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Factors AFFECTING GERMINATION *of* RUNNER PEANUTS

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Factors AFFECTING GERMINATION *of* RUNNER PEANUTS*

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SCARCITY of labor during World War II forced most Alabama peanut growers to discontinue use of hand-shelled peanut seed and to begin use of machine-shelled seed. This change resulted in a new pattern for handling seed peanuts.

When hand-shelled seed were used, it was a common practice for each grower to save and store his own planting seed. These were shelled by the producer during the winter and usually were planted with mule-drawn planters. As the use of machine-shelled seed became common, it became more convenient for most growers to purchase shelled and treated seed at planting time than to attempt to store planting seed during the winter and arrange to have them shelled in the spring. This practice placed on the seedsmen the responsibility of selecting good quality seed in the fall, storing them through the winter under conditions that would maintain their viability, and processing them in the spring into a

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product from which the grower could obtain good stands. With the establishment of acreage allotments, good stands became more important. Good stands are the first requirement for high yields. At the same time these changes were developing, the grower was changing from mule-drawn equipment to tractor-drawn planters and cultivators, which, moving at a higher rate of speed, created still more problems in obtaining and maintaining stands.

Under the stresses of these changing conditions, quite a few growers experienced difficulties with peanut seed of low viability. Some seed lots germinated very poorly; others were exceptionally good. The reasons for these differences were not clear. Many theories were advanced to explain this variation. Some of these were: (1) superiority of peanuts grown in some particular region over peanuts grown in other regions with different soil types and different climatic conditions, (2) improper curing, (3) adverse effects of bulk storage, (4) internal damage resulting from high speed shelling operations, (5) natural deterioration following shelling, (6) improper treatment, and (7) improper production and harvesting practices. Although research information was available on some of these questions, there were many questions that could not be answered. It was obvious that variation in germination of different seed lots of a given variety might be due to (1) factors that operate during the growing and harvesting season, (2) factors that operate during the curing phase, (3) factors that operate during storage, or (4) factors that operate during shelling and processing. Therefore, experiments were begun dealing with each of these groups of problems.

PRE-HARVEST FACTORS

During the fall of 1950, 135 farms in the Peanut Belt were visited for the purpose of collecting from each a 15-pound sample of picked peanuts and a history of the conditions under which the peanuts were grown. These farms were scattered through the 11 counties comprising the Peanut Belt. (See Figure 1.) Nine farms were included in the sample from each block or area studied.

The samples were collected during the period September 25 to November 8. A soil sample and a vine sample of whole plants were collected at each farm. The picked peanuts were placed in paper bags and brought to the laboratory at Auburn within 3 days after collection. A sample of the peanuts was removed at the time of collection, weighed, and oven dried to determine the percentages of moisture. At the laboratory each sample was graded to determine the percentages of sound, mature kernels; shrivels; and damaged kernels. The stage of maturity at harvest was determined by opening all peanuts on the vine sample and separating all of those that showed dark color inside the hull. The number of "mature" pods on the vine was divided by the total number of all pods, and the result is expressed as a percentage. The soil samples were used to classify the soil type on which the peanuts were grown. The percentage of free fatty acids in the oil was determined for each sample. Efforts to measure germination at the time the samples were collected were unsuccessful due to the fact that runner peanuts are dormant at the time of harvest. The samples of picked peanuts were stored in paper bags placed on shelves in a hardware-cloth cage in an unheated, sheet metal building. After 5 months in storage, the samples were removed and the free fatty acids were again determined. At this time the germination was determined by placing samples in a germinator. Details on methods are given in Appendix A.

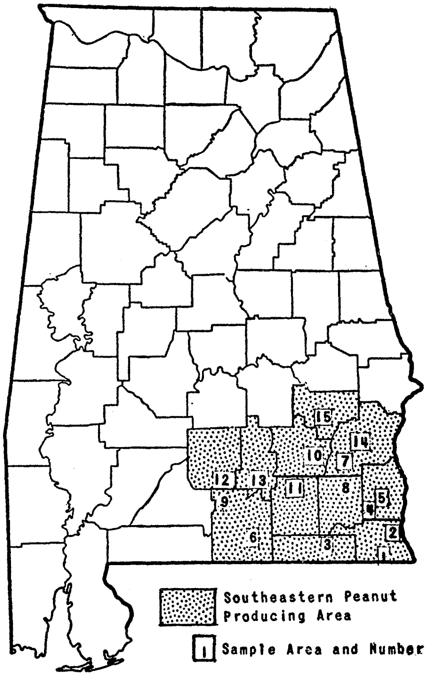

FIG. 1. Locations of areas studied.

GEOGRAPHIC LOCATION

There was considerable belief on the part of some people connected with the peanut industry that certain areas within the Peanut Belt were better adapted than others for the production of seed peanuts. This study was started with the hypothesis that this might be true. Based on this hypothesis, seed peanut samples were collected from north to south and east to west within each week in order to hold some factors constant. The data were studied under the following classifications for purposes of checking for geographic differences: (1) 15 areas, (2) north versus south, (3) east versus west, (4) three sub-regions, (5) four sub-regions, and (6) concentrated versus non-concentrated production areas.

The germination of the samples from the 135 individual farms varied from 42 to 98 per cent. Among the 15 areas included in the study, the germination of peanuts, after 5 months of storage, varied from 70 per cent to 89 per cent. The average germination of peanuts from all areas was 80 per cent, Appendix Table 1. Some farmers in all areas except one produced peanuts that had a spring germination of 85 per cent or higher. In two areas, 78 per cent of the farmers produced peanuts with a spring germination of 85 per cent or higher.

Appendix Tables 2 through 6 present data for geographic classifications, such as north versus south, etc. There were essentially no differences in the percentage of germination for any of the geographic classifications into which the 15 areas within the 11 counties were grouped. Variations in percentage of germination for areas within these geographic classifications, other than by all areas, were greater than the differences for the average geographic classification.

The germination of the 135 samples of peanuts showed a high variation between farms within each block or area and between areas. However, based on the sample, indications were that peanuts of high viability could be produced within any of the 11 counties studied. No one region or sub-region within the 11 counties could be delineated as a geographic location that should be given preference for production of runner peanuts for seed purposes. Regardless of location, some farmers can be expected to produce peanuts of high viability.

Soil Type

The composite soil samples collected from each sample field were classified into six major groups.[1] Each of the major groups contained at least 12 farms. The average germination of peanuts from the six various soil groups varied from 78 to 90 per cent,

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[1] Soils, based on soil samples collected at the time of the survey, were classified and described by L. G. Brackeen, State Soil Surveyor, State Department of Agriculture and Industries.

Appendix Table 7. Considering the small difference found in germination between the six soil groups, only limited preference should be given to any particular soil type in the selection of runner peanuts for seed purposes, unless further evidence is found to indicate that soil types should be used as the only guide. Had it been possible to separate the effect of fertilizer or lime treatment from soil type, it is possible that soil type would have shown a more significant effect on peanut quality. For instance, the red soils on which the highest germination occurred are believed to contain the highest percentage of calcium saturation.

Grade of Peanuts

Since peanuts are graded for sales purposes, it would be of considerable help if seed peanuts could be selected from commercial nuts on the basis of this same grade determination.

Sound, mature kernels. As the percentage of sound, mature kernels (SMK) in the sample increased in the fall, so did the percentage of germination, Appendix Table 8. In general, only runner peanuts grading above 65 per cent sound, mature kernels should be sorted from commercial stocks at harvest time to be saved for seed purposes.

