damaged.

These data (Table 41) do not warrant any definite conclusions regarding tolerance of the entries.

Preference

Analysis of data from Preference Test I indicated that one entry, P.I. 268777, was significantly ($p \leq .05$) preferred over all other entries. A field susceptible entry, P.I. 268680, attracted the second highest number of thrips. Mean numbers of thrips recovered from the other entries were lower and similar to each other. Starr had a slightly higher thrips infestation than 11 of the 15 other entries. The field susceptible entries did not attract more thrips than the entries being tested for resistance.

In the second preference test one entry, P.I. 280688, was significantly less preferred than Starr, P.I. 268777, and P.I. 268611. This entry was the most promising one of the 1967 field tests. Its foliage has a marked purple hue and is more pubescent than most of the other entries tested.

P.I. 290599 had significantly fewer thrips than two entries.

P.I. 268777, which was included as a susceptible check on the basis of the first preference test, was again heavily infested. It differed significantly from the best two entries. Starr had more thrips than the mean number for the experiment.

Mean numbers of thrips recovered from each entry in both preference tests are shown in Tables 42 and 43.

One entry 268661 had significantly more thrips than 13 other entries in Preference Test II; but it had ranked least infested in the previous preference test. It was the most promising entry in 1966 field tests and was well above average in its 1967 field experiment, but was the worst entry in the antibiosis experiment and was also heavily damaged. Any resistance mechanism possessed by this entry was not measured by our testing methods. Further field and laboratory tests of this entry would be of interest.

Table 42. - Mean number of thrips recovered from peanut entries in Preference Experiment 1.

Entry (P.I. Number)	Okla. P-No.	$\bar{X}$	Signif. $p \leq .05$*
268740	418	10.50	a
268661	971	10.50	a
259745	779	10.83	a
268648	849	10.83	a
155053	973	11.00	a
268633	844	12.00	a
268804	723	12.00	a
Argentine Sel.[a]	74	12.66	a
259594	311	12.66	a
268734	656	12.83	a
268770	686	12.83	a
Starr	6	13.00	a
268772	688	14.00	a
268794	711	15.33	a
268649	376	17.50	a
268777	695	24.33	b

* Means not followed by the same letter are significantly different.

[a] Argentine Selection

Table 43. - Mean number of thrips recovered from peanut entries in Preference Experiment 2.

Entry (P.I. Number)	Okla. P-No.	$\bar{X}$	Signif. $p \leq .05$*
280688	326	9.67	a
290599	949	11.17	ab
268741	663	12.33	abc
268649	376	12.50	abc
Krinkle leaf	151	13.00	abc
268725	648	13.83	abc
Argentine	2	14.83	abc
268772	688	14.83	abc
259745	779	15.00	abc
268740	418	15.17	abc
OICRB-1271	112	15.17	abc
268678	610	15.67	abc
268729	652	16.50	abc
Starr	6	18.17	bcd
268777	695	18.83	cd
268661	971	23.83	d

* Means not followed by the same letter are significantly different.

SUMMARY

Fifty-nine entries which appeared resistant in field experiments were tested in the laboratory in experiments designed to detect antibiosis, tolerance or non-preference. Antibiosis and tolerance were measured by confining 30 larvae on a leaf, counting the number of thrips which survived one week, and rating the damage of the leaf.

Preference was measured by exposing 16 entries to adult female thrips in a cylinderical rotating cage and counting the number on each entry at the end of 2 days.

Argentine was the best entry in antibiosis tests. It was significantly different ($\underline{p} \leq .05$) from five other entries.

Tolerance tests were inconclusive.

P.I. 280688, which had been outstanding in field tests was significantly ($\underline{p} \leq .05$) less preferred than Starr.

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APPENDIX

Table 1. - Mean number of thrips per foliar bud from peanut entries, Experiment 4, 1966.

Entry (P.I. No.)	Okla. P-No.	Mean No. Thrips per Bud	Significant $p \leq .05$*
Starr	6	4.82	fghijk
	761	4.71	defghi
240570	826	6.46	opqrs
248761	550	4.29	bcdef
259719	892	4.07	bcdef
259774	785	5.53	ijklmn
259778	867	7.04	rs
259800	787	3.83	abcd
259827	790	5.36	hijklm
261919	799	6.03	lmnop
261951	517	7.23	t
262000	810	7.87	t
262013	533	4.07	bcdef
262042	793	6.90	qrs
268545	341	4.78	efghij
268611	357	5.29	ghijkl
268616	837	5.70	klmno
268632	843	3.80	abc
268636	366	5.68	klmno
268642	590	4.43	bcdefg
268643	847	5.28	ghijkl
268644	372	4.26	bcdef
268647	373	6.90	qrs
268648	849	4.28	bcdef
268649	376	6.38	nopqr
268654	379	3.78	abc
268673	605	5.33	hijklm
268679	859	5.26	ghijkl
268685	618	4.35	bcdef
268701	395	6.82	pqrs
268704	626	5.98	lmno
268708	629	3.84	abcd
268711	632	4.34	bcdef
268712	409	4.93	fghijk
268714	635	4.26	bcdef
268729	652	4.95	fghijk
268737	659	4.22	bcdef
268743	665	4.82	fghijk
268757	677	4.32	bcdef
268778	696	3.92	abcde
268788	878	5.95	lmno
268806	725	5.63	jklmno
268811	729	4.32	bcdef
268812	441	4.49	bcdefgh
268817	735	4.67	cdefghi
268823	445	3.19	a
268828	450	6.17	mnopq
270791	884	4.82	fghijk
271022	467	3.62	ab

* Means not followed by the same letter are significantly different.

Table 2.-- P.I. numbers of peanut entries with significantly different ($p \leq .05$) thrips populations, Experiment 1, 1966.

High Population Entries[b]	Low Population Entries[a]																							
	261984	268723	268738	259771	268795	248767	268663	268733	268715	268774	Krinkle	Starr	259767	268649	268738	261938	270836	290608	268787	268595	261957	259701	268706	268835
268759	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
262048	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
268609	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*								
262057	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*								
268706	*	*	*	*	*	*	*	*	*	*	*	*	*											
268631	*	*	*	*	*	*	*	*	*	*	*	*	*											
221708	*	*	*	*	*	*	*	*	*															
268687	*	*	*	*	*	*																		
268633	*	*	*	*																				
261933	*	*	*	*																				
262035	*	*	*																					
268821	*	*	*																					
262005	*	*	*																					
268769	*	*																						
268708	*																							

* Indicates significant difference between entries with intersecting lines.

[a] Low population entries increase in population from left to right.

[b] High population entries decrease in population from top to bottom.

Table 3.--P.I. numbers of peanut entries with significantly different ($p \leq .05$) thrips populations, Experiment 2, 1966.

High Population Entries[b]	Low Population Entries[a]																							
	NRM 1	270851	248762A	268703	268789	268801	268741	268724	270805	270773	Spantex	248758	274208	268805	268792	268577	259754	290536	Starr	268807	268600	268824	268736	268680
268624	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
268654	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*							
268744	*	*	*	*	*	*	*	*	*	*	*													
290596	*	*	*	*	*	*	*	*	*	*														
268618	*	*	*	*	*	*	*																	
262047	*	*	*	*	*	*	*																	
268808	*	*																						
268664	*	*																						
149634	*																							

* Indicates significant difference between entries with intersecting lines.

[a] Low population entries increase in population from left to right.

[b] High population entries decrease in population from top to bottom.

Table 4.--P.I. numbers of entries with significantly different ($\underline{p} \leq .05$) thrips populations, Experiment 3, 1966.

High Population Entries[b]	Low Population Entries[a]																				
	268832	268649	268740	268832	268791	268707	268804	268746	268832	268801	268742	268701	268734	Starr	268630	268765	268772	261959	268698	259765	240578
268691	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
268724	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*			
268703	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*				
268825	*	*	*	*	*	*	*	*	*	*	*	*	*	*							
247374	*	*	*	*	*	*	*	*	*	*	*	*									
Dirty White	*	*	*	*	*	*	*	*													

* Indicates significant difference between entries with intersecting lines.

[a] Low population entries increase in population from left to right.

[b] High population entries decrease in population from top to bottom.

Table 5.--P.I. numbers of entries with significantly different ($p \leq .05$) thrips populations, Experiment 5, 1966.

High Population Entries[b]	Low Population Entries[a]																							
	268678	268699	268718	268742	276776	268787	268776	268701	261922	270789	161317	Starr	268675	268628	259671	270837	261950	268614	268795	268718	268645	268808	268790	268694
261997	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
268611	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*							
268728	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*								
268638	*	*	*	*	*	*	*	*	*	*	*													
268604	*	*	*	*	*	*	*	*	*															
162804	*	*	*	*	*	*																		
271021	*	*	*																					
268818	*	*	*																					
237507	*	*																						
262068	*																							
161312	*																							
268729	*																							
259718	*																							
268629	*																							

* Indicates significant difference between entries with intersecting lines.

[a] Low population entries increase in population from left to right.

[b] High population entries decrease in population from top to bottom.

Table 6.--P.I. numbers of entries with significantly different ($\underline{p} \leq .05$) thrips population, Experiment 6, 1966.

