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January 1, 1943 — December 31, 1944

AGRICULTURAL EXPERIMENT STATION
of the ALABAMA POLYTECHNIC INSTITUTE
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AGRICULTURAL ECONOMICS

A Brief Analysis of Progress of Tenant-Purchase Farms in Alabama from 1940 through 1942 with Comparisons. (J. W. Lester and Ben F. Alvord.) – A study for 1940 of success of 313 tenant-purchase farms scattered throughout Alabama revealed the following: (1) they had on the average a larger total investment, (2) larger total area, (3) larger productive area in crops and in pasture, and (4) more livestock and equipment than the average farm as reported by the Census.

This larger-than-average farm business yielded the tenant-purchase farmer slightly larger-than-average total farm receipts. However, gross receipts per acre of farm land was nearly one-sixth less than average and one-third less per acre of cropland. Some factors holding down gross receipts per acre appeared to be: (1) "misfits" among tenant-purchase operators, (2) heavier-than-average capital invested in buildings, (3) inadequate supervision, (4) inadequate effort on the part of some clients, and (5) insufficient time for the tenant-purchase farmer to get his business efficiently organized.

A study of 272 of these farms through 1941 and 1942 indicated that tenant-purchase farmers had increased their gross farm receipts more rapidly than the average Alabama farmer. Nevertheless, gross receipts of these farms per crop acre were still behind those of the average farm.

Losses Incurred in Peanut Harvesting, 1944. (A. H. Harrington.) – A total of 19,930 questionnaires were sent to peanut producers in nine southeastern Alabama counties to determine 1944 harvesting difficulties. Sixteen per cent of the questionnaires were returned in complete and usable form. These 3,245 complete replies represented 91,407 acres, or 23 per cent of the estimated acreage of harvested peanuts in the nine counties in 1944.

These growers reported that their total acreage of planted, dug, and hogged peanuts was more than 10 per cent larger in 1944 than in 1943. The group's total acreage of peanuts neither dug nor hogged in 1944 was over 7 times greater than in 1943 – 1,500 acres as compared to 200. The total acreage they reported dug abnormally late in 1944 was 33,000 acres as contrasted to 8,000 the previous season. Acreage intended for digging but hogged was nearly four times larger – 12,000 in 1944, 3,500 in 1943.

Losses from late digging were indicated in 63 per cent of the replies. These were reported to be 220 pounds per acre or about 20 million pounds for the entire group in 1944, as compared with reported losses from late digging of 4.5 million pounds in 1943. However, it seems possible that loss estimates from this cause may have been confused with losses due to weather and to worm damage. Assuming all farmers would have had as great a decline in yields from other causes as did those reporting no late digging, there would have been a loss of only 71 pounds per acre rather than 220 pounds. Thus the total loss in production from late digging would have been about 6.5 million pounds instead of 20 million pounds.

Most farmers assigned two or more reasons for late digging. About 40 per cent of the reasons indicated labor shortage; 19 per cent, unusual maturing of the peanuts; 19 per cent, wet weather; and 19 per cent, not enough power or equipment.

About 38 per cent of the replies reported acreages not dug that were planted for digging. The undug acreage amounted to 12 per cent of the total planted for digging in 1944. Most of the undug acreage was hogged off, so that total loss was avoided. Losses could not be measured on these acres, since land with poor yield prospects is generally abandoned first.

AGRICULTURAL ENGINEERING

Dynamics of Soil Erosion and the Principles of Control: EFFECT OF VEGETATIVE BALK IN CONTROLLING EROSION. (J. H. Neal.) – Experiments with vegetative balks have been conducted for 3 years on six 15-by-50-foot plots. The balks used were strips of close-growing vegetation between rows of a tilled crop. All plots were treated the same during the winter. Each was fertilized with 400 pounds per acre of 0-8-4, and seeded broadcast to crimson clover in October.

During April, all of the clover was harvested from three plots. On the other three plots, vegetative contour strips of about 1 foot wide were left unharvested every 7 feet. After the clover was weighed, a proportionate amount was spread evenly over the plots and turned under. The plots were then bedded and fertilized with 200 pounds 0-8-4 per acre, and cotton was planted. The balks were hoed out as soon as the clover seed matured (latter part of June).

During the winter when all plots were treated alike, the runoff and soil loss from the balk plots were, respectively, 110 and 70 per cent of the water and soil losses from the check plots. The lower soil loss during the winter was probably due to residual effect from a previous balk. The average runoff and soil loss during the summer and fall were, respectively, 60 and 26 per cent of that from the check plots. Balks were very effective for controlling erosion, but they reduced the crop yields from the plot studied.

EFFECT OF VEGETATION ON RUNOFF, SOIL LOSSES, AND INFILTRATION, WHEN PLOTS ARE SUBJECTED TO ARTIFICIAL RAIN. (J. H. Neal.) – Artificial rain was applied at different seasons to one of the erosion plots with a 5 per cent slope, as described in previous reports. The first series of rains was applied just before turning the winter cover crop; the second series, just after turning the winter cover crop; and the third series was applied on mature cotton grown on contour beds.

These tests indicate that vegetation is not effective for controlling runoff after the soil is saturated. However, vegetation does reduce the soil losses. The soil lost from a turned plot was

6 times that lost from a plot in crimson clover when the two rains were of the same intensity and approximately the same amount of runoff.

Design and Construction of Special Farm Machinery and Equipment: (1) FEED DEHYDRATION. (F. A. Kummer and A. W. Cooper.) – Experimental work on artificial dehydration of sweetpotatoes for livestock feed was concluded in 1942. In order to prolong the operating period of artificial dehydrators, experiments were carried on with other feed crops including several hay crops. Sweetpotato leaves and kudzu showed reasonable possibilities. The sweetpotato leaves were harvested with a mowing machine equipped with a buncher attachment. This equipment permits cutting only the leaves and leaf stems, and the vines are left in the field. It was possible to cut approximately one acre per hour, with a yield of 1,200 to 1,500 pounds of green leaves per acre. The kudzu, including vines and leaves, was cut with a mowing machine equipped with a special cutting attachment. The two crops were chopped in an ensilage cutter and carried immediately through the dehydrator. It was found that sweetpotato vines and leaves together were unsatisfactory for mechanical dehydration. Sweetpotato leaves alone, however, yielded an excellent feed product and are easy to dehydrate. However, they lack the volume for extensive operations.

Kudzu (vines and leaves) appears to be the most profitable hay crop for dehydration, because of the higher quality of feed produced by artificial dehydration as compared with air drying. Most significant are the relatively high carotene contents of both sweetpotato leaves and kudzu, which compare favorably with alfalfa leaf meal. Preliminary tests have shown that vitamin A deficiencies in chickens may be corrected in 5 to 10 days if small amounts of this meal are added to deficient rations.

(2) DESIGN AND CONSTRUCTION OF SPECIAL EQUIPMENT FOR DISTRIBUTION OF AMMONIUM HYDROXIDE AS A SOURCE OF NITROGEN. (F. A. Kummer and A. W. Cooper.) – This work was done in cooperation with the Tennessee Valley Authority and Department of Agricultural Engineering, University of Tennessee.

Three small distributors with a displacement pump, developed by the University of Tennessee, were mounted on Covington cotton planters for side application on row crops.