Shrivels. As the percentage of shrivels in the various samples of peanuts increased, the percentage of germination decreased, Appendix Table 9. Shriveled peanuts were not placed in the germinator. However, germination tended to decrease when the sample contained a high percentage of shrivels, even though shrivels were removed by the use of a 15/64-inch screen. Although the differences in the average germination for the various groups based on percentage shrivels were small, it is believed that only peanuts that grade less than 5 per cent shrivels should be saved for seed purposes.

Damaged kernels. As the percentage of damaged kernels other than sheller damage in the various peanut samples increased, the percentage of germination decreased, Appendix Table 10. These data indicate that only peanuts that grade 1 per cent or less damage should be saved for seed purposes.

Total meats. As the percentage of total meats in the various samples of peanuts increased, so did the percentage of germination, Appendix Table 11. Only peanuts grading at least 72 per cent or higher total meats should be saved for seed purposes, if total meats are used as the only selection factor.

All peanut samples were graded by official standards (1950). Each sample was scored on the percentage of sound, mature kernels; shrivels; damaged kernels; and total meats. The indications were that any one of these various grade factors could be used to sort runner peanuts for seed purposes from commercial stocks at harvest time. In general, only peanuts grading above 65 per cent, sound, mature kernels, or less than 5 per cent shrivels, or 1 per cent or less in damaged kernels, or at least 72 per cent or higher total meats should be saved for seed purposes, if only one of these measures is used as the basis of selecting seed peanuts. Low damaged kernels or high sound, mature kernels are perhaps the best guides of the various grade factors, provided shelled moisture content is low.

MOISTURE CONTENT

The moisture content of the individual samples of peanuts at the time of collection varied from slightly under 6 to more than 12 per cent. The average moisture content of all samples was 7.5 per cent. After 5 months of storage, the average moisture content had declined to 5.8 per cent. The individual sample variation was from 4.2 to 9.5 per cent; however, most of the samples tended to group around the average of 5.8 per cent. The results of this study indicate that the lower the shelled moisture content in the fall, the greater are the chances for good germination at the end of the storage period, Appendix Table 12.

FREE FATTY ACIDS

The percentage of free fatty acids of the peanuts collected from the various farms was determined in the fall of 1950 and again in the spring of 1951 after the peanuts had been in storage for a period of 5 months. On the average, the percentage of free fatty acids of all peanuts increased during storage from 0.56 to 0.77 per cent. In terms of individual samples of peanuts, some increased in percentage of free fatty acids while others decreased. The relationship of percentage of free fatty acids to the percentage of germination is shown in Appendix Tables 13 and 14. The higher the percentage of free fatty acids, the lower was the percentage of germination. Where it is possible to determine the percentage of free fatty acids of peanuts before storage, only those containing an average of 0.30 per cent or less free fatty acids should be held for seed purposes.

While percentage of germination seems more closely related to percentage of free fatty acids than moisture, it seems that moisture is more nearly the basic causal factor. When high moisture contents exist for a long period, the percentage of free fatty acids builds up fast, which in turn is associated with a low percentage of germination. The higher the moisture content when peanuts were placed in storage, the faster the percentage of free fatty acids developed and the lower the germination became. However, this study does not indicate the part that moisture may play in developing the percentage of free fatty acids while peanuts are in the field. Nevertheless, all evidence of this study indicates that only peanuts with a low fall moisture and a low percentage of free fatty acids should be held for seed use. In case a choice has to be made in the fall between peanuts with a moisture content higher than desirable but with a low percentage of free fatty acids versus peanuts with a desirable moisture content but with a high percentage of free fatty acids, the low percentage of free fatty acids should be favored, provided the peanuts can be stored so that moisture content will decrease rapidly.

Damaged Kernels and Free Fatty Acids

Both damaged kernels and percentage of free fatty acids appeared to be related to germination. When percentages of damage and of free fatty acids were low, a relatively high percentage of germination resulted. Conversely, when the percentages of damage and free fatty acids were both high, germination was low. There were only minor differences in percentage of germination between samples in which the percentage of damage was low and free fatty acids was high on the one hand and samples in which percentage of damage was high and free fatty acids was low on the other. For seed purposes, it is desirable to have stocks that contain 1 per cent or less damaged kernels and 0.30 per cent or less free fatty acids. Under storage conditions for 5 to 8 months, percentage of free fatty acids increased while damage did not make a change. Where a choice in the fall has to be made between seed stocks of low damage and high free fatty acids and those of high damage and low free fatty acids, the seed of low free fatty acids should be favored provided damage does not exceed 2.5 per cent. Beyond this, the percentages of damage and free fatty acids are likely to be too high for peanuts to be saved for seed purposes. Three-way comparisons of germination with fall moisture, damaged kernels, and free fatty acids, indicated that variations in fall moisture within the ranges of this experiment, **and when relatively rapid drying in storage is assured,** was the least important factor of the three in its effect on germination.

PRODUCTION AND HARVESTING PRACTICES

Germination tests were not made until peanuts had been in storage for 5 months. Since peanuts were dormant at the time they were placed in storage, it was not possible to determine germination accurately in the fall. A reliable germination test in the fall might have indicated some production and harvesting practices that were related to viability that were not shown by germination tests made after a 5-month storage period. Most of the production and harvesting practices tested showed no significant relationship to germination.

As the acres of cropland operated per farm increased, so did germination up to the 51- to 100-acre range. When over 100 acres of cropland was operated, germination decreased as the acreage of cropland operated increased, Appendix Table 15. The amount of cropland a given farmer operated may have affected his timeliness of operation and efficiency of various production and harvesting practices followed. These methods and practices seemed to have had some effect on the peanuts grown.

During the summer of 1949, there were several different crops planted on the land on which peanuts were grown in 1950. Of the total acreage of peanuts included in this study in 1950, 57 per cent was planted to peanuts, while 21 per cent was planted to corn, 16 per cent to cotton, 1 per cent to other crops, and 5 per cent was idle the previous year. Germination of the peanuts produced in 1950 varied for the different crops grown in 1949, Appendix Table 16. The highest germination occurred when peanuts followed on land that was idle the previous year. Peanuts following peanuts gave the next highest percentage of germination.

Regardless of the kind of crop grown, most farmers used 4-10-7 fertilizer under their 1949 crop, which preceded peanuts in 1950, Appendix Table 17. A few farmers used no fertilizer under the 1949 crop and others left the land idle. The 1950 peanut crop showed the highest percentage of germination when grown on land that was not fertilized in 1949.

The kind of fertilizer used with the 1950 peanut crop did not show any effect on germination. This was true when measured in terms of analysis of fertilizer used, and in variations in the amount used. However, the method used to apply fertilizer — offset from the seed or directly under the seed — did show a relationship to germination of peanuts, Appendix Tables 18, 19, and 20. Farms where lime had been used under peanuts at some time during the last 5 years showed a higher percentage of germination than did those on unlimed land, Appendix Table 21.

Only the practices just mentioned showed some relationship to germination, although many other farm production and harvesting practices were tested.[2] In some cases, it may be important to know what practices failed to show a relationship to germination. **Due to the favorable curing season that existed during this study, and for other reasons, some factors that would normally be expected to affect germination failed to show a relationship in this study.**

STAGE OF MATURITY OF PEANUTS

From the vine sample collected from each farm, all peanuts except pops were opened and examined for maturity. All peanuts that had black or red coloring inside the shell or hull were considered mature. The total number of all black or red-shell peanuts was divided by the total number of all peanuts on the vine, including pops, to determine the percentage of maturity. As the percentage maturity increased, so did the percentage of germination, Appendix Table 22.