High Population Entries[b]	Low Population Entries[a]																							
	290581	268797	268661	276105	268793	268636	268726	268818	Starr	268712	268716	268789	NRM 6	240560	268745	268693	270773	268758	268806	268599	268621	268692	268696	268830
P-970R	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
268822	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*			
268794	*	*	*	*	*																			
268751	*	*	*	*																				
259800A	*	*	*																					
268813	*																							

* Indicates significant difference between entries with intersecting lines.

[a] Low population entries increase in population from left to right.

[b] High population entries decrease in population from top to bottom.

Table 7.--P.I. numbers of entries with significantly different ($p \leq .05$) thrips populations, Experiment 7, 1966.

High Population Entries[b]	Low Population Entries[a]														
	268641	268706	270857	268617	277197	270786	268796	Starr	161300	270830	268717	268785	268826	290633	268834
261921	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
268752	*	*	*	*	*	*	*	*	*	*	*	*			
237510	*	*	*	*	*	*	*								
268637	*	*	*	*	*	*	*								
262025	*	*	*	*	*	*									
155053	*	*	*												
261925	*														
270846	*														
268790	*														
268623	*														
268711	*														

*Indicates significant difference between entries with intersecting lines.

[a] Low population entries increase in population from left to right.

[b] High population entries decrease in population from top to bottom.

Table 8.--P.I. numbers of entries with significantly different ($\underline{p} \leq .05$) thrips populations, Experiment 8, 1966.

High Population Entries[b]	Low Population Entries[a]											
	259745	259775	229553	268598	P351-1660	268816	268672	Argentine	268719	259834	268637	219824
P-970F	*	*	*	*	*	*	*	*	*	*	*	*
268684	*	*	*	*	*							
240546	*	*	*	*	*							
261976	*	*	*	*	*							

* Indicates significant difference between entries with intersecting lines.

[a] Low population entries increase in population from left to right.

[b] High population entries decrease in population from top to bottom.

Table 9.--P.I. number of entries with significantly different ($p \leq .05$) thrips populations, Experiment 9, 1966.

High Population Entries[b]	Low Population Entries[a]																			
	290599	158838	268724	268825	234420	268763	161868	268820	268782	268811	268740	268626	268828	259757	268762	299568	268711	Brown-1	268803	248762B
268598	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
268695	*	*	*	*	*	*														
259591	*	*	*	*	*	*														
261918	*	*	*	*	*															
268822	*	*	*	*																
268635	*																			
268721	*																			
261949	*																			
268707	*																			
248757	*																			
268625	*																			
162408	*																			
299467	*																			
268620	*																			
268665	*																			
268613	*																			

* Indicates significant differences between entries with intersecting lines.

[a] Low population entries increase in population from left to right.

[b] High population entries decrease in population from top to bottom.

Table 10.--P.I. numbers of entries with significantly different ($p \leq .05$) thrips populations, Experiment 10, 1966.

High Population Entries[b]	Low Population Entries[a]							
	268689	268600	268688	234421	268633	268730	260604	270777
268708	*	*	*	*	*	*	*	*
270857	*	*	*	*	*	*	*	

* Indicates significant differences between entries with intersecting lines.

[a] Low population entries increase in population from left to right.

[b] High population entries decrease in population from top to bottom.

Table 11. - Mean leaf damage ratings of peanut entries by two evaluation methods, Experiment 1, 1966.

Entry (P.I. No.)	Okla. P-No.	Single Leaf	Signif. $p \leq .05$*	Multiple Leaf	Signif. $p \leq .05$*
Starr	6	2.715	abcdefghi	2.843	ab
Brown Sel-2	955	3.016	fghijkl	2.844	ab
Krinkle leaf	151	2.737	abcdefghij	2.956	abc
OICB1272	113	2.670	abcdefh	2.875	ab
Strat. Span.[a]	11	2.475	abc	2.714	a
221708	912	3.436	mn	3.635	f
248767	554	2.772	bcdefghijk	2.927	ab
259701	777	2.774	bcdefghijk	2.986	abc
259767	783	2.826	bcdefghijk	2.722	a
259771	784	2.491	abcd	2.888	ab
259800	332	2.644	abcdef	2.889	ab
261927	514	2.626	abcdef	2.986	abc
261933	511	2.922	defghijk	2.897	ab
261938	513	2.862	cdefghijk	3.011	abc
261957	809	2.760	bcdefghijk	3.126	abcde
261984	527	2.687	abcdefgh	2.947	abc
262005	535	3.190	klm	3.496	ef
262035	792	3.004	fghijkl	3.192	abcde
262048	816	3.126	hijklm	3.046	abcd
262057	818	3.638	n	2.937	abc
268595	346	2.937	efghijkl	2.836	ab
268609	354	2.737	abcdefghij	2.895	ab
268631	582	3.046	fghijklm	3.055	abcd
268633	844	3.356	lmn	3.438	def
268649	375	2.816	bcdefghijk	3.032	abcd
268663	382	2.976	fghijkl	2.988	abc
268687	863	3.144	ijklm	2.988	abc
268704	399	2.664	abcdefg	3.015	abc
268706	400	2.638	abcdef	2.911	ab
268706	870	3.350	lmn	3.378	cdef
268708	402	3.096	ghijklm	2.937	abc
268708	404	2.794	bcdefghijk	3.121	abcde
268715	636	2.772	bcdefghijk	2.858	ab
268723	646	2.441	ab	2.684	a
268733	655	2.777	bcdefghijk	2.753	ab
268738	660	2.530	abcde	2.786	ab
268747	670	2.824	bcdefghijk	3.034	abcd
268759	874	3.140	ijklm	2.942	abc
268768	335	3.012	fghijkl	2.849	ab
268768	929	2.856	cdefghijk	2.900	ab
268769	428	2.327	a	2.986	abc
268774	693	2.752	bcdefghijk	2.744	ab
268787	432	2.944	efghijkl	2.962	abc
268795	436	2.812	bcdefghijk	2.688	a
268821	443	2.864	cdefghijk	2.976	abc
268835	752	2.722	abcdefghi	2.983	abc
270786A	883	2.898	cdefghijk	2.971	abc
270836	768	2.721	abcdefghi	2.912	ab
290608	952	3.164	jklm	2.768	ab

*Means not followed by the same letter are significantly different.

[a] Stratford Spanish

Table 12. - Mean leaf damage ratings of peanut entries by two evaluation methods, Experiment 2, 1966.

Entry (P.I. No.)	Okla. P-No.	Single Leaf	Signif. $p \leq .05$*	Multiple Leaf	Signif. $p \leq .05$*
Starr	6	2.510	abcd	2.690	abcde
NRM 1	473	2.772	abcdefghi	2.767	bcdefghi
Spantex	4	2.720	abcdefgh	2.711	abcdef
149634	974R	3.316	k	2.993	ghijklmno
152125	330	3.256	jk	3.243	o
237508	45	2.858	bcdefghij	2.876	cdefghijklm
248758	547	2.786	abcdefghi	2.912	efghijklmn
248762A	551	2.456	ab	2.560	ab
248768	555	2.651	abcdefg	2.685	abc
259754	894	3.154	hijk	3.171	no
261985	528	2.544	abcd	2.753	bcdefgh
261994	530	2.588	abcdefg	2.703	abcde
262047	794	2.933	defghijk	3.006	hijklmno
268577	344	3.154	hijk	3.141	mno
268600	566	2.452	ab	2.834	bcdefghijkl
268615	571	2.838	bcdefghij	2.981	fghijklmno
268618	572	2.845	bcdefghij	3.136	mno
268624	575	2.788	abcdefghi	3.072	klmno
268635	365	3.319	k	3.031	ijklmno
268654	854	3.185	ijk	3.052	jklmno
268659	857	2.738	abcdefgh	2.988	ghijklmno
268644	596	2.845	bcdefghij	3.122	mno
268679	611	2.673	abcdefg	2.604	abc
268680	383	2.843	bcdefghij	2.923	efghijklmn
268688	387	2.734	abcdefgh	2.768	bcdefghi
268703	624	2.565	abcdef	2.676	abcde
268724	647	2.476	abc	2.581	ab
268736	658	3.033	ghijk	2.735	abcdefgh
268741	663	2.484	abcd	2.613	abc
268744	667	2.699	abcdefg	2.672	abcde
268748	421	2.875	bcdefghij	2.930	efghijklmn
268760	426	3.016	fghijk	2.745	abcdefgh
268764	681	2.380	a	2.571	ab
	684	2.640	abcdefg	2.733	abcdefg
268789	433	2.500	abcd	2.661	abcde
268792	709	2.572	abcdef	2.736	abcdefgh
268801	721	2.561	abcde	2.810	bcdefghijk
268805	724	2.578	abcdef	2.634	abcd
268807	726	2.626	abcdefg	2.638	abcd
268808	727	2.726	abcdefgh	2.754	bcdefgh
268814	732	3.035	ghijk	2.803	bcdefghij
268824	742	2.882	bcdefghij	2.807	bcdefghijk
268827	449	2.928	cdefghijk	2.901	defghijklm
270773	456	2.843	bcdefghij	3.077	lmno
270804	462	2.536	abcd	2.475	a
270851	771	2.567	abcdef	2.686	abcde
274203	515	2.826	abcdefghij	2.993	ghijklmno
290536	945	2.880	bcdefghij	2.583	ab
290596	946	3.000	efghijk	2.759	bcdefgh

* Means not followed by the same letter are significantly different.