Fertilizer placement tests, using ammonium hydroxide as a source of nitrogen and the nitrogen equivalent of a 6-8-4 mineral fertilizer, were made on four 100-foot rows of sweetpotatoes. The equivalent of 1,000 pounds of 6-8-4 per acre was applied as side dressing in each case. The plots that received nitrate of soda as a source of nitrogen yielded at the rate of 270 bushels per acre. The plots that received the nitrogen equivalent in the form of ammonium hydroxide yielded 330 bushels per acre, or an increase of 60 bushels.

(3) SWEETPOTATO PRODUCTION WITH MACHINERY. (F. A. Kummer and A. W. Cooper.) — The value of sweetpotatoes for livestock feed depends primarily upon the price at which potatoes may be produced in comparison with corn. In order to be comparable to corn, the labor requirements for the production of the potato crop must be reduced to a minimum. Although it has been possible to reduce hand preparation and costs through the use of machinery, no satisfactory means has yet been found to reduce cultivation and harvesting costs to a reasonable level for feed production.

The experimental work was conducted on a 5-acre tract of Norfolk sandy loam on three terrace intervals. Different methods of planting and cultivation were tried. Tractor cultivator attachments, both sweeps and disc hillers, were satisfactory for weed control in middles, but were of no value for the control of weeds on top of the rows. In all cases where machine cultivation was used for weed control on top of beds, serious damage resulted to the crop either by covering the plants or uprooting them. It was possible, however, during the one-year experiment to obtain satisfactory weed control by preparing the beds 4 weeks in advance of planting and by leveling the tops of the beds with a heavy wood plank immediately before planting. This operation removed 2 to 3 inches of soil from the top of the beds and destroyed early weed growth.

It was only necessary to cultivate the middles one time during the growing season. It should be pointed out, however, that this method may not be satisfactory in a wet season, when early weed growth develops rapidly.

Grain Sorghum Cultural and Variety Tests, 1944. (J. H. Neal and T. H. Rogers.) – Different cultural practices were tried on three varieties of grain sorghum, Early Hegari, Bonita, and Early Kalo. The following methods of planting were followed: (1) two-row tractor planter with the rows spaced 38 inches; (2) grain drill with rows spaced 7½, 15, and 22½ inches apart; and (3) broadcast at rates of 10 and 20 pounds per acre.

Fertilizer was applied at the time of planting at the rate of 600 pounds of 6-8-4 per acre, except on two of the drill plots on which the applications were 1,200 and 1,800 pounds respectively. On the row plots, the fertilizer was put down in the row at the time of planting with a combination planter and distributor. On the broadcast and drill plots, the fertilizer was spread broadcast over the plots just ahead of planting. No side-dressings were applied.

The yield of grain sorghum increased about 575 pounds per acre for each 600-pound increment of fertilizer above the first 600-pound application.

The cultural practices and yields are given in Table 1. Use of the rotary hoe on the drilled plots produced significantly higher yields (31 per cent) over those given no early cultivation, but plowed once.

TABLE 1.—YIELDS OF GRAIN SORGHUM IN 38-INCH ROWS WITH DIFFERENT CULTURAL TREATMENTS

Cultural treatment	Yield of grain per acre		
	Early Hegari	Bonita	Early Kalo
	Pounds	*Pounds*	*Pounds*
Twice over with rotary hoe, plowed once	1,247	1,037	636
Hoed by hand, plowed once	1,162	719	880
Plowed once	889	819	567
Twice over with weeder, plowed once	796	709	577

AGRONOMY AND SOILS

Use of Nitrogen with Green-Manure Oats. (Randall J. Jones.) – Turning under small grains for green manure usually depresses the yield of the succeeding crop unless nitrogen is added. An experiment was begun on Norfolk sandy loam to study the effect of green-manure oats on corn yields when various amounts of nitrogen were added at different times.

Nitrogen was added to the oats in the fall at the rate of 40 pounds per acre, except plot 6 which received 80 pounds of nitrogen. Uramon was used as the source of nitrogen for all plots except plot 7, which received nitrate of soda. One ton of dolomitic limestone was applied to all plots, and 0-14-10 was applied at the rate of 300 pounds per acre to the winter crops of oats and vetch and 200 pounds to the corn.

The green weight of oats produced by 40 pounds of nitrogen from Uramon was 5,560 pounds per acre, whereas the yield was only 2,775 pounds when nitrate of soda was used. This difference was undoubtedly due to the leaching of nitrates which occurred on this sandy soil. Where 80 pounds of nitrogen in the form of Uramon was used, the green weight of oats amounted to 7,070 pounds. The dry weight yield, however, was about the same as that from 40 pounds of nitrogen. Cold weather partially killed the vetch, but it recovered and the second growth amounted to 8,270 pounds per acre (green weight).

The yield of corn was increased 4.8 bushels when nitrogen was added as a side-dressing to corn rather than applying it when the oats were turned.

Division of the nitrogen so that 20 pounds were added when oats were turned and 20 pounds applied as a side-dressing to corn gave the same yield as that obtained from applying the entire 40 pounds to the corn.

Value of Lime for Peanuts. (Howard T. Rogers.) – Numerous greenhouse tests with several of the more extensive soil types of the Coastal Plain have shown a striking response to lime by Spanish peanuts. Frequently two crops of peanuts on these light-textured soils under greenhouse conditions will deplete the available calcium in the soil to such a level that it is impossible to grow another crop of peanuts or other legumes without heavy applications of lime.

In a comparison of 10 sources of lime for Spanish peanuts and vetch in field tests, calcium silicate slag was the only material that proved inferior and of questionable value. Heavy crops of Monantha vetch were grown and turned under before planting peanuts.

A maximum yield of 3,108 pounds per acre of nuts was obtained from 3,000 pounds per acre of paper mill waste, while the average increase in yield due to lime was about 800 pounds per acre of peanuts. Ample phosphate and potash were supplied in these tests, with 300 pounds of 0-14-10 fertilizer being applied to the vetch and a similar amount to the peanuts. Although this was the second crop of peanuts removed from this soil (Norfolk sand) in 2 years, 1,500 pounds per acre of limestone applied broadcast was nearly as effective as double that amount.

In nine cooperative tests in Geneva and Houston counties in 1943, 300 pounds per acre of finely ground limestone in the row gave an average increase of 191 pounds of runner peanuts. The quality of nuts appeared to be improved by liming, but lowered by applying nitrogen or high rates of potash (120 pounds per acre of K_2O).

Alabama Soils Need Boron for Alfalfa. (Howard T. Rogers.) – At several locations in the State, large increases in alfalfa hay, ranging from ½ to 2½ tons per acre, have been obtained from the application of 20 to 30 pounds per acre of borax. In tests at Auburn, several locations in the Piedmont, and on Sand Mountain, applications of borax have proved highly beneficial to this crop.

Lime for Caley Peas. (Howard T. Rogers.) – Three sources of lime for Caley peas *(Lathyrus hirsutus)* were compared on both sandy and heavy textured soils of the Black Belt of Alabama. Either Selma chalk or dolomite was a satisfactory source of lime for this crop on all the areas tested. Calcium silicate slag was inferior to the other liming materials on extremely acid land.

Peas failed completely without lime on Vaiden clay, having a pH of 4.7. However, a yield of 1½ tons of dry hay per acre was obtained when sufficient lime was applied. Three of the four areas tested showed an average increase for lime of about one ton of dry hay per acre. Although Caley peas will grow on slightly acid soil (pH 6.0 to 7.0), the crop has a rather high lime requirement and is difficult to inoculate at a soil pH below 5.5.