Indications were that farmers could use stage of maturity as a

[2] Major practices that were tested but failed to show a significant relationship to germination were: (1) range in the amount of 4-10-7 fertilizer used with 1949 summer crops and followed with peanuts in 1950; (2) use of winter cover crops ahead of peanuts; (3) kind and amount of fertilizer used with winter cover crops ahead of peanuts; (4) date of disposal of winter cover crops ahead of peanuts; (5) source of peanut planting seed; (6) kind of seed treatment used; (7) pounds of seed peanuts planted per acre; (8) date peanuts were planted; (9) analysis of fertilizer used under peanuts; (10) range in amount of 4-10-7 fertilizer used under peanuts; (11) range in amount of 0-14-10 fertilizer used under peanuts; (12) kind of fertilizer used to side-dress peanuts; (13) time of application of side-dressing; (14) condition of peanut stand at harvest time; (15) effect of insects and diseases on peanut crop; (16) existence of a dusting program and number of dusting applications used; (17) date peanuts were dug; (18) number of days peanuts were allowed to grow; (19) method of shaking out dirt; (20) method used to cure peanuts; (21) quality of stacking; (22) number of curing days; (23) method of digging, shaking, curing, and number of curing days combined; (24) date of picking peanuts; (25) number of days between planting and picking; (26) kind of picker used; and (27) peanut yield per acre.

means of deciding when to harvest and for selecting seed peanuts. As the percentage maturity increased, so did the percentage of sound, mature kernels; at the same time free fatty acids decreased. Vine samples should show at least 70 per cent maturity if peanuts from a given field are to be saved for seed purposes.

Percentage of Pops

The percentage of pops was determined from the vine sample collected at each farm. Most pops are normally discarded by the peanut picker and are not a part of the peanuts sold. Neither are pops used in germination tests. The percentage of pops included in a given sample of peanuts may be indicated by stage of maturity. The relationship between peanut plants that produce a large number of pops and the vitality of mature peanuts on these same plants is shown in Appendix Table 23. A calcium deficiency in the soil results in a high percentage of pops. Only peanuts from fields averaging less than 10 per cent pops should be saved for seed purposes. When the percentage of pops was high, the percentages of sound, mature kernels and of fully mature kernels were low, while the percentages of shrivels and of fall moisture were high.

METHOD of CURING

Experiments were conducted at the Wiregrass Substation to compare the germination of peanuts cured by various methods. One test compared peanuts cured by artificial drying from low and high initial moisture contents with peanuts cured in piles, windrows, and stacks. Another test compared the germination of piled, windrowed, and stacked peanuts dug at five dates between October 6 and 17, 1952. A study involving windrowed peanuts alone covered a much wider range of digging dates. A fourth test was made to compare various methods of piling, windrowing, and stacking. Included in this test were peanuts in windrows with (1) the nuts turned up, (2) the nuts turned down, (3) the nuts mixed, and (4) with the tops mowed before digging. Also included were large and small piles, turned and not turned, and stacks formed from peanuts, the tops of which had been mowed before digging.

During a good curing season (1952), artificial drying showed no advantage over field-cured peanuts, and it may even have had a harmful effect on germination, especially at the higher moisture levels (20 per cent or higher). During a poor curing season (1951), artificial drying demonstrated a definite advantage over the field-cured methods, Appendix Table 24. Adverse climatic conditions did not allow the field-cured peanuts to dry to a safe storage moisture level. There were no differences in germination of the three field-cured methods in 1951 or 1952. These data suggest a procedure for curing seed peanuts that would take advantage of favorable field-curing seasons but would have stand-by drying facilities as insurance against inclement weather.

Neither the time of digging between October 6 and 17, nor the method of field curing of the windrowed, piled, or stacked peanuts had an effect on germination in 1952, Appendix Table 25. Where the peanuts were dug before or after these dates, there was a decrease in germination, Appendix Tables 25 and 26. This demonstrates that peanuts must be fully mature for best germination and that they should not be left in the ground too long.

The various methods of piling, windrowing, and stacking peanuts, indicated in Appendix Table 27, showed different results in the 2 years studied. During a good curing year, 1952, the more exposed curing condition of small piles and windrows resulted in higher germination. However, during the 1950 season when the peanuts were exposed to rain, the peanuts cured in large piles and stacks were best.

These tests show that curing procedures resulting in minimum exposure to adverse weather are best for seed peanuts. The data also indicate that of the various methods of field curing tested no one was consistently superior to the others in maintaining high germination. Since the curing season cannot be predicted in advance, one method of field curing cannot be selected from these data as superior to others. The importance of stand-by drying facilities as insurance against unfavorable weather was indicated.

METHOD OF STORAGE

MOISTURE CONTENT

Germination of seed peanuts after storage is dependent on the kernel moisture content at which the peanuts are stored, on the temperature of the storage environment, and the length of storage period. The effect of various kernel moisture contents on germination was tested in an experimental set-up without temperature control. These tests were conducted in separate years and the first studies were carried out on a small scale, using glazed tiles as storage containers. In the glazed-tile study, unshelled and shelled peanuts were cured on a canvas in the sun to various moistures. Rain was not allowed to contact the peanuts.

Unshelled peanuts were cured to percentages of 10, 8, 7, and 6 kernel moisture contents, while the shelled peanuts were cured to kernel moisture percentages of 9, 7, 6, and 5. The germination percentages of the unshelled and shelled peanuts after 5 and 8 months of storage are given in Appendix Table 28. The temperature and relative humidity that prevailed during the storage period are summarized in Appendix Table 29. The 5-month storage period was characterized by low temperatures with a large number of days of high humidity. This storage environment did not lower germinations as much as did the next 3 months of storage, which was marked by higher temperatures. At the 5-month storage interval, which is the normal period between harvest and planting time, germination was 90.8 per cent for unshelled peanuts with 6 per cent kernel moisture content, while in 8 months germination was 75 per cent. At kernel moisture contents above 6 per cent, germination percentages were lowered in proportion to moisture content. Stored shelled peanuts had lower germination percentages than did unshelled peanuts.

The foregoing studies showed that for high germination at planting time seed peanuts should be stored **unshelled** with a **kernel moisture of 6 per cent.** Storing of seed peanuts for longer than 5 months cannot be done without lowering germination, even at a kernel moisture content of 6 per cent.

Additional information on the safe storage moisture for seed peanuts was obtained from storing peanuts at Headland, Alabama, in bin lots ranging in size from 2.3 to 20.6 tons.[3] Peanuts were placed in the bins in the fall of 1952 with kernel moistures ranging from 5.2 to 11.4 per cent. Samples were withdrawn from 7 positions within each bin after 5 and 9 months' storage. The average germination percentages of all positions for each moisture range after 5 and 9 months' storage are given in Appendix Table 30. The results, which agree with those from the tile storage studies, show that seed peanuts at low initial ker-

[3] Results from a cooperate project between the Commodity Credit Corporation and the Agricultural Marketing Service, USDA, and the Agricultural Experiment Station.

nel moistures can be stored for 5 months and still result in high germination (91.0 per cent). Reduction in germination occurred after 9 months' storage. Bin storage data show that the moisture limit for high germinating seed peanuts was **6 per cent or less kernel moisture,** which is the same limit established for safe storage moisture content by the tile storage studies.