Table 13. - Mean leaf damage ratings of peanut entries by two evaluation methods, Experiment 3, 1966.

Entry (P.I. No.)	Okla. P-No.	Single Leaf	Signif. p ≤ .05*	Multiple Leaf	Signif. p ≤ .05*
Starr	6	2.646	abc	2.954	ab
Dirty White	29	3.328	kl	3.041	abc
Dixie Giant	964	3.284	jkl	2.918	a
NRM 6	486	3.314	kl	3.089	abc
240578	562	2.816	bcedfgh	2.955	ab
247374	823	2.769	bcdef	3.595	d
259637	337	2.848	bcdefghi	2.983	abc
259765	782	2.792	bcdefgh	3.135	abc
259860	791	2.566	ab	2.916	a
261978	813	3.178	ghijkl	3.018	abc
261959	812	2.364	a	2.939	a
262065	797	3.033	cdefghijk	3.279	bc
268626	362	3.228	ijkl	3.079	abc
268627	578	3.183	hijkl	3.141	abc
268630	842	3.096	efghijk	3.104	abc
268637	367	3.086	defghijk	3.029	abc
268639	661	2.791	bcdefgh	3.282	c
268639	845	3.054	defghijk	3.072	abc
268649	593	2.761	bcdef	3.096	abc
268650	850	3.252	jkl	3.157	abc
268654	594	3.350	kl	3.155	abc
268657	380	3.142	fghijkl	3.069	abc
268657	595	2.792	bcdefgh	3.020	abc
268680	384	3.517	l	3.086	abc
268690	615	2.776	bcdef	2.919	a
268691	866	2.686	abcd	2.913	a
268698	391	2.742	abcdef	2.937	a
268698	619	2.808	bcdefgh	2.924	a
268701	396	2.790	bcdefgh	2.860	a
268703	625	2.731	abcde	2.877	a
268707	628	2.787	bcdefgh	3.048	abc
268720	641	2.542	ab	3.106	abc
268724	411	2.765	bcdef	2.965	abc
268734	656	2.532	ab	3.102	abc
268740	417	2.852	bcdefghi	3.143	abc
268742	420	3.181	hijkl	3.011	abc
268746	669	2.592	ab	2.892	a
268752	871	3.111	efghijk	3.107	abc
268765	682	2.782	bcdefg	2.945	a
268772	689	2.743	abcdef	2.959	ab
268791	706	2.685	abcd	2.860	a
268801	719	2.865	bcdefghi	3.070	abc
268804	723	2.626	ab	2.962	abc
268825	743	3.088	defghijk	2.983	abc
268828	746	2.646	abc	3.044	abc
268832	455	2.858	bcdefghi	2.955	ab
268832	728	2.762	bcdef	3.144	abc
268832	749	2.808	bcdefgh	2.950	a
270838	464	2.912	bcdefghij	3.112	abc

* Means not followed by the same letter are significantly different.

Table 14.—Mean leaf damage ratings of peanut entries by two evaluation methods, Experiment 4, 1966.

Entry (P.I. No.)	Okla. P-No.	Single Leaf	Signif. $\underline{p} \leq .05$*	Multiple Leaf	Signif. $\underline{p} \leq .05$*
Starr	6	2.712	abc	2.766	abcdef
240570	826	3.317	hijkl	3.038	f
248761	550	2.825	abcdef	2.879	bcdef
259719	892	3.126	cdefghijk	2.857	bcdef
259774	785	2.866	abcdef	2.831	afcdef
259778	867	2.980	abcdefghijk	2.976	ef
259800	787	2.900	abcdefgh	2.853	bcdef
259827	790	2.856	abcdef	2.706	abcde
261919	799	3.122	cdefghijk	2.977	ef
261951	517	3.308	ghijkl	2.954	cdef
262000	810	3.357	jklm	3.025	f
262013	533	2.980	abcdefghijk	2.991	ef
262042	793	3.391	klm	2.967	def
268545	341	3.229	fghijkl	2.907	bcdef
268611	357	3.315	hijkl	2.775	abcdef
268616	837	3.036	abcdefghijk	2.978	ef
268632	843	3.122	cdefghijk	2.631	ab
268636	366	3.200	fghijk	3.036	f
268642	590	3.153	defghijk	3.030	f
268643	847	2.966	abcdefghijk	2.929	cdef
268644	372	2.944	abcdefghi	2.552	a
268647	373	3.378	jklm	2.907	bcdef
268648	849	3.178	efghijk	3.030	f
268649	376	3.711	m	2.933	cdef
268654	379	2.654	ab	2.762	abcdef
268673	605	3.128	cdefghijk	2.900	bcdef
268679	859	2.954	abcdefghij	2.660	abc
268697	618	2.804	abcdef	2.754	abcdef
268701	395	3.050	bcdefghijk	2.919	bcdef
268704	626	2.712	abc	2.806	abcdef
268708	629	3.617	lm	2.942	cdef
268711	632	2.764	abcde	2.782	abcdef
268712	409	2.920	abcdefgh	2.940	cdef
268714	635	2.880	abcdefg	2.910	bcdef
268729	652	2.610	a	2.792	abcdef
268737	659	2.658	ab	2.796	abcdef
268743	665	2.879	abcdef	2.773	abcdef
268757	677	3.000	abcdefghijk	2.815	abcdef
268778	696	2.716	abc	2.749	abcdef
268788	878	3.169	efghijk	3.030	f
268806	725	2.946	abcdefghi	2.872	bcdef
268811	729	2.842	abcdef	2.841	abcdef
268812	441	2.984	abcdefghijk	2.724	abcde
268817	735	2.727	abcd	2.967	def
268823	445	2.684	ab	2.675	abcd
268828	450	3.060	cdefghijk	2.977	ef
270791	884	3.132	cdefghijk	2.952	cdef
271022	467	2.626	ab	2.864	bcdef
	761	2.932	abcdefghi	2.878	bcdef

* Means not followed by the same letter are significantly different.

Table 15. - Mean leaf damage ratings of peanut entries by two evaluation methods, Experiment 5, 1966.

Entry (P.I. No.)	Okla. P-No.	Single Leaf	Signif. p ≤ .05*	Multiple Leaf	Signif. p ≤ .05*
Starr	6	2.568	ab	2.696	abcde
139918	976	3.185	hijklm	2.845	abcdefghi
161312	15	2.774	abcdefg	2.761	abcdefgh
161317	331	2.964	bcdefghijk	2.667	abc
162541	154	3.143	ghijkl	2.556	a
126804	978	3.556	m	3.252	j
237507	43	3.274	jklm	3.061	hij
247378	557	2.558	ab	2.829	abcdefghi
248766	553	2.808	abcdefghi	2.870	bcdefghi
259671	338	2.678	abcdef	2.863	abcdefghi
259718	891	3.270	jklm	2.841	abcdefghi
261922	803	2.904	bcdefghij	2.816	abcdefghi
261950	804	3.052	efghijk	2.791	abcdefghi
261958	520	2.978	cdefghijk	2.807	abcdefghi
261997	472	3.256	jklm	3.033	ghij
262068	817	3.500	lm	3.088	ij
268604	568	3.096	ghijk	2.982	defghij
268611	356	3.313	klm	2.971	cdefghij
268614	570	2.780	abcdefgh	2.837	abcdefghi
268615	358	3.068	fghijk	2.842	abcdefghi
268617	838	2.910	bcdefghijk	2.817	abcdefghi
268628	579	3.009	defghijk	2.889	bcdefghi
268628	579	3.009	defghijk	2.889	bcdefghi
268629	580	3.040	efghijk	3.002	efghij
268638	588	3.196	ijklm	2.937	cdefghi
268645	848	3.036	efghijk	2.835	abcdefghi
268675	607	2.936	bcdefghijk	2.820	abcdefghi
268678	610	2.416	a	2.587	ab
268694	869	2.936	bcdefghijk	2.748	abcdefg
268699	620	2.471	a	2.890	bcdefghi
268701	622	3.076	fghijk	2.784	abcdefghi
268718	370	3.312	[illegible]klm	3.015	fghij
2687[illegible]	639	2.876	bcdefghij	2.857	abcdefghi
2687[illegible]8	651	2.936	bcdefghijk	2.716	abcdef
268729	413	2.913	bcdefghijk	2.785	abcdefghi
268739	416	2.772	abcdefg	2.866	bcdefghi
268742	664	2.762	abcdefg	2.922	cdefghi
268743	666	2.930	bcdefghijk	2.793	abcdefghi
268773	691	2.657	abcde	2.688	abcd
268776	694	2.991	cdefghijk	2.762	abcdefgh
268787	704	2.612	abcd	2.738	abcdefg
268790	705	2.782	abcdefgh	2.813	abcdefghi
268795	437	2.881	bcdefghij	2.934	cdefghi
268802	720	2.789	abcdefghi	2.783	abcdefghi
268808	439	2.590	abc	2.850	abcdefghi
268818	442	2.984	cdefghijk	2.724	abcdefg
270789	759	2.882	bcdefghij	2.887	bcdefghi
270837	769	2.800	abcdefghi	2.850	abcdefghi
271021	466	3.225	jklm	2.934	cdefghi
276776	754	2.932	bcdefghijk	2.689	abcd

* Means not followed by the same letter are significantly different.