Susceptibility of Winter Legumes to Injury by Borax. (Howard T. Rogers.) – The nature of the crop and degree of boron deficiency of the soil will affect the best time and method of applying borax. In a comparison of different methods of applying borax to several winter legumes, it was found that crops varied greatly in their tolerance to this material, as well as in their response to applications of boron. On a sandy soil highly deficient in boron, bur clover died out during a dry fall when no borax was added. On the other hand, severe injury to Austrian winter peas, vetch, and crimson clover was observed after applying 20 pounds of borax per acre at time of seeding or 2 weeks after seedling emergence. In susceptibility to injury by borax, the several crops rank in the following order: Austrian winter peas; crimson clover; vetch; and bur clover and lupine, both of which are highly tolerant.

Borax Increases Legume Seed Production. (Howard T. Rogers.) – Five times as much crimson clover seed was produced where 20 pounds of borax per acre were applied as was obtained without borax on Norfolk sand at Auburn. The same treatment more than doubled the yield of Monantha vetch seed. However, with both crops the increase in vegetative growth was small on some areas.

Residual boron from an application of borax the year before (20 pounds per acre) was sufficient for vetch seed and alfalfa hay production on a soil highly deficient in native boron at the beginning of the test. A wide variation among legumes in boron requirement was evident, since no response to borax was obtained with Austrian winter peas and lupine on soils deficient in boron for alfalfa, clovers, and vetch seed production.

Effect of Fertilizer on the Yield of Alfalfa Hay. (D. G. Sturkie and T. H. Rogers.) – Alfalfa produced an average yield of 8,996 pounds of hay per acre at Auburn in 1943 and 1944 on land that received per acre 2 tons of dolomite, 500 pounds of superphosphate, 200 pounds of muriate of potash, 30 pounds of borax, and 5 tons of manure. This yield was obtained in an experiment with fertilizers conducted on Bradley sandy loam soil. The alfalfa was planted in the fall of 1942 and cut four times each year during 1943 and 1944. In this test, all plots received an application of 2 tons of dolomite in the summer of 1942 and an annual application of 500 pounds of superphosphate per acre. Marked increases in the growth of alfalfa were obtained from applications of manure, borax, and potash in the presence of phosphate and lime. These increases in yield amounted to 1,234 pounds per acre from 5 tons of manure, 1,174 pounds per acre from 30 pounds of borax, and 2,863 pounds per acre from 200 pounds of muriate of potash.

Effect of High Rates of Nitrogen in Fertilizers on the Yields of Peanuts. (D. G. Sturkie, E. F. Schultz, Jr., and H. R. Albrecht.) – In a test on Norfolk soil at Auburn in 1943, a yield increase of 1,016 pounds per acre of Spanish peanut seed was obtained from an application of 750 pounds of nitrate of soda. This increase from the use of a high rate of nitrogen was in contrast to the results obtained in the past with low rates of nitrogen.

In 1944 two tests were run on Norfolk soil on farms in the vicinity of Auburn. One test was on a sandy loam and the other on a loamy sand. In these two tests, the yields of seed of Spanish peanuts were increased by fertilization with nitrogen up to 500 pounds per acre of nitrate of soda, amounting to approximately a pound of peanuts for each pound of nitrate of soda applied. Runner peanut seed yields were not increased by application of nitrogen beyond 125 pounds of nitrate of soda per acre. The hay yields of both Spanish and runners increased as nitrogen was added.

Another test was conducted in 1944 at the Main Station, Auburn, on 11 plots of Norfolk sandy loam soil that had received differential treatments for the last 11 years. In 1944 the plots were split into halves, one of which received nitrate of soda and one of which did not. Spanish peanuts gave an average yield increase of 349 pounds of seed per acre from an application of 750 pounds of nitrate of soda. Runner peanut seed yields again were not increased by the addition of nitrate of soda. The application of nitrogen did not significantly affect the percentage of sound and mature kernels, rotten kernels, or "pops" of either Spanish or runner peanuts in 1944.

Effect of Magnesium Fertilization on the Oil Content of Cotton Seed. (Anna L. Sommer.) – The effect of magnesium fertilization on the oil content of cotton seed was investigated in both greenhouse and field experiments. No significant effects were found.

Need for Sulfur as a Plant Food in Alabama. (N. J. Volk.) – Sulfur brought down in the rain in the agricultural regions of Alabama ranged from 7.2 pounds of SO_3 per acre at Kinston to 15.5 pounds at Hanceville, according to results obtained over the 1940-43 period. Data obtained from cooperative field tests reveal that cotton in Alabama needs about as much SO_3 per acre as P_2O_5, or around 40 to 50 pounds of SO_3 per acre. The sulfur brought down in the rain represents only about 20 to 30 per cent of what is needed. Consequently, if crops are fertilized with fertilizers made up of nonsulfur-containing materials, gypsum or some other sulfur compound should be added to the fertilizer or to the soil.

Cultural, Fertilizer, and Seeding Test on Outlying Pastures on Various Soil Types. (E. L. Mayton.) – The following points are based on a summary of the results from some 30 different pasture experiments conducted in nearly all sections during the past 3 seasons:

(1) All permanent pastures should contain both a spring clover and a summer grass. Of the two types of plants the clover is the most important, since it extends the grazing season and furnishes nitrogen for the stimulation of a summer grass crop.

(2) Clovers are the most difficult of the two types of plants

to maintain in a pasture sod. For this reason and because of their importance, they should receive the greater attention – supplying their fertilizer, cultural, and management requirements.

(3) The results of fertilizer experiments very definitely show that applications of lime, phosphate, and potash are necessary for the successful establishment and maintenance of clovers. The only exception is on lime soils of the Black Belt where only phosphate and potash need to be applied.

(4) When either lime, phosphate, or potash is omitted from the application, it lowers the efficiency of the other elements.

(5) Spring-growing clovers should be seeded on a firm seed bed in the fall. In most instances, late winter or spring seedings have not given satisfactory stands or a seed crop sufficient for reseeding.

(6) The establishment of a clover is proportional to the amount of preparation given the seedbed. Disking in of the fertilizers is about the minimum amount of preparation that can be given and a successful stand established. If a stand of Dallis grass is present, it need not be destroyed. However, a rather thorough disking of sods, such as carpet grass and broomsedge, is desirable.

Cotton Breeding. (H. B. Tisdale and J. B. Dick.) – Work was continued for improvement in yield, wilt-resistance, and other important agronomic qualities of Cook 144, Stoneville, Deltapine, Miller, and Coker 100 Wilt varieties by straight line selection, and by the hybridization and selfing program, involving several varieties of cotton shown by variety tests to be well adapted to conditions in Alabama. A new strain of cotton developed from a Stoneville-Clevewilt cross, designated as Auburn Hybrid 9531, was increased for limited distribution in 1945. This strain has shown very satisfactory results in yield, staple length, and wilt-resistance in strain and variety tests for the past 3 years. It has medium to light foliage, medium to large size, oblong bolls, around 38 per cent lint, one inch or better staple and high tolerance to wilt diseases.