TEMPERATURE

The investigations on establishment of the safe storage moisture content for seed peanuts indicated that storage temperature affected viability. To study the temperature effect, unshelled peanuts cured to kernel moistures percentages of 8.1, 7.4, 6.8, 5.6, and 5.3 were placed in sealed Mason jars and stored in constant-temperature cabinets at 68°F., 76°F., 86°F., and 96°F. The effect of the various storage temperatures on germinability is summarized in Appendix Table 31. These data show that kernel moisture can be raised without lowering germination if temperature is lowered for storage periods of 5 months. For maintenance of high germinability for longer storage (8 months), both kernel moisture and temperature must be low (6 per cent and 68°F.). With **kernel moistures below 7 per cent** even at 86°F. or 96°F., germination is not lowered for a 5-month storage period. This means that temperature controls in storage structures are not needed for low-moisture seed peanuts if not held beyond planting time. For longer storage some means of holding temperatures below 76°F. is indicated as needed as a part of the storage structure (compare germination at 8 months at 68°F. and higher).

SHELLING

The results of 3 years' shelling tests, in which the sheller speed, type of cylinder, type of grate, rate of feed, and clearance between the grate and cylinder were varied, show that the germination of undamaged kernels is not affected by these sheller factors. Changing these adjustments or units may affect markedly the quantity of undamaged seed obtained from a given lot of stock peanuts. The operator of the sheller should select equipment and adjust it to damage the least possible number of peanuts, and should arrange equipment, including a picking table, that will enable removal of all shriveled and damaged peanuts from the shelled seed. These seed, if treated before planting with an approved fungicide, should germinate approximately as well as hand-shelled seed.

The effects of methods of field curing and moisture content at the time of shelling on germination also were studied. Peanuts cured in the field by different methods were shelled by a sheller set up to operate with the best combination of factors found in other tests. The methods of curing used in the field in the 1950 season were: (1) windrow, with peanuts topside; (2) windrow, with peanuts mixed; (3) windrow, with peanuts on bottom; (4) peanuts half cured in windrow, then put in small piles; (5) peanuts in small piles turned during curing; (6) peanuts in small piles; (7) peanuts in large piles turned during curing; (8) peanuts in large piles; and (9) peanuts in small stacks. The percentage of splits, including shriveled kernels which passed through a 13/64 × ¾-inch screen, and the field germination of samples taken from these curing methods are shown graphically in Figure 2.

Data from a similar study in 1952 show the same trends but do not show such extreme variations in percentage of splits or field germination between samples of peanuts cured by the different

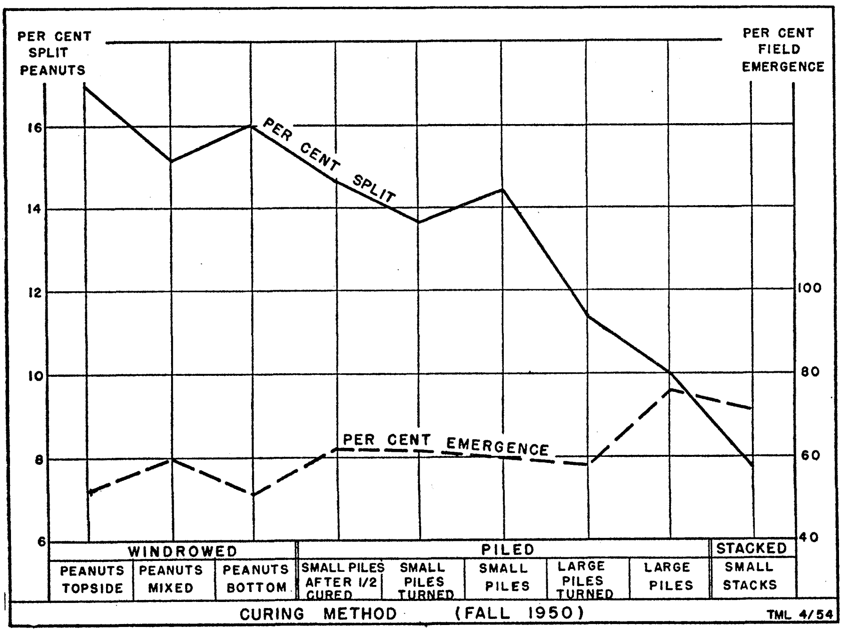

FIGURE. 2. Effects of curing method on percentage of splits and field emergence.

methods. Curing methods 4, 5, 7, and 8 as used in 1950 were not repeated. These were replaced in 1952 with methods in which most of the tops of peanuts were mowed just before digging, with the peanuts being cured in windrows and stacks.

The data in Figure 2 show that the percentage of peanuts split by the sheller varied with the curing rate. The method giving the fastest drying rate produced the most splits. The germination of sound kernels was not affected by curing rate except for the marked increase for peanuts cured in stacks and large piles in 1950. However, this difference was not apparent in the 1952 tests.

Results from the tests conducted in 1951 to determine the effect of the moisture content at shelling time on the shelling characteristics and germination are given in Table 1.

These data were obtained by shelling samples of peanuts after they had been taken from storage, had water added to increase the moisture, and held for a period of time so that the moisture content was uniform. Results in 1952 from tests using peanuts at different moisture contents from the field closely agree. Although the percentage of splits decreased and the shelling efficiency increased as the moisture content increased, the percentage of germination of the undamaged kernels decreased. Keeping qualities of the peanuts at moisture contents over 7 per cent were greatly reduced as moisture increased; this fact also discouraged shelling peanuts at high moisture contents for seed or edible stock.

The importance of using only sound, whole kernels for seed is shown by the data presented in Tables 2, 3, and 4. Data in Table 2 were obtained by passing a sample of shelled, whole peanuts through a series of screens and testing each fraction for germina-

TABLE 1. EFFECT OF MOISTURE CONTENT ON SHELLING CAPACITY, PERCENTAGE OF PEANUTS SPLIT, AND GERMINATION OF SHELLED PEANUTS[1]

Moisture content		Peanuts split	Capacity	Shelling efficiency	Germination in laboratory
Hulls	Kernels				
Per cent	*Per cent*	*Per cent*	*Lb./Hr.*	*Per cent*	*Per cent*
10.5[2]	5.7[2]	15.1	303	86.4	81
14.5	8.5	10.2	268	88.3	85
15.8	9.9	6.5	353	91.1	78
16.5	11.3	5.9	428	93.3	68
19.4	14.0	4.2	427	93.9	48

1 Dixie Runner variety.
2 Moisture content of stored peanuts.

TABLE 2. RELATIONSHIP OF SIZE OF PEANUT KERNEL TO GERMINATION

Size of peanut kernel	Germination	Percentage of total
Inches	*Per cent*	*Per cent*
Over 17/64	90.5	83.0
17/64 - 15/64	86.0	7.1
15/64 - 13/64	82.0	7.9
Under 13/64	70.5	2.0

TABLE 3. RELATIONSHIP OF KERNEL DAMAGE TO GERMINATION BY METHOD OF CURING

Damage	Germination percentage of peanuts cured in:		
	Stacks	Piles	Windrow
	Pct.	*Pct.*	*Pct.*
Sound kernels	77.0	82.0	85.0
Visible field damage	58.0	27.0	49.0
Partial skin removal	51.0	30.0	55.0
Complete skin removal	15.0	9.0	10.0
Nicked cotyledonary ends	39.0	44.0	38.0
Splits with germ remaining	41.0	16.0	48.0

TABLE 4. RELATIONSHIP OF KERNEL DAMAGE TO GERMINATION BY METHOD OF SELECTION

Sample	Germination percentage
	Per cent
Before picking	61.0
After picking	84.0
Pickings	0.5

tion quality. The screens used had 17/64 × ¾, 15/64 × ¾, and 13/64 ×¾-inch holes; thus the shelled sample was divided into four parts of different size. Germinability decreased as kernel size decreased.