Table 16. - Mean leaf damage ratings of peanut entries by two evaluation methods, Experiment 6, 1966.

Entry (P.I. No.)	Okla. P-No.	Single Leaf	Signif. $p \leq .05$*	Multiple Leaf	Signif. $p \leq .05$*
NRM 6	486	2.685	abcd	2.856	defghijkl
Ross Select.	328	2.860	bcdefghi	2.855	defghijkl
Starr	6	2.836	bcdefgh	2.767	defg
[illegible]	970R	3.323	jklmn	2.989	efghijkl
234422	42	3.191	fghijklm	3.062	jkl
237569	47	3.458	lmn	2.953	efghijkl
240560	515	2.866	bcdefghi	2.938	efghijkl
259800A	990	2.854	bcdefghi	2.916	efghijkl
259835	899	2.810	abcdefg	2.787	defghi
261952	518	3.272	hijklm	2.979	efghijkl
262072	500	3.298	ijklm	3.111	l
268599	351	2.621	abc	2.956	efghijkl
268621	840	3.017	cdefghijkl	2.480	ab
268636	353	3.210	ghijklm	3.029	ghijkl
268636	583	2.700	abcde	2.891	defghijkl
268652	852	3.323	jklmn	3.091	kl
268654	377	3.385	klmn	3.026	fghijkl
268661	971	2.384	a	2.501	ab
268683	612	3.208	ghijklm	2.907	efghijkl
268685	613	2.826	abcdefgh	2.996	efghijkl
268692	393	2.964	cdefghijk	2.978	efghijkl
268693	868	3.115	defghijklm	2.893	defghijkl
268696	617	2.810	abcdefg	2.806	defghij
268712	633	2.772	abcdefg	2.792	defghi
268716	410	2.613	abc	2.796	defghi
268726	649	2.696	abcde	2.764	defg
268745	668	2.774	abcdefg	2.841	defghijk
268747	671	2.621	abc	2.781	defgh
268751	674	2.994	cdefghijk	2.894	defghijkl
268758	424	3.027	cdefghijklm	2.825	defghij
268777	695	2.501	ab	2.643	bcd
268781	877	3.390	klmn	3.022	fghijkl
268786	702	2.890	bcdefghij	2.909	efghijkl
268789	434	3.054	cdefghijklm	2.769	defg
268791	707	2.722	abcde	2.741	cde
268792	708	2.900	bcdefghij	2.847	defghijk
268793	710	2.886	bcdefghij	2.760	def
268794	711	2.727	abcde	2.897	defghijkl
268796	714	2.744	abcdef	2.907	efghijkl
268797	715	2.831	bcdefgh	2.745	cde
268806	879	3.148	efghijklm	3.051	ijkl
268813	880	3.734	n	3.114	l
268818	736	2.797	abcdefg	2.825	defghij
268821	739	3.465	mn	3.047	hijkl
268822	444	3.026	cdefghijklm	2.928	efghijkl
268830	4540	2.990	bcdefghij	2.770	defg
270773	457	3.027	cdefghijklm	2.859	defghijkl
276105	941	2.954	bcdefghijk	2.524	abc
290581	944	2.874	bcdefghi	2.354	a

* Means not followed by the same letter are significantly different.

Table 17. - Mean leaf damage ratings of peanut entries by two evaluation methods, Experiment 7, 1966.

Entry (P.I. No.)	Okla. P-No.	Single Leaf	Signif. $p \leq .05$*	Multiple Leaf	Signif. $p \leq .05$*
Dixie Spanish	3	2.890	abcdefgh	3.011	efghi
Starr	6	2.662	abc	2.701	abc
T 206-6-1	176	2.982	bcdefghijk	2.760	abcde
F416-2	938	3.021	bcdefghijk	2.542	a
145045	979	3.381	kl	3.055	ghi
155053	973	3.463	l	3.042	ghi
161300	17	2.623	ab	2.732	abcd
237510	46	3.118	efghijkl	2.905	bcdefghi
259579	789	2.764	abcde	2.721	abcd
259603	900	2.776	abcde	2.673	ab
259812	788	2.746	abcde	2.856	bcdefgh
261921	800	3.390	kl	2.905	bcdefghi
261925	802	3.309	ijkl	3.053	ghi
262025	534	3.114	defghijkl	3.009	efghi
262050	496	3.356	jkl	2.900	bcdefghi
264159	333	2.955	bcdefghij	2.824	bcdefg
268596	347	3.030	bcdefghijk	2.817	bcdefg
268598	350	2.854	abcdef	2.931	bcdefghi
268613	586	3.324	ijkl	2.926	bcdefghi
268616	359	3.054	cdefghijkl	2.710	abcd
268616	361	3.298	hijkl	3.129	i
268623	574	2.918	abcdefghi	2.970	defghi
268637	369	3.239	fghijkl	3.088	hi
268641	589	2.820	abcdef	2.774	abcdef
268658	856	2.884	abcdefgh	2.840	bcdefgh
268670	603	3.296	hijkl	2.891	bcdefghi
268688	864	3.274	ghijkl	2.951	cdefghi
268706	405	2.874	abcdefg	2.688	ab
268711	631	2.689	abcd	2.849	bcdefgh
268716	637	2.796	abcde	2.881	bcdefghi
268717	638	2.758	abcde	2.934	bcdefghi
268749	422	2.829	abcdef	2.844	bcdefgh
268767	427	2.841	abcdef	2.894	bcdefghi
268752	423	3.378	kl	3.050	ghi
268774	692	2.940	bcdefghij	2.773	abcde
268781	712	2.768	abcde	2.746	abcd
268781	697	3.152	efghijkl	3.034	fghi
268785	701	2.844	abcdef	2.870	bcdefgh
268790	435	2.749	abcde	2.863	bcdefgh
268796	713	2.814	abcde	2.816	bcdefg
268816	737	3.058	cdefghijkl	3.091	hi
268824	942	2.744	abcde	2.537	a
268826	448	3.166	efghijkl	2.804	bcdefg
268834	751	3.160	efghijkl	2.849	bcdefgh
270786	459	2.993	bcdefghijk	2.951	cdefghi
270830	765	2.930	abcdefghi	2.880	bcdefghi
270846	770	3.006	bcdefghijk	2.904	bcdefghi
270857	772	2.517	a	2.680	ab
290633	953	2.914	abcdefghi	2.678	ab

* Means not followed by the same letter are significantly different.

Table 18. - Mean leaf damage ratings of peanut entries by two evaluation methods, Experiment 8, 1966.

Entry (P.I. No.)	Okla. P-No.	Single Leaf	Signif. $p \leq .05$*	Multiple Leaf	Signif. $p \leq .05$*
Argentine	2	2.836	abc	2.776	abcde
Pearl	12	3.298	cdefghijk	2.831	abcdef
Starr	6	2.878	abcd	2.782	abcdef
NRM 2	474	3.023	abcdefgh	2.820	abcdef
P-35-1-1660	214	2.787	ab	2.837	abcdef
	970-F	3.226	bcdefghijk	2.953	cdefg
229553	25	2.988	abcdefg	2.639	a
219824	38	3.150	bcdefghijk	2.844	abcdef
240546	558	3.407	fghijkl	2.953	cdefg
248759	548	3.108	bcdefghij	2.921	bcdefg
259591	774	3.258	cdefghijk	2.923	bcdefg
259745	779	2.588	a	2.701	ab
259775	896	2.994	abcdefg	2.782	abcdef
259834	898	2.762	ab	2.788	abcdef
261953	519	3.483	hijkl	2.987	defg
261974	523	3.272	cdefghijk	2.852	abcdefg
261976	525	3.530	jkl	3.090	g
262055	796	3.568	kl	3.016	efg
268592	564	3.342	defghijk	2.837	abcdef
268598	349	2.860	abc	2.743	abcd
268622	841	3.412	ghijkl	2.828	abcdef
268637	368	3.512	ijkl	2.903	bcdefg
268654	378	3.473	hijkl	2.960	cdefg
268660	703	3.410	ghijkl	2.894	bcdefg
268660	381	2.896	abcde	2.795	abcdef
268669	601	3.347	efghijk	2.967	cdefg
268672	604	3.160	bcdefghijk	2.833	abcdef
268684	385	3.121	bcdefghijk	2.800	abcdef
268690	390	3.282	cdefghijk	2.805	abcdef
268692	392	2.999	abcdefg	2.723	abc
268706	627	2.900	abcde	2.740	abcd
268711	407	2.872	abc	2.857	abcdefg
268719	687	2.981	abcdefg	2.826	abcdef
268719	640	3.068	bcdefghi	2.848	abcdef
268735	657	2.868	abc	2.908	bcdefg
268754	676	3.822	l	3.025	fg
268760	876	3.346	efghijk	2.959	cdefg
268768	335	3.024	abcdefgh	2.757	abcd
268769	685	2.933	abcde	2.828	abcdef
268784	700	3.275	cdefghijk	2.743	abcd
268810	440	3.146	bcdefghijk	2.902	bcdefg
268816	734	3.500	ijkl	2.861	abcdefg
268823	741	3.086	bcdefghij	2.781	abcdef
268826	744	2.945	abcdef	2.738	abc
268833	750	2.925	abcde	2.698	ab
269710	827	3.072	bcdefghij	2.847	abcdef
270784	458	3.404	fghijkl	2.857	abcdefg
271017	760	3.000	abcdefg	2.784	abcdef
271017	763	3.194	bcdefghijk	2.835	abcdef

* Means not followed by the same letter are significantly different.