ANIMAL AND POULTRY HUSBANDRY

Grazing Kudzu with Cattle and Hogs. (J. C. Grimes.) – Tests have been conducted during the past several summers in grazing Kudzu with both cattle and hogs. The following results were obtained from grazing cattle: (1) one acre of Kudzu furnished sufficient grazing for one cow from May 1 to September 1; (2) cows on Kudzu gained from 1 to 1¼ pounds per day; (3) damage to Kudzu stand was prevented by removing the cattle September 1, allowing the plants to put on a new crop of leaves before frost; and (4) frosted leaves and plants may be grazed for a month or 6 weeks after frost before deterioration sets in and much of the food value is lost.

Results from grazing hogs on kudzu are as follows: (1) 50-pound pigs getting no other feed just about maintained their weight while grazing Kudzu; (2) dry sows and 100-pound shoats without other feed gained from ¼ to ⅓ of a pound per day while grazing Kudzu; (3) shoats, weighing from 75 to 100 pounds on Kudzu pasture, gained from ¼ to ¾ of a pound per day when given one pound of corn per head daily in addition to grazing; (4) shoats receiving a full feed of corn while grazing Kudzu gained from 1¼ to 1½ pounds per day; (5) the use of a protein supplement for hogs that were being fed corn on Kudzu pasture was of questionable value; and (6) the acreage of Kudzu required for a given number of hogs depended on the growth of the Kudzu, the size of the hogs, and the way they were being fed. It appears that one acre of average Kudzu will be sufficient for five or six large shoats or mature sows when they are receiving no supplementary feed. If a full feed of corn is being allowed, one acre should be sufficient for approximately 10 such hogs.

Green Feed as a Supplement to Grains for Laying Hens. (D. F. King.) – Starting on March 10, 1944, and continuing for a period of 7 months, a pen of White Leghorn pullets, which received green feed as a substitute for three-fourths of the laying mash, was compared with a similar pen receiving unlimited amounts of laying mash but no green feed. White Dutch Clover was grazed from March 10 to June 20 and Otootan soybeans were grazed from June 21 to September 30.

The hens receiving green grazing produced eggs at the rate of 52 per cent on a ration containing 28 per cent more grain and 77 per cent less mash than the control hens, which laid at the rate of 44 per cent. Since the grain and green feed can be produced on the farm, the advantages of this feeding system are obvious. Even when the feeds were charged at market price, the green-fed hens produced eggs at a feed cost of 15 cents per dozen as compared with a feed cost of 25 cents per dozen for the control hens.

Management of Farm Poultry Flocks. (D. F. King and G. J. Cottier.) – The object of this project is to study under farm conditions the importance of improved housing, feeding, and breeding of hens, and improved methods of raising chicks.

On farms where all four improvement practices were followed, egg production per hen was 2½ times greater than where no improvement practices were used. The improvement practices having the greatest effect on egg production rank as follows: breeding and feeding of hens, methods of raising chicks, and housing of hens. Other factors affecting the yearly egg production are date of hatching, age of birds in flock, consumption of corn, and amount of range allowed the flock.

Effect of Gossypol or other Substances in Cottonseed Meal on Egg Quality. (D. F. King and A. G. Williams.) – Rations containing cottonseed meal were fed to hens to determine the effect of cooking and the additions of ferrous sulphate on the quality of storage eggs.

Results indicate that cooking cottonseed meal, which eliminates the free gossypol, reduced to a considerable extent the dark yolk color of storage eggs. Additions of iron to a non-cooked cottonseed meal ration also reduced the yolk discoloration. Since eggs produced on a ration containing both cooked cottonseed meal and iron showed only very little discoloration after storage, it is assumed the iron must largely eliminate discoloration caused by bound gossypol.

Studies to modify the methods of determining gossypol in cottonseed meal for use in analyzing fresh eggs were somewhat unsuccessful, because of the relatively small amount of gossypol in eggs and the rather large amounts of fat present.

Study of the Transmission of Factors Related to the Economical Production of Swine. (J. C. Grimes and A. H. Quinn.) – The experiment to study the transmission of factors related to the economical production of swine was continued. Twelve litters of 68 pigs were tested in 1944. The best litter required only 311 pounds of feed for each 100 pounds of gain. This was the best litter record in the experiment to date.

Since this experiment was started, seven generations of 665 pigs have been tested. The results have shown that the ability to make rapid and efficient gains varies in individuals and in families, and that the factors that control this ability are transmitted.

Variations in the Vitamin A and Carotene Content of Milk and Butter. (W. D. Salmon and Cornelia Flanagan.) – The vitamin A content of butter showed some seasonal variation, but was more nearly constant than was the carotene content. The low level for the vitamin A content of butters assayed in 1944 was in the range of 4.50 to 5.00 μg./gm. butter; the high level was in the range of 6.50 to 7.60 μg./gm. butter. The low level of carotene was in the range of 1.00 to 2.00 μg./gm. butter and the high level was in the range of 9.00 to 10.00 μg./gm. butter. The high values for both vitamin A and carotene occurred from May to October and the low values from November to April.

The variation in the vitamin A and carotene content of milk followed a pattern similar to that of the butter. The minimum vitamin A content was 0.26 μg./gm. or 253 μg./qt. and the maximum vitamin A content was 0.41 μg./gm. or 400 μg./qt. The minimum carotene content was 0.23 μg./gm. or 224 μg./qt. and the maximum carotene content was 1.06 μg./gm. or 1,033 μg./qt.

The carotene and vitamin A contents of milk and butter were directly related to the amount of green forage or grazing consumed by the cow.

Relation of B-Vitamins, Fats and Amino Acids to Growth of Rats. (W. D. Salmon.) – Increasing the level of thiamin above 20 μg. per rat daily did not increase the rate of growth of rats receiving a high-sucrose diet. The addition of brewer's yeast, however, to a high-sucrose diet, supplemented with the known crystalline vitamins except biotin, increased the growth rate significantly. When the basal diet contained 30 per cent of lard, the addition of brewer's yeast had no significant effect on the growth rate. The retardation of growth by the addition of cystine to a low casein-high sucrose diet was diminished by the addition of brewer's yeast.

Lathyrism in Relation to the Use of Caley Peas *(Lathyrus hirsutus)* **for Livestock.** (D. M. Turney, D. H. Copeland and W. D. Salmon.) – Severe anatomical deformities were produced by the inclusion of 25 to 50 per cent of Caley pea seed in otherwise adequate rations for rats, chicks, and pigs. The bone ash of affected animals was 3 to 6 per cent lower than that of control animals. Reproductive failure occurred in rats receiving 25 per cent of the seed in the diet. The addition of 0.20 to 0.50 per cent of manganese sulfate to diets containing 50 per cent of the seed gave increased growth, lowered mortality, and some delay in the development of anatomical abnormalities. However, the protection was not sufficient to be of practical importance. On the basis of these results the feeding of mixtures of oats and Caley pea seed would appear to be risky.

The harmful effect of the seed was not overcome by cooking.

Cooking Losses of Ascorbic Acid and Carotene in Large Scale Cooking. (W. D. Salmon and Cornelia Flanagan.) – In large scale cooking practice, losses of ascorbic acid for different vegetables averaged as follows (in per cent): lima beans 81.0; string beans 74.5; cabbage 76.0; carrots 46.0; cauliflower 44.5; boiled potatoes 50.8; mashed potatoes 47.3; oven-browned potatoes 80.0; spinach 95.8; baked sweetpotatoes 11.0; turnip greens 58.8; and turnip roots 55.6. The use of large quantities of cooking water, which was discarded, and excessive cooking time appeared to be the factors responsible for the high losses.