Samples of shelled peanuts were separated according to degree of damage, and the segregated portions were tested according to standard germination tests. Results, as shown in Table 3, indicate that those peanuts showing any damage caused in the field or in the shelling process are inferior in germinability to the whole, sound kernels.

A selected lot of peanuts was shelled and the hulls, splits, and unshelled peanuts were removed. A sample was taken from the remainder and tested for germination. For comparison, another sample was taken and those peanuts appearing damaged in any way were removed. Germination tests were run on both the picked-over peanuts and those picked out of the sample. Results of the germination tests, as shown in Table 4, again indicate the importance of using only sound, whole peanuts for seed if a good stand is to be expected. The methods by which these seed were cured and shelled did not appear to be as important as the selection of well developed, sound, whole kernels and the removal of damaged or underveloped kernels from the seed stock.

SUMMARY AND CONCLUSIONS

This report covers four phases of research on factors affecting germination of runner peanuts. Each phase is reported under a separate section.

The germination of the 135 samples of peanuts, collected from individual farms in the 11 counties of the Peanut Belt, showed a high variation between farms and between areas. Indications were that peanuts of high viability could be produced within any county of the Peanut Belt. No one geographic location could be delineated that should be given preference for the production of runner peanuts for seed purposes. Only small differences were found in the percentage of germination of runner peanuts when related to type of soil on which they were produced. Consequently, caution should be used in giving preference to any particular soil type in the selection of runner peanuts for seed purposes.

There were indications from this study that runner peanuts for seed purposes could be sorted from commercial stocks advantageously at harvest time if based on the official grade of peanuts. Only peanuts grading above 65 per cent sound, mature kernels; or less than 5 per cent shrivels; or 1 per cent or less in damaged kernels should be saved for seed purposes when any one grade factor is used for sorting purposes.

Only peanuts of a low kernel moisture content in the fall should be held for seed purposes. Also, only peanuts containing 0.30 per cent or less free fatty acids should be held for seed purposes.

Just a few of the production and harvesting practices followed by farmers seem related to germination of the peanuts. However, some practices that would normally be expected to affect germination failed to show a relationship in this study.

Peanuts with a low stage of maturity at harvest time are likely to be high in percentage of free fatty acids and pops, while low in percentage of sound, mature kernels. Peanuts should not be saved for seed purposes from fields running low in stage of maturity (under 70 per cent) or high in pops (10 per cent or higher).

During a favorable season for field-curing peanuts, artificial drying did not result in higher germination. Indeed, peanuts dried from 20 per cent moisture germinated less than field-cured peanuts. During a poor season for field-curing, however, artificially dried peanuts germinated much better than those cured in the field. For seed peanuts, this suggests field curing where possible, with stand-by facilities for artificial drying when bad weather prevails during harvest season.

There was no difference in germination of windrowed, piled, or stacked peanuts in 1952. Maximum germination was obtained during an 11-day digging period. Peanuts dug before or after this peak period showed reductions in germination.

Best germination during a good season was obtained from peanuts field-cured in small piles and windrows. Large piles and stacks were best during a poor season for field-curing. Thus, germination was affected more by prevailing weather conditions than by method of field-curing.

Germination of seed peanuts after storage is largely dependent on the kernel moisture content at which the peanuts are stored, the temperature of the storage environment, the length of the storage period, and whether stored shelled or unshelled. The results of this study show that unshelled peanuts could be stored either under controlled conditions or in farm-type bins for a period up to 5 months, during which temperatures remained below 96°F. and still have a high germination percentage, provided the peanuts had an initial kernel moisture content of 7 per cent or less. If seed peanuts are to be stored for a period longer than 5 months, a means of holding temperatures below 76°F. should be a part of the storage structure.

Germination of undamaged peanut kernels is not affected by such sheller factors as sheller speed, type of cylinder, type of grate, rate of feed, or clearance between the grate and cylinder. However, changing these adjustments or units may affect markedly the quantity of undamaged seed obtained from a given lot of stock peanuts. Low machine damage and removal of all shriveled and damaged seed is necessary for good seed peanuts.

APPENDIX A

Methodology

Free Fatty Acids. The A.O.C.S.[1] Official Method was followed in determining the percentage of free fatty acids in the oil except for the extraction step. A 50-gram sample of peanut kernels was ground in a food chopper, using a tooth blade. The oil was then extracted by means of a Carver Laboratory Press at 20,000 pounds per square inch of pressure. From the extracted oil, a 7.05 g. weighed sample was mixed with 30 ml. of neutral alcohol and 1 ml. of phenolphthalein indicator and titrated to a faint pink color with 0.25 N NaOH. The percentage of free fatty acids were reported as ml. of 0.25 N alkali used.

Germinations. Germination was determined only of the kernels that failed to pass through a 15/64 × ¾-inch perforation. No attempt was made to pick out damaged kernels. Before the kernels were placed on the toweling paper, they were dusted with Arasan. Four samples of 50 kernels each were then germinated on rolled towels at alternate temperatures of 30°C. and 20°C. as directed in Rules for Testing Seeds, A.O.S.A.[2] The percentage of germination was based on counting as germinable only those seeds that developed normal radicles and plumules free of disease.

Moisture. Moisture figures were expressed on a percentage wet weight basis of the kernels. Percentages of moisture were determined by taking weighings of 100-gram samples of kernels before and after drying in a forced-draft oven at 130°C. for 5 hours.

Grading. From each of the 15-pound farm samples, a 10-pound sample of peanuts (1950 official method) was placed on a table and well mixed and divided into equal quarters. From one of the quarters, an 8-ounce sample was weighed out and the percentage of foreign material was determined. A weighed 4-ounce sample was taken then from the cleaned 8-ounce sample and was shelled by hand. The shelled peanuts were placed on a 15/64 × ¾-inch perforated screen. The kernels passing through the screen were

[1] "Official and Tentative Methods of the American Oil Chemist Society." 2nd Edition. 1946.
[2] "Proceedings of the Association of Official Seed Analysts." 1949.

weighed as other kernels or shrivels. The kernels riding the screen were broken open and examined for concealed damage. The damaged kernels were weighed, and the remaining undamaged kernels were then weighed. The first figure was recorded as damaged kernels and the remaining kernels were noted as sound, mature kernels. These weighings were converted into percentage figures.[3]

[3] Condensed from Official Method, Fresh Products and Standardization and Inspection Division, Fruit and Vegetable Branch, PMA, USDA, 1950.

APPENDIX B

APPENDIX TABLES

APPENDIX TABLE 1. RELATIONSHIP OF AREAS STUDIED TO GERMINATION[1] AND OTHER FACTORS, 135 FARMS IN PEANUT AREA, 11 COUNTIES IN SOUTHEASTERN ALABAMA, 1950-51

Area number	Average germination[2]	Percentage of farms with 85 per cent or higher germination in each area	Percentage of total farms in each area by method of curing	
			Stacks	Windrows
	Per cent	*Per cent*	*Per cent*	*Per cent*
2	89	78	0	100
8	89	67	100	0
5	87	67	100	0
10	86	78	100	0
12	85	56	100	0
15	84	33	100	0
14	83	56	100	0
11	81	33	100	0
7	79	44	100	0
3	77	22	89	11
4	76	33	22	78
6	75	44	100	0
1	72	33	89	11
9	72	11	100	0
13	70	0	100	0
TOTAL OR AVERAGE	80	44	87	13

[1] All germination tests were run at the end of a 5-month storage period.