Table 19. - Mean leaf damage ratings of peanut entries by two evaluation methods, Experiment 9, 1966.

Entry (P.I. No.)	Okla. P-No.	Single Leaf	Signif. p ≤ .05*	Multiple Leaf	Signif. p ≤ .05*
Brown Sel.-1	954	3.104	ijklmn	2.907	efghijkl
Starr	6	2.386	abcd	2.563	abcdef
158838	977	2.130	ab	2.494	ab
161868	148	2.460	abcde	2.613	abcdefgh
162403	147	2.886	defghijkl	3.029	ghijkl
162408	149	3.024	ghijklmn	3.091	kl
234420	40	2.474	abcdef	2.560	abcde
248757	546	2.933	efghijkl	2.524	abc
248762B	822	3.302	lmn	2.996	efghijkl
259591	775	3.456	n	2.938	efghijkl
259756	895	2.394	abcd	2.631	abcdefghi
261918	798	2.786	defghijk	2.969	klm
261923	801	3.421	mn	2.760	def
261949	805	2.799	defghijkl	2.934	jklm
268595	345	2.764	defghijk	2.873	hijklm
268598	348	3.258	klmn	2.928	efghijkl
268613	569	3.246	jklmn	3.111	l
268620	573	2.805	defghijkl	2.891	defghijkl
268625	576	3.146	jklmn	2.909	efghijkl
268626	363	2.916	efghijkl	2.354	a
268635	585	3.050	hijklmn	2.781	defgh
268637	587	2.904	efghijkl	2.825	defghij
268665	597	3.020	ghijklmn	2.847	defghijk
268695	616	2.752	defghijk	2.805	efghijkl
268702	623	2.874	defghijkl	2.979	efghijkl
268707	401	2.891	defghijkl	2.893	defghijkl
268721	642	2.590	bcdefgh	2.821	efghijklm
268724	412	2.745	defghij	2.510	abc
268727	650	2.798	defghijkl	2.831	efghijklm
268740	418	2.593	bcdefghi	2.694	abcdefghi
268759	425	2.864	defghijkl	2.856	defghijkl
268762	679	2.852	defghijkl	2.643	bcd
268763	680	2.879	defghijkl	2.894	defghijkl
268771	408	2.814	defghijkl	2.989	efghijkl
268773	690	2.606	cdefghi	2.801	efghijkl
268777	430	2.525	bcdefg	2.699	bcdefghijk
268782	698	2.928	efghijkl	2.859	defghijkl
268789	773	2.880	defghijkl	2.897	defghijkl
268799	717	2.770	defghijk	2.843	ghijklm
268803	781	3.060	hijklmn	2.639	a
268803	722	2.852	defghijkl	2.916	efghijkl
268811	730	2.816	defghijkl	2.956	efghijkl
268820	738	2.972	fghijklm	2.953	efghijkl
268822	740	2.830	defghijkl	2.796	defghi
268825	446	2.745	defghij	2.799	efghijkl
268828	452	2.802	defghijkl	2.502	ab
290599	949	2.024	a	2.377	a
299467	965	2.825	defghijkl	2.741	cde
299468	966	2.216	abc	2.529	abcd

* Means not followed by the same letter are significantly different.

Table 20. - Mean leaf damage ratings of peanut entries by two evaluation methods, Experiment 10, 1966.

Entry (P.I.No.)	Okla. P-No.	Single Leaf	Signif $p \leq .05$*	Multiple Leaf	Signif. $p \leq .05$*
Starr	6	2.388	abc	2.541	a
NRM-3	475	2.788	defghijkl	2.774	abcdefghij
NRM-7	487	2.875	fghijkl	2.850	bcdefghij
259805	294	2.682	bcdefghijk	2.629	abcdef
268730	653	2.688	bcdefghijk	2.606	abcd
234417	144	3.056	klm	2.756	abcdefghij
234421	41	2.682	bcdefghijk	2.804	abcdefghij
240555	559	2.706	bcdefghijk	2.778	abcdefghij
259753	780	2.606	abcdefgh	2.585	abc
259821	688	2.538	abcdefg	2.756	abcdefghij
261895	508	3.344	m	3.716	k
261932	509	2.962	hijkl	2.900	fghij
261962	815	2.769	cdefghijkl	2.730	abcdefghi
261968	521	2.838	efghijkl	2.729	abcdefghi
261977	526	2.625	abcdefghij	2.931	ghijk
262049	795	2.850	efghijkl	2.846	bcdefghij
268573	343	2.762	cdefghijkl	2.775	abcdefghij
268597	565	2.319	ab	2.630	abcdef
268601	352	2.706	bcdefghijk	2.814	abcdefghij
268604	835	2.856	efghijkl	2.873	defghij
268633	364	3.012	ijklm	2.609	abcd
268644	371	3.125	lm	2.968	hijk
268651	851	2.982	hijkl	3.024	jk
268660	858	2.856	efghijkl	2.776	abcdefghij
268669	602	2.894	fghijkl	2.799	abcdefghij
268688	388	2.756	cdefghijkl	2.803	abcdefghij
268689	389	2.550	abcdefg	2.681	abcdefg
268692	394	3.019	jklm	2.982	ijk
268700	621	2.888	fghijkl	2.866	defghij
268704	398	2.906	fghijkl	2.865	cdefghij
268708	403	2.475	abc	2.660	abcdefg
268709	630	2.700	bcdefghijk	2.757	abcdefghij
268723	645	2.712	cdefghijk	2.798	abcdefghij
268725	648	2.475	abc	2.789	abcdefghij
268729	414	2.712	cdefghijk	2.696	abcdefgh
268739	662	2.619	abcdefghi	2.611	abcde
268749	673	2.800	defghijkl	2.691	abcdefgh
268766	683	2.419	abcd	2.650	abcdef
268767	334	2.294	a	2.571	ab
268798	716	2.612	abcdefgh	2.678	abcdefg
268815	733	2.850	efghijkl	2.727	abcdefghi
270777	762	2.925	ghijkl	3.015	jk
270789	460	3.125	lm	2.891	efghij
270804	461	2.682	bcdefghijk	2.784	abcdefghij
270815	764	2.988	hijklm	2.809	abcdefghij
270850	672	2.600	abcdefgh	2.882	defghij
299469	967	2.519	abcdef	2.579	ab
299471	969	2.675	abcdefghijk	2.607	abcd
487368	556	2.969	hijkl	2.884	defghij

* Means not followed by the same letter are significantly different.

Table 26. - Mean leaf damage rating of peanut entries in late season Experiment A, 1966.

Entry (P.I. Number)	Okla. P-No.	$\bar{X}$	Signif. $p \leq .05$*	Quartile in spring test
Argentine	2	1.530	abcde	Lowest
Starr	6	1.661	bcdef	Lowest
152125	330	1.707	defg	Highest
161300	17	1.611	abcdef	Lowest
247378	557	1.680	bcdef	Lowest
248762A	551	1.612	abcdef	Lowest
259579	789	1.683	cdef	Lowest
259591	775	1.934	h	Highest
259678	339	1.718	efg	----
259753	780	1.699	cdef	Lowest
259800	332	1.454	a	Lowest
259835	899	1.596	abcde	Second
268597	565	1.496	abc	Lowest
268635	365	1.675	bcdef	Highest
268648	849	1.805	fgh	Highest
268649	376	1.885	gh	Highest
268703	625	1.640	abcdef	Lowest
268706	400	1.526	abcde	Lowest
268708	403	1.507	abcd	Lowest
268711	407	1.439	a	Lowest
268729	652	1.584	abcde	Lowest
268740	418	1.690	cdef	Lowest
268766	683	1.480	ab	Lowest
268773	690	1.618	abcdef	Lowest
268794	711	1.452	a	Lowest
268823	445	1.521	abcde	Lowest
270857	672	1.573	abcde	Lowest

* Means not followed by the same letter are significantly different.

Table 27. - Mean leaf damage rating of peanut entries in late season Experiment B, 1966.