Carotene losses were less serious than the ascorbic acid losses.

BOTANY AND PLANT PATHOLOGY

Cause and Control of Concealed Damage in Peanuts. (Coyt Wilson.) – During the summer and fall of 1944, an effort was made to determine the cause of concealed damage and the conditions that favor its development. Samples of peanuts were collected in the field before digging, from various types of shocks and stacks, from windrows, and from farmers' stocks delivered to the shelling plant. These were examined and the percentage of damage determined.

The disease was found to occur in the field. The majority of the samples collected before digging did not contain concealed damage, but one sample was found to contain 12 per cent damage. A few other samples were collected that contained less than 3 per cent damage.

The disease appears to progress most rapidly under conditions that retard rapid curing. The percentage of damage in samples collected from the top and outside of shocks contained from none to 1 per cent damage. Samples collected from the bottom and center of the same shocks contained from 6 to 35 per cent damage. The same trend was evident in stacks, most of the damage being found in the center of the stack. Peanuts cured in the windrow were found to contain very little or no concealed damage.

No evidence of correlation was found between soil type or soil fertility and development of concealed damage.

Spanish peanuts sometimes contain concealed damage, but the disease is far more prevalent in peanuts of the runner type.

A fungus, tentatively identified as *Diplodia theobromae* (Pat.) Nowell, has been isolated repeatedly from seeds with concealed damage. Over 1,200 seeds from 12 samples collected in different localities have been plated. This fungus has been isolated from 65 per cent of these seeds, and it has constituted 95 per cent of all cultures obtained.

HORTICULTURE AND FORESTRY

Comparative Yields from Slash and Loblolly Pines at Auburn. (L. M. Ware, J. E. Bryan, and R. Stahelin.) – Data taken during the winter of 1943-44, at the Main Station as part of a thinning operation offer a good basis for comparing the volume of slash and loblolly pine. Two ages and sites were involved. One planting, 17 years old, was on what was at one time an abandoned and rather severely eroded hillside. The other, 12 years old, was on a flat, sandy area of rather low fertility. The rate of growth of the slash was higher than the loblolly on both sites at both ages.

TABLE 2.—VOLUME OF WOOD AND RATE OF GROWTH OF SLASH AND LOBLOLLY PINE

Age	Class of product	Volume		Rate of Growth per acre per year	
		Slash	Loblolly	Slash	Loblolly
		Cords	*Cords*	*Cords*	*Cords*
17 yrs.	Total volume	32.5	27.0	1.91	1.60
17 yrs.	Total volume	31.2	26.2	1.83	1.54
17 yrs.	Pulpwood	22.8	20.2	1.34	1.20
17 yrs.	Pulpwood	20.0	19.5	1.18	1.15
12 yrs.	Total volume	26.5	18.7	2.21	1.56
12 yrs.	Total volume	24.7	20.5	2.16	1.71
12 yrs.	Pulpwood	16.8	12.2	1.40	1.02
12 yrs.	Pulpwood	16.0	12.3	1.33	1.02

Rate of Growth of Wood in Young Stands a Function of the Number of Trees Per Acre. (L. M. Ware, Rudolph Stahelin, and J. E. Bryan.) – Spacing experiments with artificial plantings of pines on the Main Station serve a purpose much beyond that of showing the influence of trees per acre on the rate of growth, the volume of growth, and the quality of the wood in artificial stands.

TABLE 3.—VOLUME PER ACRE AND RATE OF GROWTH OF SLASH PINE

Spacing	Volume per acre at 12 years	Rate of growth per acre per year
Feet	*Cords*	*Cords*
4 by 4	35.6	2.96
6 by 6	26.2	2.18
8 by 8	15.8	1.32
10 by 10	14.5	1.20
12 by 12	13.1	1.10
16 by 16	8.1	.68
20 by 20	2.9	.25

These experiments show the basic relation of the number of trees per acre to growth, volume, and quality of wood, irrespective of whether the stand is natural or artificial. The results show that the rate of growth of wood is a mathematical function of the number of trees per acre. Results from the spacing experiment are given in Table 3.

Returns from Artificial Planting of Slash Pine in Short Rotation. (L. M. Ware, R. Stahelin, and J. E. Bryan.) – The data in Table 4 are from a 12-year-old planting on a rather level, sandy area but low in fertility. Trees were originally spaced 6 by 6 feet apart. The total volume of wood was calculated before thinning, the stands were then thinned, and the thinnings measured. The thinnings were sold as pulpwood and as firewood. The amount of labor required to cut, stack, load, haul, and load on the cars or deliver to the customer was recorded.

TABLE 4.—YIELD AND VALUE PER ACRE OF 12-YEAR-OLD SLASH PINE PLANTATION

Product	Yield		Cost			Net Value
	Volume	Value	Labor		Truck	
	Cords	*Dollars*	*Man Hours*	*Dollars*	*Dollars*	*Dollars*
		Trees cut in thinning				
Pulpwood	6.7	45.50	54	13.50	3.50	28.50
Firewood	5.8	29.00	66	16.50	3.00	9.50
Total	12.5	74.50	120	30.00	6.50	38.00
		Yield and value of trees left				
Pulpwood	10.7	73.00	86	21.50	5.50	46.00
Firewood	4.2	21.00	48	12.00	2.00	7.00
Total	14.9	94.00	134	33.50	7.50	53.00
		Yield and value of all trees				
Pulpwood	17.4	118.50	140	35.00	9.00	74.50
Firewood	10.0	50.00	114	28.50	5.00	16.50
Total	27.4	168.50	254	63.50	14.00	91.00

Response of Hybrid Sweet Corn to Intensive Methods. (L. M. Ware and W. A. Johnson.) – Yield of corn in the United States is known to decrease from the Canadian border to the Gulf. Yields in Alabama and neighboring states are low. High moisture, high nitrogen, high amount of organic matter in the soil, and high temperatures are favorable to high yields.

TABLE 5.—YIELD AND CHARACTERISTICS OF HYBRID SWEET CORN IN RESPONSE TO FERTILIZERS, ORGANIC MATERIAL, AND IRRIGATION

	Treatment				Characteristics of ears			Yield		
	Amount of fertilizer 6-8-4 applied, per acre	Amount of irrigation per week[1]	Amount manure applied per acre	Other organic matter	Percentage of hills with two ears	Percentage of hills with large ears	Large and medium ears per 100 hills	Marketable ears	Dozen ears	Gross value per acre
	Pounds	*Inches*	*Tons*		*Per cent*	*Per cent*	*Number*	*Pounds*	*Number*	*Dollars*
1	1,000	0	0	0	2	0	0	2,281	307	153.00
2	0	0	0	0	0	0	0	0	0	0
3	1,000	0	12	0	23	14	72	8,176	879	439.50
4	1,000	0	0	Vetch	29	5	47	7,395	839	419.50
5	1,000	0	0	Rye	15	0	17	4,810	573	286.50
6	1,000	1	0	0	9	0	15	4,217	506	253.00
7	1,000	1	12	0	61	64	126	11,146	1,106	553.00
8	1,000	1	0	Vetch	46	26	88	8,883	1,013	506.50
9	1,000	0	0	0	7	0	10	3,584	426	213.00
10	1,000	1	12	Vetch	59	98	154	13,945	1,399	699.55
11	1,000	1	6	Vetch	54	56	130	11,712	1,093	546.50
12	1,000	1	0	Rye	48	30	91	8,269	853	426.50
13	1,000	0	12	Vetch	33	18	81	9,114	1,093	546.50
14	1,000	1	12	Vetch	77	80	148	13,939	1,359	679.50
15[2]	1,500	1	12	Vetch	47	76	135	12,169	1,199	599.50
16	2,000	1	12	Vetch	58	93	157	14,310	1,412	706.00
17	1,000	1	0	Rye	25	5	28	5,491	613	306.50

[1]One inch irrigation per week if rain had not supplied this amount.
[2]All plots supplied lime and boron except this plot.