[2] Computed F for differences in germination in areas was 3.21. Tabular F was 1.77 at the 95 and 2.24 at the 99 per cent probability level.

APPENDIX TABLE 2. RELATIONSHIP OF LOCATION TO GERMINATION, 135 FARMS IN PEANUT AREA, 11 COUNTIES IN SOUTHEASTERN ALABAMA, 1950-51

Region	Farms	Average germination[3]
	Number	*Per cent*
North[1]	54	81
South[2]	81	80
TOTAL OR AVERAGE	135	80

[1] The northern region consisted of areas 7, 10, 12, 13, 14, and 15. (See Figure 1.)
[2] The southern region consisted of areas 1, 2, 3, 4, 5, 6, 8, 9, and 11.
[3] Computed F for differences in germination by regions was 0.41. Tabular F was 3.92 at the 95 and 6.82 at the 99 per cent probability level.

APPENDIX TABLE 3. RELATIONSHIP OF LOCATION TO GERMINATION, 135 FARMS IN PEANUT AREA, 11 COUNTIES IN SOUTHEASTERN ALABAMA, 1950-51

Region	Farms	Average germination[3]
	Number	*Per cent*
East[1]	81	82
West[2]	54	78
TOTAL OR AVERAGE	135	80

[1] The eastern region consisted of areas 1, 2, 3, 4, 5, 7, 8, 14, and 15. (See Figure 1.)
[2] The western region consisted of areas 6, 9, 10, 11, 12, and 13.
[3] Computed F for differences in germination by regions was 2.66. Tabular F was 3.92 at the 95 and 6.82 at the 99 per cent probability level.

APPENDIX TABLE 4. RELATIONSHIP OF LOCATION TO GERMINATION, 135 FARMS IN PEANUT AREA, 11 COUNTIES IN SOUTHEASTERN ALABAMA, 1950-51

Region	Farms	Average germination[4]
	Number	*Per cent*
Area I[1]	45	78
Area II[2]	54	81
Area III[3]	36	83
TOTAL OR AVERAGE	135	80

[1] Area I consisted of areas 1, 2, 3, 4, and 6. (See Figure 1.)
[2] Area II consisted of areas 5, 8, 11, 13, 9, and 12.
[3] Area III consisted of areas 7, 14, 10, and 15.
[4] Computed F for differences in germination by regions was 1.88. Tabular F was 3.06 at the 95 and 4.76 at the 99 per cent probability level.

APPENDIX TABLE 5. RELATIONSHIP OF LOCATION TO GERMINATION, 135 FARMS IN PEANUT AREA, 11 COUNTIES IN SOUTHEASTERN ALABAMA, 1950-51

Region	Farms	Average germination[5]
	Number	*Per cent*
Area I[1]	36	83
Area II[2]	36	81
Area III[3]	27	82
Area IV[4]	36	76
TOTAL OR AVERAGE	135	80

[1] Area I consisted of areas 7, 10, 14, and 15. (See Figure 1.)
[2] Area II consisted of areas 1, 2, 4, and 5.
[3] Area III consisted of areas 3, 8, and 11.
[4] Area IV consisted of areas 6, 9, 12, and 13.
[5] Computed F for differences by regions was 2.58. Tabular F was 2.68 at the 95 and 3.92 at the 99 per cent probability level. There was only 1 probability out of 10 that differences in germination by regions was due to chance.

APPENDIX TABLE 6. RELATIONSHIP OF PRODUCTION AREA TO GERMINATION, 135 FARMS IN PEANUT AREA, 11 COUNTIES IN SOUTHEASTERN ALABAMA, 1950-51

Region	Farms	Average germination[3]
	Number	*Per cent*
Concentrated production areas[1]	72	81
Non-concentrated production areas[2]	63	79
TOTAL OR AVERAGE	135	80

[1] The concentrated area consisted of areas 1, 2, 3, 4, 5, 7, 10, and 14. (See Figure 1.)
[2] The non-concentrated area consisted of areas 6, 8, 9, 11, 12, 13, and 15.
[3] Computed F for differences by regions was 0.57. Tabular F was 3.92 at the 95 and 6.82 at the 99 per cent probability level.

APPENDIX TABLE 7. RELATIONSHIP OF SOIL TYPES TO GERMINATION, 135 FARMS IN PEANUT AREA, 11 COUNTIES IN SOUTHEASTERN ALABAMA, 1950-51

Type of soil	Farms	Average germination[1]
	Number	*Per cent*
Greenville	12	90
Red Bay and Orangeburg	22	81
Bowie & Norfolk	23	81
Eustin & Americus	16	80
Ruston, Shubuta, & Faceville	31	78
Lakeland & Kalmia	31	78
TOTAL OR AVERAGE	135	80

[1] Computed F for differences by type of soil was 2.04. Tabular F was 2.28 at the 95 and 3.16 at the 99 per cent probability level. There was 1 possibility out of 10 that this difference might be due to chance.

APPENDIX TABLE 8. RELATIONSHIP OF PERCENTAGE SOUND, MATURE KERNELS TO GERMINATION, 135 FARMS IN PEANUT AREA, 11 COUNTIES IN SOUTHEASTERN ALABAMA, 1950-51

Percentage of SMK in fall		Farms	Average germination[1]
Range	*Average*	*Number*	*Per cent*
60.0 or less	55.8	59	76
60.1 - 65.0	62.8	40	81
65.1 or more	68.3	36	87
TOTAL OR AVERAGE	61.2	135	80

[1] Computed F for differences in germination by range in SMK was 13.25. Tabular F was 3.06 at the 95 and 4.76 at the 99 per cent probability level.

APPENDIX TABLE 9. RELATIONSHIP OF PERCENTAGE OF SHRIVEL KERNELS TO GERMINATION, 135 FARMS IN PEANUT AREA, 11 COUNTIES IN SOUTHEASTERN ALABAMA, 1950-51

Percentage of shrivels in fall		Farms	Average germination[1]
Range	*Average*	*Number*	*Per cent*
5.0 or less	4.2	24	84
5.1 - 7.0	6.4	31	81
7.1 - 9.0	8.5	44	80
9.1 or more	11.6	36	77
TOTAL OR AVERAGE	8.1	135	80

[1] Computed F for differences in germination by range in percentage shrivels was 2.00. Tabular F was 2.68 at 95 and 3.92 at 99 per cent probability levels.

APPENDIX TABLE 10. RELATIONSHIP OF PERCENTAGE DAMAGED KERNELS TO GERMINATION, 135 FARMS IN PEANUT AREA, 11 COUNTIES IN SOUTHEASTERN ALABAMA, 1950-51

Percentage of damaged kernels in fall		Farms	Average germination[1]
Range	*Average*	*Number*	*Per cent*
1.0 or less	0.7	72	85
1.1 - 2.0	2.0	25	79
2.1 - 3.0	2.9	17	78
3.1 or more	5.9	21	68
TOTAL OR AVERAGE	2.0	135	80

[1] Computed F for differences in germination by percentage of damaged kernels in the fall was 14.46. Tabular F was 2.68 at the 95 and 3.92 per cent at the 99 per cent probability level.