Entry (P.I. Number)	Okla. P-No.	$\bar{X}$	Signif. $p \leq .05$*	Quartile in spring test
Starr	6	1.521	abcd	Lowest
155053	973	1.814	h	Highest
221708	912	1.750	fgh	Highest
259771	784	1.554	abcde	Lowest
259834	898	1.498	ab	Lowest
259860	791	1.630	bcdefg	Lowest
261985	528	1.601	bcdefg	Lowest
268599	351	1.721	efgh	Lowest
268633	844	1.829	h	Highest
268647	373	1.668	bcdefgh	Highest
268654	594	1.679	cdefgh	Highest
268706	870	1.804	gh	Highest
268708	629	1.767	gh	Highest
268711	631	1.536	abcd	Lowest
268724	647	1.571	abcde	Lowest
268734	656	1.516	abcd	Lowest
268735	657	1.582	abcdef	Lowest
268737	659	1.589	abcdef	Lowest
268741	663	1.522	abcd	Lowest
268754	676	1.718	efgh	Highest
268767	334	1.511	abc	Lowest
268769	428	1.429	a	Lowest
268773	691	1.561	abcde	Lowest
268804	723	1.424	a	Lowest
268808	439	1.688	defgh	Lowest
268817	735	1.605	bcdefg	Lowest
270857	772	1.551	abcde	Lowest

* Means not followed by the same letter are significantly different.

Table 28. - Mean leaf damage rating of peanut entries in late season Experiment C, 1966.

Entry (P.I. Number)	Okla. P-No.	$\bar{X}$	Signif. $p \leq .05$*	Quartile in spring test
Starr	6	1.638	abcd	Lowest
Strat. Span.[a]	11	1.491	abc	Lowest
NRM 6	486	1.483	abc	Lowest
145045	979	1.895	d	Highest
161312	15	1.632	abcd	Lowest
259821	688	1.541	abc	Lowest
259821	788	1.608	abc	Lowest
262000	810	1.615	abc	Highest
268600	566	1.596	abc	Lowest
268644	371	1.709	bcd	Highest
268661	971	1.530	abc	Lowest
268678	610	1.526	abc	Lowest
268704	626	1.745	cd	Lowest
268716	410	1.526	abc	Lowest
268721	642	1.433	ab	Lowest
268738	660	1.650	bcd	Lowest
268739	416	1.576	abc	Lowest
268747	671	1.695	bcd	Lowest
268764	681	1.551	abc	Lowest
268777	695	1.356	a	Lowest
268781	712	1.487	abc	Lowest
268790	435	1.484	abc	Lowest
268791	707	1.614	abc	Lowest
268796	714	1.579	abc	Lowest
268802	720	1.486	abc	Second
268828	746	1.588	abc	Lowest
270789	460	1.595	abc	Highest

* Means not followed by the same letter are significantly different.

[a] Stratford Spanish

Table 31. – Mean leaf damage ratings of peanut entries by two evaluation methods, Experiment 1, 1967.

Entry (P.I. No.)	Okla. P-No.	Single Leaf	Signif. $p \leq .05$*	Multiple Leaf	Signif. $p \leq .05$*
Starr	6	2.275	abcdefghi	2.419	abcdef
Tennessee Red	161	2.500	ghijkl		
Va. Bunch 67	959	2.831	n	2.606	defg
NC-5	958	2.119	abc	2.500	bcdefg
VA56R	288	2.200	abcdefg	2.306	abcd
162524	14	2.138	abcde	2.381	abcde
259650	316	2.569	ijklmn		
259753	780	2.475	fghijkl	2.425	abcdef
259814	304	2.275	abcdefghi	2.588	cdefg
259826	309	2.425	defghijkl		
259860	791	2.150	abcde	2.206	ab
261946	806	2.619	jklmn		
261958	520	2.356	bcdefghijkl		
261977	524	2.425	defghijkl		
262000	810	2.698	klmn	2.789	g
262012	476	2.619	jklmn		
262016	480	2.475	fghijkl		
262097	536	2.650	lmn		
268677	609	2.131	abcd	2.412	abcdef
268708	629	2.338	bcdefghij	2.631	efg
268710	920	2.325	bcdefghij		
268726	649	2.244	abcdefgh	2.562	cdefg
268769	428	2.331	bcdefghij	2.356	abcde
268771	429	1.994	a	2.169	a
268787	704	2.288	abcdefghi	2.438	abcdef
268787	432	2.544	hijklm		
269719	828	2.438	efghijkl		
270794	886	2.275	abcdefghi	2.425	abcdef
270831	766	2.400	bcdefghijkl		
277197	942	2.419	cdefghijkl		
290606	950	2.256	abcdefgh	2.400	abcdef
290781	1139	2.350	bcdefghijk		
291983	1144	2.812	mn	2.706	fg
298838	1177	2.256	abcdefgh	2.512	bcdefg
298840	1179	2.181	abcdef	2.325	abcde
298843	1182	2.112	ab	2.469	abcdef
298853	1192	2.306	bcdefghi		
298861	1198	2.281	abcdefghi	2.569	cdefg
298871	1204	2.169	abcde	2.425	abcdef
298874	1207	2.344	bcdefghijk		
300244	1219	2.275	abcdefghi	2.281	abc
306218	1235	2.212	abcdefg	2.444	abcdef
306228	1243	2.150	abcde	2.312	abcd
306359	1247	2.475	fghijkl		
306361	1249	2.519	hijkl		

* Means not followed by the same letter are significantly different.

Table 32. - Mean leaf damage ratings of peanut entries by two evaluation methods, Experiment 2, 1967.

Entry (P.I. No.)	Okla. P-No.	Single Leaf	Signif. $p \leq .05$*	Multiple Leaf	Signif. $p \leq .05$*
Dixie Runner	927	2.538	cdefghijklm		
Starr	6	2.275	abcdefg	2.431	abc
VA61R	289	2.550	defghijklm		
	761	2.275	abcdefg	2.538	abcd
158838	977	2.400	abcdefghij	2.569	abcd
161300	17	2.288	abcdefg	2.512	abcd
229683	160	2.781	klm	2.769	cd
229656	24	2.431	abcdefghij		
229685	26	2.706	hijklm		
234422	32	2.419	abcdefghij		
242100	35	2.431	abcdefghijk		
248760	549	2.150	ab	2.456	abcd
259536	306	2.350	abcdefgh	2.475	abcd
259585	300	2.288	abcdefg	2.588	abcd
259675	314	2.794	lm	2.781	d
259742	319	2.725	ijklm		
261956	811	2.575	efghijklm		
261988	529	2.431	abcdefghijk		
262046	495	2.556	efghijklm		
262052	498	2.550	defghijklm		
262087	547	2.531	cdefghijklm		
268564	342	2.375	abcdefghi	2.625	bcd
268598	349	2.569	efghijklm	2.648	bcd
268630	581	2.406	abcdefghij		
268649	376	2.781	klm	2.775	cd
268723	646	2.188	abcd	2.431	abc
268724	647	2.231	abcde	2.600	abcd
268732	654	2.400	abcdefghij	2.606	abcd
268755	872	2.750	jklm		
268766	683	2.181	abc	2.400	ab
268777	695	2.281	abcdefg	2.281	a
268790	435	2.262	abcdefg	2.538	abcd
268823	445	2.294	abcdefg	2.375	ab
268829	881	2.319	abcdefg	2.531	abcd
270795	887	2.338	abcdefg	2.600	abcd
290580	943	2.606	fghijklm		
294646	1147	2.625	ghijklm		
294647	1148	2.862	m	3.088	e
295974	1158	2.575	efghijklm		
298826	1167	2.412	abcdefghij		
298835	1174	2.481	bcdefghijkl		
298845	1184	2.412	abcdefghij		
298850	1189	2.512	bcdefghijklm		
298877	1209	2.075	a	2.469	abcd
300588	1225	2.600	fghijklm		
306358	1246	2.244	abcdef	2.762	cd
306360	1248	2.444	bcdefghijkl		
307603	1251	2.288	abcdefg	2.719	bcd

* Means not followed by the same letter are significantly different.

Table 33. - Mean leaf damage ratings of peanut entries by two evaluation methods, Experiment 3, 1967.

Entry (P.I. No.)	Okla. P-No.	Single Leaf	Signif. $p \leq .05$*	Multiple Leaf	Signif. $p \leq .05$*
Florigiant	906	2.375	abcd	2.534	abcde
Starr	6	2.362	abcd	2.606	abcde
162421	159	2.494	abcde		
162659	18	2.306	ab	2.694	bcde
163279	19	2.600	abcde		
221707	911	2.406	abcde	2.731	cdef
229553	25	2.275	ab	2.569	abcde
234416	30	2.512	abcde		
234419	39	2.494	abcde		
242101	34	2.438	abcde		
246389	915	2.462	abcde		
259594	311	2.256	a	2.400	a
259599	313	2.750	e	3.156	gh
259723	321	2.444	abcde		
259776	786	2.631	bcde		
259800A	930	2.406	abcde	2.775	def
261971	522	2.538	abcde		
262062	499	2.675	cde		
262105	485	2.562	abcde		
268601	567	2.719	de	2.775	def
268619	839	2.544	abcde		
268668	600	2.338	abc	2.981	fg
268678	610	2.600	abcde	2.425	ab
268689	865	2.325	abc	2.731	cdef
268706	400	2.450	abcde	2.475	abc
268721	643	2.262	a	2.506	abcd
268731	678	2.550	abcde		
268740	419	2.531	abcde		
268779	875	2.719	de		
268791	707	2.506	abcde	2.657	abcde
268791	706	2.506	abcde		
268802	720	2.475	abcde	2.681	bcde
268804	723	2.269	ab	2.575	abcde
268812	731	2.469	abcde		
268827	745	2.494	abcde		
275500	1130	2.362	abcd	2.712	cde
290581	944	2.550	abcde		
291986	1146	2.594	abcde		
294654	1155	2.569	abcde		
295983	1160	2.262	a	2.662	abcde
295989	1165	2.259	ab	2.819	ef
299463	966	2.369	abcd	2.681	bcde
300242	1217	2.756	e	3.238	h
306217	1234	2.369	abcd	2.800	ef
306222	1237	2.319	abc	2.475	abc
311262	1253	2.669	cde		

* Means not followed by the same letter are significantly different.