To determine the extent to which these conditions might be supplied and the corresponding increase in yield, one of the hybrid varieties of sweet corn was grown under conditions that supplied singly and in combinations fertilizers, stable manures, irrigation, and green manures. The results are given in Table 5.

Influence of the Rate of Fertilizer Application, Time of Planting, and Spacing on the Yield and Grade of Sweetpotatoes. (L. M. Ware and W. A. Johnson.) – Studies have been conducted for 5 years in which were compared the yield by grades of sweetpotatoes from 3 rates of application of fertilizer, 4 spacings, and 3 planting periods. The yields are given in Table 6.

TABLE 6.—YIELD AND GRADE OF SWEETPOTATOES OBTAINED FROM DIFFERENT RATES OF FERTILIZER, TIME OF PLANTING, AND SPACING; 5-YEAR AVERAGE

Approximate planting dates	Fertilizer[1] rates	Spacing in 3-foot rows	Yields per acre		
			Total[2]	Marketable	Jumbo
	Pounds	*Inches*	*Bushels*	*Bushels*	*Bushels*
April 1	900	8	289	232	16
	900	12	285	235	23
	900	16	271	228	36
	900	20	274	232	40
	600	12	223	182	6
	1,200	12	294	244	21
May 1	900	8	237	176	4
	900	12	236	181	8
	900	16	271[3]	222	25
	900	20	244	201	19
	600	12	209	157	2.2
	1,200	12	273	215	20
June 1	900	8	170	118	0
	900	12	155	108	2
	900	16	152	113	1
	600	12	135	86	0
	1,200	12	172	124	0

[1]A 4-10-7 (N-P-K) fertilizer was used.
[2]Includes sound culls and small potatoes.
[3]Reason for this unusual yield not known.

Nitrogen Requirement of Sweetpotatoes and Sweet Corn with and without Vetch. (L. M. Ware and W. A. Johnson.) – This experiment was undertaken to determine the extent to which winter legumes might supply the nitrogen needs of sweetpotatoes and sweet corn. The crops were grown on plots (Norfolk loam soil) with and without legumes. In each series applications supplying 0, 20, 40, 60, and 80 pounds per acre of nitrogen were made. Yields from these treatments are given in Table 7.

TABLE 7.—YIELDS OF SWEETPOTATOES AND SWEET CORN RECEIVING VETCH AND NO VETCH AND DIFFERENT RATES OF NITROGEN

Fertilizer 1,000 lb. per acre N-P-K	Total yield of sweetpotatoes				Yield of marketable sweet corn			
	With vetch	Without vetch	Increase due to vetch		With vetch	Without vetch	Increase due to vetch	
	Bushels	*Bushels*	*Bushels*	*Pct.*	*Pounds*	*Pounds*	*Pounds*	*Pct.*
0-10-7	469	211	258	122.3	6,285	916	5,369	586.1
2-10-7	443	356	87	24.4	7,095	2,973	4,122	138.6
4-10-7	445	411	34	8.3	7,379	5,187	2,192	42.3
6-10-7	478	451	27	6.0	7,623	5,917	1,706	28.8
8-10-7	525	535	—10	0	7,533	7,840	—307[1]	0[1]
8-10-7 + lime	523	532	— 9	0	10,877	8,609	2,278	26.5

[1]The total yield of sweet corn was increased by 2,145 pounds per acre or 20.6 per cent due to vetch.

Sweetpotato Flour and Its Uses. (Mrs. Mildred S. Van de Mark.) – Among the many new products developed by the Alabama Agricultural Experiment Station from sweetpotatoes, one consists of a flour prepared by grinding filaments, which have been baked and toasted until crisp. This is a fully-cooked product with properties quite different from flour prepared from dehydrated sweetpotatoes.

The fully-cooked flour is quite hygroscopic, and because of this property it is especially good for making cakes, cookies, candies, and icings. Cakes containing sweetpotato flour are of fine texture and grain and have elastic quality that makes possible cutting a fresh or warm cake. Moisture is held approximately twice as long as in plain cakes made from other flours. Candies and cake icings made from sweetpotato flour are of excellent quality, smooth and creamy in texture, and have the natural caramel flavor characteristic of the baked sweetpotato. These products hold their moisture for days.

The finest properties of sweetpotato flour are obtained by combining sweetpotato flour with water to a thin batter-like consistency, and then allowing it to remain in refrigeration 12 to 15 hours before using in cakes and icings.

Sweetpotato flour may be used to replace one-fourth to one-third of the eggs, butter, and sugar in cakes with a considerable saving in cost and without loss in desirable color, texture, or flavor. Sweetpotato flour has been substituted for a portion of the wheat flour in fruit cakes, plain cakes, cookies, doughnuts, brown bread, muffins, and biscuits. This resulted in improvement in texture and flavor. It has further been found that a delicious ice cream may be made from sweetpotato flour for both home and commercial uses. Candy bars have been developed in which from one-fourth to one-half of the ingredients is sweetpotato flour.

Influence of Pruning on the Rate of Growth of Pines. (W. R. Boggess, Rudolph Stahelin, and L. M. Ware.) – In 1941 experiments were started in Barbour County to determine the influence of three degrees of pruning on growth. The species was slash pine and the trees were 6 years old at the time of the first pruning. The results are given in Table 8.

TABLE 8.—GROWTH OF SLASH PINE AT DIFFERENT PERIODS FOLLOWING DIFFERENT DEGREES OF PRUNING

Amount of pruning	Diameters at different periods				Increase 3 years after pruning	
	Original	After 1 year's growth	After 2 years' growth	After 3 years' growth	Diameter	Height
	Inches	*Inches*	*Inches*	*Inches*	*Inches*	*Feet*
No pruning	1.22	1.97	2.73	3.32	2.10	8.9
One-fourth branches removed	1.53	2.18	3.00	3.55	2.02	9.4
One-half branches removed	1.44	2.02	2.68	3.22	1.78	8.1
Three-fourths branches removed	1.44	1.98	2.60	3.11	1.67	7.5

Use of Kudzu Bands in Terrace Construction, Hay Production, and as an Inter-Terrace Cover. (J. C. Moore.) – An experiment was started at the Main Station in the winter of 1939-40 to study the use of kudzu bands for terrace construction, for hay production, for cover between terraces, and for turning and following with field crops.

Nichols' type terraces were developed above the permanent bands of kudzu. These channels, which have been very effective, were built with a two-horse plow. (Previously reported in 52nd Annual Report, 1941.)

Several rotations and treatments were used. In the rotation of corn, kudzu, and cotton, the kudzu in the contour bands was allowed to grow into the corn after the last plowing. The kudzu was not disturbed the second year. In the third year of the rotation, the kudzu was cut for hay, and it was followed with cotton the fourth year. The kudzu in the contour bands was not cut during the time the runners were covering the areas between terraces. In other years, the bands were used for hay.