APPENDIX TABLE 11. RELATIONSHIP OF PERCENTAGE TOTAL MEATS TO GERMINATION, 135 FARMS IN PEANUT AREA, 11 COUNTIES IN SOUTHEASTERN ALABAMA, 1950-51

Percentage of total meats in fall		Farms	Average germination[1]
Range	*Average*	*Number*	*Per cent*
Under 70.0	66.4	35	75
70.0 - 71.9	70.7	34	78
72.0 - 73.0	72.5	32	83
Over 73.0	75.8	34	85
TOTAL OR AVERAGE	71.4	135	80

[1] Computed F for differences in total meats was 5.76. Tabular F was 2.68 at the 95 and 3.92 at the 99 per cent probability level.

APPENDIX TABLE 12. RELATIONSHIP OF FALL SHELLED MOISTURE CONTENT TO GERMINATION, 135 FARMS IN PEANUT AREA, 11 COUNTIES IN SOUTHEASTERN ALABAMA, 1950-51

Percentage of moisture content in fall		Farms	Average germination[1]
Range	*Average*	*Number*	*Per cent*
6.9 or less	6.5	54	82
7.0 - 7.9	7.5	51	82
8.0 or more	9.3	30	75
TOTAL OR AVERAGE	7.5	135	80

[1] Computed F for differences in moisture was 4.48. Tabular F was 3.06 at the 95 and 4.76 at the 99 per cent probability level.

APPENDIX TABLE 13. RELATIONSHIP OF FALL FREE FATTY ACIDS TO GERMINATION, 135 FARMS IN PEANUT AREA, 11 COUNTIES IN SOUTHEASTERN ALABAMA, 1950-51

Percentage of free fatty acids in fall		Farms	Average germination[1]
Range	*Average*	*Number*	*Per cent*
0.30 or less	0.25	49	85
0.30 - 0.60	.46	52	82
0.61 or higher	1.19	34	71
TOTAL OR AVERAGE	0.56	135	80

[1] Computed F for differences in germination by range in fall free fatty acids was 19.15. Tabular F was 3.06 at the 95 and 4.76 at the 99 per cent probability level.

APPENDIX TABLE 14. RELATIONSHIP OF SPRING FREE FATTY ACIDS TO GERMINATION, 135 FARMS IN PEANUT AREA, 11 COUNTIES IN SOUTHEASTERN ALABAMA, 1950-51

Percentage of free fatty acids in spring		Farms	Average germination[1]
Range	*Average*	*Number*	*Per cent*
0.30 or less	0.24	44	85
0.31 - 0.60	.47	34	83
0.61 or higher	1.35	57	75
TOTAL OR AVERAGE	0.77	135	80

[1] Computed F for differences in germination by range in spring free fatty acids was 10.74. Tabular F was 3.06 at the 95 per cent and 4.76 at the 99 per cent probability level.

APPENDIX TABLE 15. RELATIONSHIP OF ACRES OF CROPLAND OPERATED TO GERMINATION, 135 FARMS IN PEANUT AREA, 11 COUNTIES IN SOUTHEASTERN ALABAMA, 1950-51

Number of acres of cropland operated		Farms	Average germination[1]
Range	*Average*	*Number*	*Per cent*
1 - 50	32	53	78
51 - 100	79	46	84
101 - 150	117	20	83
151 - 200	167	6	77
201 or more	282	10	75
TOTAL OR AVERAGE	85	135	80

[1] Computed F for differences in germination by variation in acres of cropland operated was 2.52. Tabular F was 2.44 at the 95 and 3.46 at the 99 per cent probability level.

APPENDIX TABLE 16. RELATIONSHIP OF 1949 SUMMER CROP PRECEEDING PEANUTS TO GERMINATION, 135 FARMS IN PEANUT AREA, 11 COUNTIES IN SOUTHEASTERN ALABAMA, 1950-51

1949 summer crop	Farms	Average germination[2]
	Number	*Per cent*
Peanuts	55	82
Corn	38	80
Cotton	33	77
Other crops	2	60
None	7	87
TOTAL OR AVERAGE	135	80

[1] Other crops were watermelons and sorghum.
[2] Computed F for differences in germination by crops was 3.43. Tabular F was 2.44 at the 95 and 3.46 at the 99 per cent probability level.

APPENDIX TABLE 17. RELATIONSHIP OF KIND OF FERTILIZER USED WITH 1949 SUMMER CROP TO GERMINATION, 135 FARMS IN PEANUT AREA, 11 COUNTIES IN SOUTHEASTERN ALABAMA, 1950-51

Kind of fertilizer used on 1949 summer crop	Average amount used per acre	Farms	Average germination[1]
	Pounds	*Number*	*Per cent*
4-10-7	332	80	82
0-14-10	357	7	80
Other	337	38	76
None	0	10	86
TOTAL OR AVERAGE	328	135	80

[1] Computed F for differences by kinds of fertilizer was 2.73. Tabular F was 2.68 at the 95 and 3.92 at the 99 per cent probability level.

APPENDIX TABLE 18. RELATIONSHIP OF METHOD OF APPLYING FERTILIZER USED WITH PEANUTS TO GERMINATION, 122 FARMS IN PEANUT AREA, 11 COUNTIES IN SOUTHEASTERN ALABAMA, 1950-51

Method of applying fertilizer	Farms using fertilizer	Average germination[1]
	Number	*Per cent*
Off-set from seed	18	86
Directly under seed	104	80
TOTAL OR AVERAGE	122	81

[1] Computed F for differences in germination by methods of applying fertilizer was 3.99. Tabular F was 3.92 at 95 and 6.84 at 99 per cent probability levels.

APPENDIX TABLE 19. RELATIONSHIP OF METHOD OF APPLYING 4-10-7 FERTILIZER TO PEANUTS TO GERMINATION, 81 FARMS IN PEANUT AREA, 11 COUNTIES IN SOUTHEASTERN ALABAMA, 1950-51

Method of applying 4-10-7 fertilizer	Farms using 4-10-7 fertilizer	Average germination[1]
	Number	*Per cent*
Off-set from seed	13	87
Directly under seed	68	80
TOTAL OR AVERAGE	81	81

[1] Computed F for differences in germination by method of applying fertilizer was 4.35. Tabular F was 3.96 at 95 and 6.96 at 99 per cent probability levels.

APPENDIX TABLE 20. RELATIONSHIP OF THE METHOD OF APPLYING 0-14-10 FERTILIZER TO PEANUTS TO GERMINATION, 23 FARMS IN PEANUT AREA, 11 COUNTIES IN SOUTHEASTERN ALABAMA, 1950-51

Method of applying 0-14-10 fertilizer	Farms using 0-14-10 fertilizer	Average germination[1]
	Number	*Per cent*
Off-set from seed	3	91
Directly under seed	20	80
TOTAL OR AVERAGE	23	81

[1] Computed F for differences in germination by methods of applying fertilizer was 3.49. Tabular F was 2.97 at the 90 per cent probability level.

APPENDIX TABLE 21. RELATIONSHIP OF THE USE OF LIME TO GERMINATION, 135 FARMS IN PEANUT AREA, 11 COUNTIES IN SOUTHEASTERN ALABAMA, 1950-51

Practice followed	Farms	Average germination[1]
	Number	*Per cent*
Used lime in last 5 years	28	86
Had not used lime in last 5 years	107	80
TOTAL OR AVERAGE	135	80

[1] Computed F for differences in germination by practice followed was 2.75. Tabular F was 2.71 at the 90 per cent probability level.