Table 34. - Mean leaf damage ratings of peanut entries by two evaluation methods, Experiment 4, 1967.

Entry (P.I. No.)	Okla. P-No.	Single Leaf	Signif. $p \leq .05$*	Multiple Leaf	Signif. $p \leq .05$*
Starr	6	2.231	ab	2.462	a
Argentine Sel.	200	2.294	abcd	2.491	ab
Argentine Sel.	266	2.250	ab	2.612	abc
Tifton Spanish	985	2.300	abcd	2.656	abc
121070-1	108	2.331	abcdef	2.481	a
121070-3	111	2.369	abcdefg	2.594	abc
155053	973	2.781	l	3.025	g
162522-B	155	2.331	abcdef	2.738	bcde
219824	38	2.612	ghijkl		
259705	778	2.681	jkl	2.950	efg
259771	784	2.338	abcdef	2.681	abcd
259777	305	2.238	ab	2.631	abc
261989	470	2.475	bcdefghij		
261995	531	2.406	abcdefghi	2.894	defg
262034	488	2.656	ijkl		
262101	481	2.681	jkl		
268596	832	2.606	fghikl		
268616	360	2.438	bcdefghij		
268646	591	2.450	bcdefghij		
268661	971	2.319	abcde	2.544	ab
268676	608	2.625	hijkl		
268680	860	2.581	fghijkl		
268682	862	2.450	bcdefghij		
268701	396	2.350	abcdef	2.562	abc
268708	403	2.238	ab	2.456	a
268711	407	2.381	abcdefgh	2.438	a
268713	634	2.269	abc	2.531	ab
268768	929	2.388	abcdefgh	2.531	ab
268772	688	2.162	a	2.600	abc
268833	750	2.544	defghijkl		
270788	758	2.506	cdefghij		
270849	465	2.538	defghijk		
274267	486	2.306	abcd	2.600	abc
280691	1134	2.394	abcdefgh	2.788	cdef
288215	1136	2.531	defghijk		
290607	951	2.244	ab	2.675	abcd
291982	1143	2.481	bcdefghij		
294649	1150	2.488	bcdefghij		
298842	1181	2.512	cdefghij		
300243	1218	2.506	cdefghij		
300585	1222	2.425	bcdefghi		
300586	1223	2.562	efghijkl		
300587	1224	2.744	kl	2.981	fg
300591	1228	2.288	abcd	2.600	abc
300596	1233	2.481	bcdefghij		
311265	1256	2.444	bcdefghij		

* Means not followed by the same letter are significantly different.

Table 35. - Mean leaf damage ratings of peanut entries by two evaluation methods, Experiment 5, 1967.

Entry (P.I. No.)	Okla. P-No.	Single Leaf	Signif. p ≤ .05*	Multiple Leaf	Signif. p ≤ .05*
Starr	6	2.456	ab	2.550	ab
NC 2	36	2.619	abcdefg	2.662	abc
F416-2	938	2.862	defghi		
234375	28	2.762	bcdefgh		
234418	31	2.719	bcdefgh		
234420	40	2.575	abcde	2.656	abc
240579	563	3.025	hij		
248755	543	2.612	abcdef	2.700	abc
259591	775	3.075	ij	2.852	c
259617	299	2.581	abcde	2.788	bc
259662	295	2.594	abcdef	2.538	ab
259665	303	2.850	defghi		
259678	339	2.706	bcdefg		
262045	498	2.875	efghi		
262076	504	2.475	abc	2.694	abc
262088	478	2.681	bcdefg		
268597	565	2.588	abcdef	2.556	ab
268648	374	2.900	efghi		
268686	614	2.725	bcdefgh		
268667	599	2.888	efghi		
268703	397	2.912	fghi		
268737	415	2.712	bcdefgh		
268748	672	2.681	bcdefg		
268764	681	2.631	bcdefg	2.575	ab
268767	334	2.744	bcdefgh	2.644	abc
268770	686	2.306	a	2.444	a
268778	431	2.669	bcdefg		
268794	711	2.475	abc	2.631	abc
268830	747	2.594	abcdef	2.519	ab
270768	753	2.881	efghi		
270776	754	2.788	cdefghi		
270804	462	2.488	abc	2.594	abc
280690	1133	2.588	abcdef	2.575	ab
294653	1154	3.094	ij	3.150	d
295982	1159	2.712	bcdefgh		
295987	1164	2.450	ab	2.562	ab
298828	1169	3.281	j	3.100	d
298848	1187	2.519	abc	2.562	ab
298860	1197	2.688	bcdefg		
298865	1201	2.862	defghi		
300589	1226	2.538	abcd	2.588	abc
300592	1229	2.619	abcdefg	2.600	abc
300594	1231	2.938	ghi		
306224	1239	2.481	abc	2.538	ab
306227	1242	2.600	abcdef	2.669	abc
306362	1250	2.825	defghi		

* Means not followed by the same letter are significantly different.

Table 36. - Mean leaf damage ratings of peanut entries by two evaluation methods, Experiment 6, 1967.

Entry (P.I. No.)	Okla. P-No.	Single Leaf	Signif. $p \leq .05$*	Multiple Leaf	Signif. $p \leq .05$*
Starr	6	2.806	bcdefghijk	2.488	bcde
Argentine	2	2.862	cdefghijkl	2.400	abc
Spanette	5	2.606	bcdef	2.531	bcde
Valentia Sel.	926	2.931	fghijklm		
121070-1	20	2.644	bcdefgh	2.625	bcdef
162537-B	158	3.281	m	3.000	h
163147	156	2.969	fghijklm		
223684	175	2.900	defghijkl		
248763	552	2.919	efghijklm		
259591	293	3.169	klm	2.850	fgh
259594	323	2.794	bcdefghij		
259660	317	2.938	fghijklm		
259663	312	3.094	ijklm		
259805	294	2.925	fghijklm		
259834	898	2.619	bcdef	2.631	cdefg
262001	532	2.969	fghijklm		
262020	483	2.750	bcdefghi		
262059	538	2.969	fghijklm		
262094	1280	3.081	ijklm		
262099	819	3.006	ghijklm		
268621	840	3.012	hijklm		
268644	372	2.519	bc	2.612	bcdef
268653	853	2.956	fghijklm		
268666	598	2.969	fghijklm		
268681	861	2.912	efghijkl		
268703	625	2.531	bcd	2.744	efgh
268710	631	2.669	bcdefgh	2.688	cdefg
268740	418	2.488	b	2.544	bcdef
268746	669	2.725	bcdefghi	2.731	defgh
268756	873	2.769	bcdefghij		
268633	844	3.088	ijklm	2.850	fgh
270857	772	2.669	bcdefgh	2.575	bcdef
279481	1131	2.638	bcdefg	2.319	ab
280688	926	2.056	a	2.194	a
294651	1152	3.138	jklm		
295984	1161	2.612	bcdef	2.588	bcdef
298834	1173	2.881	cdefghijkl		
298837	1176	2.725	bcdefghi	2.569	bcdef
298851	1190	3.212	lm	2.919	gh
298855	1193	2.669	bcdefgh	2.431	abcd
298859	1196	2.819	bcdefghijk		
298866	1202	2.550	bcde	2.612	bcdef
299467	1210	2.788	bcdefghij		
299469	967	2.819	bcdefghijk	2.606	bcdef
306219	1236	2.800	bcdefghijk		
306225	1240	2.538	bcd	2.588	bcdef
306226	1241	2.606	bcdef	2.319	ab

* Means not followed by the same letter are significantly different.

Table 37. - Mean leaf damage ratings of peanut entries by two evaluation methods, Experiment 7, 1967.