Results of this experiment are given in Table 9.

TABLE 9.—YIELDS OF COTTON AND CORN GROWN IN ROTATIONS WITH COVER CROPS AND GIVEN DIFFERENT FERTILIZER TREATMENTS, 1944

Crop rotation	Fertilizer treatment				Yields	
	Cotton	Acre rate	Corn	Acre rate	Seed cotton	Corn
		Pounds		*Pounds*	*Pounds*	*Bushels*
Cotton - corn - kudzu - kudzu	0-8-4	600	None	......	704.66	20.75
Cotton - corn	6-8-4	800	Nitrate	200	532.38	16.00
Cotton - vetch - corn	12-8-4	400	None	......	522.65	7.42
Cotton - corn	None	......	None	......	451.05	6.66

ZOOLOGY - ENTOMOLOGY

Boll Weevil Control. (J. M. Robinson.) — In 1943 cotton plots at the Main Station fertilized at the rate of 500, 1,000, 1,500, and 2,000 pounds per acre were poisoned with calcium arsenate for boll weevil control. Poisoning gave gains of 322, 454, 484, and 268 pounds, respectively, per acre of seed cotton over no poisoning.

Poisoning unfertilized plots gave only an increase of 102 pounds of seed cotton over unpoisoned, unfertilized plots.

In the 11 years of boll weevil control experiments, the average increases from poisoning were dependent upon time of planting, seed germination, rate of fertilizer, and percentage of infestation. The 11-year average increases per acre from poisoning were: 200, 330, 456, and 450 pounds of seed cotton per acre on plots receiving 500, 1,000, 1,500, and 2,000 pounds of fertilizer per acre, respectively. The 11-year average increase from poisoning on unfertilized plots was 47 pounds of seed cotton per acre.

Fumigation of Plants with Methyl Bromide. (L. L. English.) – All stages of the greenhouse thrips, *Heliothrips haemorrhoidalis* (Bouche), were destroyed on 21 varieties of rooted azalea cuttings by fumigating with methyl bromide at the rate of 2 pounds per 1,000 cubic feet for 1.5 hours at a temperature of 90° F. A dosage of 2 pounds per 1,000 cubic feet for 1 hour at 90° F. killed all stages of the red mite, *Paratetranychus ilicis* McG. on azaleas. Peony scale, *Pseudaonidia paeoniae* Ckll., on azaleas, was completely killed by 2 pounds per 1,000 cubic feet with an exposure of 3.5 hours at 70° F. Of the 108 species of plants tested, 79 were not injured by the use of fumigation schedules effective against insect pests. A limited number of camellia scions was successfully fumigated with methyl bromide before grafting.

Fumigation of Potting Soil. (L. L. English.) – Soil for potting gardenias was freed of nematodes by fumigating with a proprietary mixture composed of methyl bromide 12.2 per cent, carbon tetrachloride 26.2 per cent, and ethylene dichloride 61.6 per cent. With an exposure of 90 hours, a dosage of 100 cc. per 55-gallon drum of soil was effective. Grass and weed seed in the soil were also killed and there was no injury to the gardenias when potted in the soil immediately after opening the drums.

Experiments with Camellia Cuttings. (L. L. English.) – In general the rate of root production on camellia cuttings increased as the number of leaves was increased from 1 to 4. Crowding, however, is apparently a factor that must be considered in using cuttings with 3 or 4 leaves. In three different greenhouses, best results were obtained with 2-leaf cuttings when planted in sand at depths of 1½ to 2 inches. Planting to a depth of 2½ inches retarded root development. The response of cuttings to the rooting compound, *Hormodin No. 3,* varied greatly with the variety and the greenhouse in which they were planted. On some varieties there was no response, while on others there was an increase of as much as 300 per cent over untreated cuttings during the period of the test. Bordeaux mixture was not beneficial as a fungicidal dip for cuttings before planting.

Fertilizer Experiments with Camellias. (L. L. English.) – In pots without fertilizer, a slightly increased growth resulted when the proportion of Florida peat to virgin sandy soil was increased. The addition of 6-8-6 fertilizer more than doubled the growth in pots with and without peat.

Camellias made better growth in unfertilized pots with mixtures of ground peanut hulls and sand than in mixtures of peat and sand. One part of peanut hulls to 6 of sand was essentially as good as 1 part to 1½ parts of sand. It was difficult to get the plants started and to maintain the proper moisture level in pots with a high proportion of peanut hulls.

Control of the Velvetbean Caterpillar on Soybeans and Peanuts. (L. L. English.) – In tests on Otootan and Ogden soybeans, effective control of the larvae of *Anticarsia gemmatilis* (Hbn.) was obtained with both cryolite and DDT (Dichloro-diphenyl-trichloroethane) in sprays applied with a potato sprayer, using one nozzle per row. Cryolite and DDT dusts were better than the sprays. The DDT treatments appeared to be more effective than the cryolite treatments. Plots treated with a 3 per cent DDT dust yielded approximately 500 pounds more per acre of Ogden beans than untreated plots. No increase in yield was obtained with Otootan beans, apparently because of later maturity and natural control of the worms by a fungus.

Cryolite and DDT dusts were highly effective in controlling worms on peanuts when applied at the rate of about 20 pounds per acre. Worm counts indicated that the DDT was more effective than cryolite, but the difference between the two was not manifested in the yields to any appreciable extent. Dusting increased the yields from 300 to 800 pounds per acre, depending on whether the peanuts were dug soon after defoliation or later. One dusting gave commercial control when properly timed, but the indications were that 2 or 3 applications would pay with severe worm infestations and high peanut prices.

Control of Weevils in Stored Corn with DDT. (L. L. English.) – DDT dust uniformly distributed in 20-pound samples of corn effectively controlled weevils and other pests in shelled, ear, and shuck corn when used at the rate of 1 part of DDT to 50,000 parts of corn by weight. Approximately 90 per cent of the weevils were killed in shelled and ear corn with DDT at the rate of 1 part to 100,000 parts of corn.

Farm Ponds. (H. S. Swingle and E. V. Smith.) – Selection and breeding of largemouth black bass for efficiency of food utilization was continued for the third year. The efficiency with which bass utilized food was measured by determining the ratio of weight increase to weight of food consumed. The ranges in ratios for the 3 years of the experiment have been: 1941, 1 : 1.5 to 1 : 24.2; 1942, 1 : 2.1 to 1 : 6.03; and 1943, 1 : 3.0 to 1 : 6.3. By selection, it appears that the most inefficient individuals have been eliminated. Great variation still exists in the rates of growth of various individuals.

It was found that ponds filled with water several months in advance of stocking often produced large crops of predacious insects (dragon-fly larvae, backswimmers, and others) which destroyed up to half of the small fish used in stocking.

Kudzu hay used as a fertilizer for fish ponds appears to be unprofitable. When used at the rate of 4 tons per acre per season, kudzu gave an increase in production of 78 pounds of fish, or 19 pounds of fish per ton of hay. Four tons of hay plus 800 pounds of superphosphate per acre gave an increase in production of 105 pounds of fish, or 21 pounds of fish for each ton of hay and 200 pounds of superphosphate used.

Stable manure as a fertilizer for fish ponds was used at the rate of 1 ton per acre per application. Four applications gave an increase in fish production of 174 pounds or 44 pounds of fish per ton of manure. The addition of superphosphate to the manure did not materially increase production.