APPENDIX TABLE 22. RELATIONSHIP OF STAGE OF MATURITY TO GERMINATION, 135 FARMS IN PEANUT AREA, 11 COUNTIES IN SOUTHEASTERN ALABAMA, 1950-51

Percentage of stage of maturity		Farms	Average germination[1]
Range	*Average*	*Number*	*Per cent*
41 - 60	53	38	79
61 - 80	70	73	82
81 or more	84	6	89
TOTAL OR AVERAGE	61	135	80

[1] Computed F for differences in germination by stage of maturity was 2.70. Tabular F was 2.68 at the 95 per cent probability level.

APPENDIX TABLE 23. RELATIONSHIP OF PERCENTAGE POPS TO GERMINATION, 135 FARMS IN PEANUT AREA, 11 COUNTIES IN SOUTHEASTERN ALABAMA, 1950-51

Percentage of pops		Farms	Average germination[1]
Range	*Average*	*Number*	*Per cent*
10 or less	7	37	84
11 - 20	15	54	80
21 - 30	24	22	81
31 or more	40	22	74
TOTAL OR AVERAGE	18	135	80

[1] Computed F for differences in germination by percentage pops was 3.42. Tabular F was 2.68 at the 95 and 3.92 at the 99 per cent probability level.

APPENDIX TABLE 24. GERMINATION OF PEANUTS CURED BY VARIOUS METHODS

Treatment	1951 crop		1952 crop	
	Moisture at harvest	Germination in March, 1952[1]	Moisture at harvest	Germination in May, 1953[2]
	Per cent	*Per cent*	*Per cent*	*Per cent*
Windrowed	16.7	47	6.0	73
Piles	15.6	52	6.0	67
Stacked	10.7	57	6.0	71
Dried artificially from low moisture	14.0[3]	79	13.1[3]	66
Dried artificially from high moisture	30.0[3]	72	20.6[3]	59

[1] The 1951 germination percentage obtained by Official Association of Seed Analysts Germinator Method.
[2] The 1952 percentage is average of two germination percentages and one field emergence count.
[3] Artificially dried peanuts brought to 5 and 6 per cent moisture.

APPENDIX TABLE 25. GERMINATION OF WINDROWED, PILED, AND STACKED PEANUTS DUG ON FIVE DATES BETWEEN OCTOBER 6 AND OCTOBER 17, 1952

Digging date	Percentage of moisture at harvest[1]			Percentage of germination[2]		
	Windrowed	Piled	Stacked	Windrowed	Piled	Stacked
	Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
October 6	5.0	5.0	5.0	99	83	92
October 11	5.0	5.0	5.0	95	90	87
October 13	6.0	5.0	5.0	88	87	80
October 15	5.0	5.0	8.0	89	94	79
October 17	11.0	11.0	8.0	74	71	90
AVERAGE				89.0	85.4	85.6

[1] Steinlite moisture tester.
[2] Official Association of Seed Analysts Germination Method.

APPENDIX TABLE 26. THE EFFECT OF TIME OF DIGGING ON GERMINATION OF WINDROW-CURED PEANUTS IN THE FALL OF 1952

Digging date	Moisture content at harvest[1]	Germination[2]
	Per cent	*Per cent*
September 15, 1952	6.0	68
September 21, 1952	6.0	78
September 27, 1952	6.0	84
October 3, 1952	6.0	88
October 9, 1952	6.0	96
October 15, 1952	6.0	95
October 20, 1952	6.0	73
October 26, 1952	6.0	85

[1] Steinlite moisture tester.
[2] Official method of American Association of Seed Analysts. Germination tests made in May, 1953.

APPENDIX TABLE 27. EFFECT OF INDICATED TREATMENTS ON GERMINATION OF PEANUTS FIELD-CURED TO A SALEABLE MOISTURE CONTENT

Treatment	Percentage of germination[1]	
	1950	1952
	Per cent	*Per cent*
Windrowed with nuts up	49	79
Windrowed with nuts mixed	53	81
Windrowed with nuts down	49	86
Cured part in windrow then in small piles	69	—
Windrowed with tops mowed before digging	—	84
Small piles turned	64	—
Small piles	59	85
Large piles turned	63	—
Large piles	79	—
Small stacks	73	74
Stack with tops mowed before digging	—	72

[1] Germination percentage shown is average of germination and field emergence percentages. There was a correlation between germinator and field emergence data.

APPENDIX TABLE 28. THE GERMINATION OF UNSHELLED AND SHELLED PEANUTS AFTER STORAGE AT VARIOUS MOISTURE LEVELS FOR 5 AND 8-MONTH PERIODS IN GLAZED TILES AT AUBURN, ALABAMA, 1949 - 1950

Unshelled				Shelled			
Initial kernel moisture	Mean storage kernel moisture	Germination after storage for 5 months	Germination after storage for 8 months	Initial kernel moisture	Mean storage kernel moisture	Germination after storage for 5 months	Germination after storage for 8 months
Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
10.0	8.0	65.5	14.5	9.0	7.3	70.5	28.0
8.0	6.5	75.0	64.6	7.0	6.4	76.5	59.0
7.0	6.0	81.3	69.0	6.0	5.7	73.0	60.0
6.0	5.7	90.8	75.0	5.0	5.3	68.3	45.0

APPENDIX TABLE 29. A SUMMARY OF TEMPERATURES AND RELATIVE HUMIDITIES THAT PREVAILED IN THE STORAGE STRUCTURE AT AUBURN, ALABAMA, 1949-50

Month	Mean monthly temperature	Days with mean temperatures above 70°F	Mean monthly relative humidity	Days with mean relative humidites above 75 per cent
	°F	*Number*	*Per cent*	*Number*
November	49.0	2	64.5	8
December	39.5	0	72.0	13
January	42.5	0	69.5	11
February	48.0	0	74.5	19
March	56.5	1	68.0	13
April	61.5	7	68.0	9
May	73.5	19	61.0	4
June	76.5	30	72.5	15
July	80.0	31	75.0	13

APPENDIX TABLE 30. THE EFFECT OF INITIAL KERNEL MOISTURE CONTENT ON THE GERMINATION OF PEANUTS STORED FOR 5 MONTHS AND 9 MONTHS IN BINS AT HEADLAND, ALABAMA, 1952-53

Initial kernel moisture	Initial germination	Germination after a 5-month storage period	Germination after a 9-month storage period
Per cent	*Per cent*	*Per cent*	*Per cent*
11.4	76.0	63.0	29.0
8.4	88.0	74.0	53.0
6.4	95.0	83.0	69.0
5.2	88.0	91.0	74.0

APPENDIX TABLE 31. THE EFFECT OF VARIOUS STORAGE TEMPERATURES ON THE GERMINATION OF PEANUTS AT VARIOUS KERNEL MOISTURES AFTER 5 AND 8 MONTH STORAGE PERIODS

Kernel moisture content	Germination after 5 months at				Germination after 8 months at			
	68°F	76°F	86°F	96°F	68°F	76°F	86°F	96°F
Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
8.1	78.0	----	----	----	43.0	----	----	----
7.4	90.0	----	8.0	----	31.0	22.0	3.0	----
6.8	90.0	90.0	90.0	90.0	55.0	13.5	----	----
6.3	90.0	84.0	82.0	92.0	90.0	63.0	54.5	36.0
5.6	90.0	92.0	86.0	86.0	90.0	61.0	55.0	46.5
5.3	90.0	91.0	84.0	81.0	90.0	82.0	80.0	68.5