Entry (P.I. No.)	Okla. P-No.	Single Leaf	Signif. $p \leq .05$*	Multiple Leaf	Signif. $p \leq .05$*
Starr	6	2.600	a	2.575	a
Argentine Sel.	327	2.606	ab	2.656	abc
Va. 462	290	2.719	abcde	2.631	ab
T-400-1	21	2.819	abcdefg	2.744	abc
T-437	22	2.612	abc	2.712	abc
145045	979	3.238	k	3.269	g
230328	27	2.788	abcdef	2.975	cdefg
240543	825	3.106	ghijk		
248762A	551	2.912	cdefghij	2.912	bcdef
259648	296	2.969	defghijk		
259670	320	2.956	defghijk		
259745	779	2.781	abcdef	2.675	abc
259746	893	3.225	k	3.081	defg
259775	308	2.925	defghij		
259800	332	2.962	defghijk	2.306	abcd
259800	310	2.831	abcdefg	2.912	bcdef
259805	322	2.900	bcdefghi		
261935	512	2.806	abcdef	2.962	cdef
261940	516	3.100	ghijk		
262014	477	3.094	ghijk		
262019	482	3.138	hijk		
262038	491	3.162	ijk	3.175	fg
262080	505	3.000	efghijk		
262104	541	3.144	hijk		
268640	846	2.925	defghij		
268648	849	2.862	abcdefghi	2.912	bcdef
268674	606	2.981	defghijk		
268701	406	2.769	abcdef	2.944	bcdef
268721	642	2.906	bcdefghij	2.688	abc
268724	412	2.812	abcdefg	2.806	abcd
268821	739	2.775	abcdef	3.138	efg
268826	447	3.000	efghijk		
268828	452	2.850	abcdefgh	2.844	abcde
268831	748	2.875	abcdefghi	2.850	abcde
270778	755	3.062	fghijk		
270817	463	2.775	abcdef	2.769	abcd
287297	1138	2.888	abcdefghi	2.756	abc
290597	947	2.681	abcd	2.562	a
290599	949	2.856	abcdefgh	2.738	abc
298831	1171	2.906	bcdefghij		
298833	1172	3.000	efghijk		
298852	1191	2.881	abcdefghi	2.756	abc
298857	1195	2.994	efghijk		
300595	1232	3.194	jk	3.319	g
306231	1245	2.912	cdefghij		

* Means not followed by the same letter are significantly different.

Table 38. - Mean leaf damage ratings of peanut entries by two evaluation methods, Experiment 8, 1967.

Entry (P.I. No.)	Okla. P-No.	Single Leaf	Signif. p ≤ .05*	Multiple Leaf	Signif. p ≤ .05*
Starr	6	2.494	abcdefgh	2.569	abc
Strat. Span.[a]	11	2.444	abcdefg	2.525	abc
OICB 1271	112	2.381	abcde	2.538	abc
121298	174	2.375	abcde	2.475	ab
162538	16	2.525	abcdefghij	2.469	ab
185632	150	2.344	abcd	2.462	ab
196740	975	2.800	klmn		
226249	23	2.606	defghijklm		
240561	560	2.569	cdefghijkl		
259597	324	2.512	abcdefghi	2.656	abc
259728	301	2.431	abcdef	2.669	bc
259772	315	2.788	jklmn		
259985	1162	2.550	bcdefghijkl		
261934	510	2.606	defghijklm		
261955	808	2.712	ghijklmn		
261970	469	2.425	abcdef	2.594	abc
262087	493	2.769	ijklmn		
262075	503	2.800	klmn,		
262100	540	2.931	n	3.200	d
268516	340	2.800	klmn		
268595	831	2.725	hijklmn		
268634	584	2.712	ghijklmn		
268647	592	2.719	hijklmn		
268724	922	2.569	cdefghijkl		
268725	648	2.475	abcdefgh	2.531	abc
268753	675	2.694	fghijklmn		
268773	691	2.544	bcdefghijk	2.619	abc
268800	718	2.706	ghijklmn		
270767	882	2.938	n	2.806	c
270793	885	2.819	lmn	2.650	abc
270816	888	2.575	cdefghijklm		
275497	1128	2.431	abcdef	2.500	ab
275499	1129	2.625	efghijklm		
280689	1132	2.394	abcde	2.606	abc
290633	953	2.731	hijklmn		
295971	1156	2.494	abcdefgh	2.550	abc
298827	1168	2.506	abcdefghi	2.656	abc
298836	1175	2.725	hijklmn		
298844	1183	2.731	hijklmn		
298847	1186	2.325	abc	2.506	ab
298849	1188	2.494	abcdefgh	2.619	abc
298863	1200	2.388	abcde	2.375	a
299468	1211	2.262	a	2.394	ab
299469	1212	2.588	cdefghijklm		
300239	1215	2.844	mn	2.800	c
311264	1255	2.294	ab	2.588	abc

* Means not followed by the same letter are significantly different.

[a] Stratford Spanish

Table 39. - Mean leaf damage ratings of peanut entries by two evaluation methods, Experiment 9, 1967.

Entry (P.I. No.)	Okla. P-No.	Single Leaf	Signif. $p \leq .05$*	Multiple Leaf	Signif. $p \leq .05$*
Starr	6	2.331	ab	2.581	ab
NC 4X	204	2.369	abcde	2.662	abc
OAEP 58-16[a]	74	2.269	a	2.556	ab
OTCB1275	116	2.388	abcde	2.612	abc
161867	206	2.975	k	3.238	ef
161868	148	2.362	abcd	2.825	abcd
221708	912	2.825	hijk	2.862	bcd
237337	033	2.569	abcdefgh		
240572	561	2.725	fghijk		
247375	824	2.638	cdefghi		
248756	544	2.444	abcdef	2.788	abcd
259598	776	2.412	abcde	2.725	abcd
259680	925	2.669	efghij		
259824	897	2.669	efghij		
261997	471	2.738	fghijk		
262004	814	2.444	abcdef	2.862	bcd
262022	484	2.831	hijk		
262037	490	2.506	abcdef		
262066	537	2.462	abcdef		
262073	501	2.556	abcdefgh		
262074	502	2.569	abcdefgh		
262098	821	2.938	jk	2.944	cde
268609	355	2.506	abcdef		
268612	836	2.806	ghijk		
268626	577	2.294	ab	2.688	abc
268655	855	2.644	defghi		
268716	410	2.338	abc	2.675	abc
268722	644	2.388	abcde	2.694	abc
268771	336	2.281	a	2.644	abc
268778	696	2.419	abcde	2.531	ab
270784	756	2.475	abcdef		
270785	757	2.406	abcde	2.812	abcd
270842	889	2.594	bcdefgh		
274201	506	2.819	hijk		
291628	1141	2.450	abcdef		
291629	1142	2.638	cdefghi		
291984	1145	2.381	abcde	2.781	abcd
294652	1153	2.881	ijk		
295973	1157	2.375	abcde	2.675	abc
298423	1166	2.550	abcdefgh		
298830	1170	2.494	abcdef		
298856	1194	2.944	jk	3.394	f
298862	1199	2.500	abcdef		
298869	1203	2.300	ab	2.506	a
298872	1205	2.356	abcd	2.494	a
299470	1213	2.988	k	3.081	def
300247	1221	2.381	abcde	2.700	abc
306229	1244	2.650	defghi		
311003	1252	2.525	abcdefg		

* Means not followed by the same letter are significantly different.

[a] Argentine Selection

Table 40. - Mean leaf damage ratings of peanut entries by two evaluation methods, Experiment 10, 1967.

Entry (P.I. No.)	Okla. P-No.	Single Leaf	Signif. $p \leq .05$*	Multiple Leaf	Signif. $p \leq .05$*
Early Runner	215	2.719	ijkl		
Spanette	984	2.350	abcde	2.700	ab
Starr	6	2.356	abcde	2.744	abcd
Fla.-393	960	3.081	m	3.106	fg
NRM-5	479	2.506	bcdefghijk		
162541	154	2.381	abcdefg	2.788	abcd
259600	297	2.625	defghijkl		
259605	890	2.456	abcdefghij		
259677	318	2.744	jkl		
259681	298	2.556	bcdefghijk		
259767	783	2.250	ab	2.669	ab
259774	302	2.388	abcdefgh	2.775	abcd
259800	307	2.525	bcdefghijk		
261954	807	2.475	abcdefghijk		
261959	812	2.788	kl	3.231	g
261965	539	2.894	lm	3.125	fg
262036	489	2.706	hijkl		
262040	492	2.681	fghijkl		
262051	497	2.588	cdefghijkl		
262095	820	2.700	ghijkl		
268654	379	2.375	abcdef	2.794	abcd
268686	386	2.681	fghijkl		
268729	652	2.594	cdefghijkl	3.012	ef
268734	656	2.352	abc	2.738	abc
268741	663	2.412	abcdefghi	2.862	bcdef
2687718	931	2.400	abcdefghi	2.800	bcde
268795	712	2.412	abcdefghi	2.788	abcd
268801	438	2.506	bcdefghijk		
268828	451	2.531	bcdefghijk		
287796	1137	2.531	bcdefghijk		
288214	1135	2.525	bcdefghijk		
290599	948	2.306	abcd	2.788	abcd
290971	1140	2.444	abcdefghij		
294648	1149	2.575	bcdefghijk		
294650	1151	2.738	jkl		
295986	1163	2.344	abcde	2.694	ab
298839	1178	2.381	abcdefg	2.644	ab
298841	1180	2.438	abcdefghij		
298846	1185	2.381	abcdefg	2.744	abc
298873	1206	2.412	abcdefghi	2.781	abcd
298876	1208	2.352	abc	2.975	def
299471	1214	2.569	bcdefghijk		
300240	1216	2.638	efghijkl		
300246	1220	2.352	abc	2.775	abcd
300590	1227	2.494	bcdefghijk		
300593	1230	2.431	abcdefghij	2.844	bcde
306223	1238	2.156	a	2.569	a
311263	1254	2.788	kl	2.931	cdef

* Means not followed by the same letter are significantly different.

VITA

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