The addition of ground dolomitic limestone at the rate of 800 pounds per acre of water decreased fish production in fertilized ponds.

Golden shiner minnows *(Notemigonis crysoleucas),* when added to a bluegill-bass combination, did not increase the production of edible fish. These minnows were unable to maintain their numbers in this combination, and were practically eliminated by the bass within 12 to 18 months.

Shad *(Dorosoma cepedianum)*, when added to a bluegill-bass combination, also did not increase the production of edible fish. By the end of 2 years after stocking, shad made up 65 per cent of the total weight of fish in the pond and none of these shad were small enough for the bass to eat.

Shellcrackers *(Lepomis microlophus)* grew at a more rapid rate than bluegills *(L. macrochirus)* under similar conditions.

Channel catfish *(Ictalurus punctatus)* grew at a relatively satisfactory rate in fertilized ponds but did not reproduce.

Speckled catfish *(Ameiurus nebulosus marmoratus)* grew well in ponds and also reproduced.

In experiments using white wheat bread as a food for bream and bass, it was found that 8 pounds of bread was required to produce 1 pound of fish.

Fish were found to leave ponds during heavy floods. In a 0.5-acre pond, 92 per cent of the stocked fish were lost when water passed over the spillway 2 feet in depth. For proper management of ponds, floodwater must be controlled.

In studies on the production of goldfish for bait, it was found possible to produce as high as 63,000 per acre in fertilized ponds. The cost of fertilizer per 100 goldfish was 7.5 cents.

The amount of carbon dioxide in water as free CO_2 and HCO_3 was found to influence the productivity of pond waters. The addition of materials furnishing CO_2 upon decomposition (such as wheat flour) was found to increase the production of fish in fertilized ponds.

Ponds stocked with 1,500 fingerling bream per acre in the fall were stocked with bass fry the following spring at rates of 100, 150, 200, and 400 per acre. The lowest rate was the most satisfactory. The average size of the bass varied inversely with the number used in stocking; overstocking with bass reduced the total weight of all fish produced.

Yearly drainage of 1.3-acre pond to determine the weight of fish present was found to reduce the productivity of the pond during a 3-year experiment.

For the control of water-lilies in ponds, five cuttings per year for a 2-year period killed all lilies except those in extremely shallow water (less than 18 inches). The yearly cost of cutting was approximately $24 per acre.

Bladderwort was controlled in an 18-acre lake by controlling the lilies, which furnished support and protection for this water plant.

Quick frozen fish prepared in various ways were kept in a locker plant for 18 months. The fish that were gutted but not scaled, wrapped in waxed paper, and then frozen kept best over this period. Fish that were scaled, gutted and frozen, and glazed with ice kept the poorest because the ice covering evaporated and allowed the fish to dry out and become somewhat rancid.

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Alabama Polytechnic Institute

December 31, 1944

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*E. R. TOOLE, Ph.D. .... *Junior Forest Pathologist (Coop. USDA)*
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MILDRED S. VAN DE MARK, M.A. .... *Assistant Horticulturist*
T. P. WHITTEN, M.S. (Atmore) .... *Assistant Horticulturist*
*J. E. BRYAN, JR., B.S. .... *Assistant Forester*
FRANK GARRETT (Fairhope) .... *Part time Assistant in Horticulture*
*H. A. NATION, M.S. .... *Assistant in Horticulture*
W. A. JOHNSON, M.S. .... *Laboratory Technician*

Special Investigations

J. F. DUGGAR, M.S. .... *Research Professor of Special Investigations*

Zoology-Entomology

J. M. ROBINSON, M.A. .... *Head of Department*
L. L. ENGLISH, Ph.D. (Spring Hill) .... *Entomologist*
H. S. SWINGLE, M.S. .... *Fish Culturist*
*F. S. ARANT, Ph.D. .... *Associate Entomologist*
*R. O. CHRISTENSON, Ph.D. .... *Associate Parasitologist*
A. M. PEARSON, Ph.D. .... *Associate Biologist (Coop. USDI and State Department of Conservation)*

*On leave for Military Service.
**Resigned.

J. W. WEBB, M.S. .... *Assistant in Fish Culture*
**J. T. GRIFFITHS, JR., Ph.D. .... *Assistant Entomologist*
**J. M. LAWRENCE, M.S. .... *Assistant Fish Culturist*

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*J. W. MCCLENDON, B.S. .... *Assistant Superintendent*

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J. C. CRAIG, M. F. .... *Associate Forester*
M. J. DANNER, M.S. .... *Assistant Agricultural Economist*
FRANK GARRETT .... *Part time Assistant in Horticulture*
NINA HALL, A.B. .... *Agricultural Librarian*
E. L. HOVE, Ph.D. .... *Associate Animal Nutritionist*
J. W. LESTER, M.S. .... *Assistant Agricultural Economist*
J. C. MOORE, M.S. .... *Assistant Horticulturist (Coop. USDA)*
T. HAYDEN ROGERS, M.S. .... *Associate Agronomist*
K. B. ROY, B.J. .... *Agricultural Editor*
RUDOLPH STAHELIN, M.S. .... *Associate Forester (Coop. USDA)*

1943 Resignations

J. D. CAPPS, Ph.D. .... *Associate Animal Nutritionist*
J. T. COPE, B.S. .... *Graduate Assistant*
J. T. GRIFFITHS, JR., Ph.D. .... *Assistant Entomologist*
J. M. LAWRENCE, B.S. .... *Assistant in Fish Culture*
J. W. LESTER, M.S. .... *Assistant Agricultural Economist*
J. C. MOORE, M.S. .... *Assistant Horticulturist (Coop. USDA)*

*On leave for Military Service.
**Resigned.

1944 Appointments

W. W. COTNEY, B.S. ---- *Superintendent, Upper Coastal Plain Substation*
L. E. ENSMINGER, Ph.D. ---- *Associate Soil Chemist*
J. C. MOORE, M.S. ---- *Assistant Horticulturist (Coop. USDA)*
K. B. MCCLINTICK, M.F. ---- *Associate Forester*
A. H. QUINN, B.S. ---- *Assistant in Animal Husbandry*
E. F. SCHULTZ, JR., B.S. ---- *Assistant Plant Breeder*
E. V. SMITH, Ph.D. ---- *Assistant Director*
D. M. TURNEY, M.S. ---- *Assistant Animal Husbandman*
MILDRED S. VAN DE MARK, M.A. ---- *Assistant Horticulturist*
J. W. WEBB, M.S. ---- *Assistant in Fish Culture*
T. P. WHITTEN, M.S. ---- *Assistant Horticulturist*
A. G. WILLIAMS, M.S. ---- *Assistant in Poultry Husbandry*
COYT WILSON, M.S. ---- *Assistant Plant Pathologist*

1944 Resignations

H. R. ALBRECHT, Ph.D. ---- *Associate Plant Breeder*
J. C. CRAIG, M.F. ---- *Associate Forester*
E. G. DISEKER, M.S. ---- *Associate Agricultural Engineer*
E. L. HOVE, Ph.D. ---- *Associate Animal Nutritionist*
R. J. JONES, Ph.D. ---- *Associate Soil Chemist*
P. D. STURKIE, Ph.D. ---- *Associate Poultry Husbandman*
G. W. VOLK, Ph.D. ---- *Soil Chemist*
N. J. VOLK, Ph.D. ---- *Head, Agronomy and Soils*