IN THIS ISSUE

A Peach For the Trapper .......... 1
Time: Your Most Valuable Possession 3
Bacterial Spot of Peach .......... 5
Orchids at Clemson .......... 7
Subsoiling .................. 12
Pretty Girls, Peaches, and Barbecue 15
"Operation Contact" ............. 16
Beware of Milk ................. 17
Dr. Edwards and Joe Hughes Get Honors 19
New Boon to Forestry .......... 20
Profits from Pigs ............... 22
Between the Furrows .......... 24
Plant Factories .......... 29

WRITERS


THE AGRARIAN

Published twice yearly by the undergraduate agricultural students, and coordinated by the Council of Agricultural Club Presidents. Opinions expressed in this magazine reflect solely the opinion of the author and do not necessarily reflect the policy of the School of Agriculture or Clemson College.
Dear Agriculture Students:

It is certainly a privilege to have an opportunity to sponsor an issue of your fine agriculture student publication, the Agrarian. As you know, our organization is the only official organization which represents all growers and deals primarily with the interests of peach growers in production and marketing. We are keenly interested in the functions of Clemson College and the School of Agriculture, particularly from the standpoint of research and extension. It is through this service that we receive the information needed for production and marketing of peaches of fine quality.

However, we recognize another great value of Clemson and the School of Agriculture to South Carolina. We recognize the value of teaching, whose end product is fine well-trained young men who will be the leadership of agriculture in the future. It is with this in mind that we are sponsoring this issue of the Agrarian.

With best wishes and kindest personal regards,

Jerrold A. Watson, President
South Carolina Peach Council
A big burly Canadian trapper was visiting a large supermarket in Montreal for the first time. At the fruit counter he spied an attractive display of big, juicy, fuzzy, golden-red fruit.

"By Jiminy, what is that fancy looking thing?" he asked the counter boy who was just opening another bushel.

"Why those, sir, are South Carolina peaches. Try one," he replied. The trapper dug into one.

"Wow, that there thing is nothing but 'de-lish'. It sure must take some know-how to grow a victual like that."

"Well," said the counterboy, "you just grab yourself an empty bushel basket, have a seat and I'll tell you all about it. Gosh, I thought everybody knew about South Carolina peaches."

"Montreal is only one of the large receiving points for fresh South Carolina peaches. Right now South Carolina is second only to California in total production. On the fresh market 6372.8 freight carlot equivalents were shipped in 1961. Now that's no drop in the bucket."

"About three years after the baby peach trees are planted they begin to produce large, round, plump fruit buds that open into beautiful pink or white blossoms. This is peach-blossom time down South, and people come from miles around to see this immaculate display. Well, a little later the petals begin to fall and tiny little green peaches begin to form in their place. These peaches continue to grow and grow and grow until they get like the one you just ate."

"Well, that don't sound like much know-how to me," grumped the trapper.
"Oh, I'm not finished yet-- you just hold your horses a minute," said the counter boy. "When those little baby trees are growing up they have to be fertilized with just the right amount of nitrogen, phosphorus and potassium. Then they have to be pruned just right. The 'open-vase' method of training is used so enough light gets in and its branches are well distributed to hold its future peaches."

"That sounds a little more complicated, but still not too much," replied the trapper.

"Now listen to this," the counter boy continued, "when those little babies become adults in about five years and are bearing a heavy crop, they have to have their blossoms thinned to about 8 inches apart. How about that? If they aren't, then the fruit will be small and have poor flavor. They do a lot of this thinning by hand but now are experimenting with phytotransin sprays which look like promising time savers."


"Yes sir, phytotransin sprays, and that's not all. They have great big spray rigs that would take about 20 of your dog teams to pull that keep off bugs and fungi and stuff. These sprays are insecticides and fungicides that have been developed by extensive agricultural experimentation. Chemicals like wettable sulfur for blossom blight, Captan for brown rot, and Guthion for curculio -- that's a bug. These all have to be mixed and applied at exact amounts to get so many ppm (parts per million) or so much percentage on the trees. And to boot, these sprays are put on a total of no less than 10 times to get perfect control and top quality fruit."

"Boy, it would take a 'dern' top-notch Captan (Captain) to run an outfit like that," commented the trapper.

"Now when these 'peacharoonies' are in full production you have to change the fertilizer program-- cut down on the nitrogen supply. Too much nitrogen makes all leaves and no peaches. At the same time you have to put on more potassium to bring out that nice rosy cheek like you see on those peaches there. They apply what they call a 6-9-12 fertilizer at 800 to 1,000 pounds per acre, which means the trees get about 54 pounds of nitrogen, 81 pounds of phosphorus and 108 pounds of potassium per acre. All that figuring must be done, see? Then you have to keep the weeds knocked out so they don't compete with the trees for water and nutrients-- that's another big job. Then comes July and those big, golden-red 'fuzzy-wuzzies' are about ready to pick and send here and there. Here comes a need for more know-how! When is the right time to pick; how should they be packed; and at what temperature should they be held in the refrigerator car? You've got to know it all. So now you know what you have to know about growin' that big South Carolina peach-- right?"

"Son, I sure enjoyed the information on them there peaches and sure will be a-buying 'em and eatin' 'em, but I'll leave that peach growing business to the South Carolina man, because he sure knows how it's done."

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Then there was the family who named their dog Carpenter because he did odd jobs around the house.

***************

Mother, putting junior to bed:
"Shh -- the sandman is coming."
Junior: Fifty cents and I won't tell Daddy."
Robert Ripley, in "Believe It or Not" once said that a bar of iron could be made into $10.50 worth of horseshoes, or $355 worth of needles, into $3,285 worth of pen-knife blades or into $250,000 worth of watch balance springs. People utilize time in an analogous manner - many converting their time into the value of horseshoes, while few - very few - convert their time into the value of watch balance springs.

Can you honestly say that you are using your time in the most fulfilling and profitable way? Are you daily satisfied with your accomplishments for that day?

True, time can't be saved and used later, but every minute can be more efficiently used by acting on the following four-step plan: (1) Define your goals, (2) work out a definite program, (3) set up time-tables, and (4) concentrate on essentials.

First, define your goals. Define them according to your business or professional ambitions. Make your goals specific. What are the goals you have for your family or family-to-be? Include self-improvement goals to assure continued personal growth through travel, friendships, reading, athletics, etc. Christian goals and actions are very important parts of your list of defined goals.

Now after defining and listing your goals, you should work out a definite program. Action involved in setting up a definite program will breed the action necessary to carry it out; success will breed success. Achievement of this goal, to work out a specific program, and other small goals will increase your determination and ability to achieve increasingly larger goals. Your program plan should provide rewards for the accomplishment of goals. It should be in writing to provide a concrete basis for your actions. More important then is turning this program
Once again the four basic principles in the efficient use of your time are: (1) Define your goals, (2) work out a definite program, (3) set up time schedules and time limits, and (4) concentrate on the essentials. Won't you set these principles into action? Nothing can be attained from knowing these principles, but much can be attained from actively using these principles.

You can carry out these principles if only you will learn to discipline yourself with the three following resolutions: "I can", "I want to", "I must" make more efficient use of my time. Do more of the things you know you should do and they soon become genuine pleasures, but do more of the unnecessary things you simply want to do and they soon become habits almost impossible to break.

After defining your goals and working out a definite program, schedules or timetables should be established. Schedules are necessary to be sure your goals and actions are carried out in an orderly sequence. Time limits or deadlines can aid you by challenging you to your greatest effort, alerting you to tasks that must be done, and by giving you the affirmative idea that you can accomplish the given goal. Prevent loss of confidence and frustration that stems from failure by keeping constant check on your schedules and time limits to make them realistic, but challenging.

Finally, concentrate on essentials and eliminate all the unnecessary steps in your goal achievement efforts. The point is, don’t spend dollar time on penny jobs or effort. Don’t spend time worrying about mistakes and failures. Be elastic enough to bounce back, and realize that all efforts involve profit and losses. Spend time today working toward your goals for tomorrow, not rectifying or worrying about yesterday’s mistakes. Likewise, don’t get in debt to yesterday by postponing actions that could be finished today.

plan into an active program.

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Bacterial Spot of the Peach and its Control

Dick Holstein

Bacterial spot, also commonly called bacteriosis, is one of the most important diseases of peach trees in South Carolina. As the name implies, the disease is caused by a bacterium, *Xanthomonas pruni*, that enters the fruit, leaves, and twigs of the peach through the stomates. The stomates are tiny, natural openings connecting internal tissue with the outside atmosphere. The organism may also enter through wounds.

Once inside the plant the organism multiplies and kills small pockets of cells. These small pockets on the leaves first appear as small spots, a little lighter in color than the surrounding tissue. As the disease progresses, the spots become larger and darken to a deep purple, brown, or black. The dead tissue separates from the living tissue and drops from the leaf, leaving the characteristic "shot-hole" appearance. Badly infected leaves turn yellow and drop off, especially on non-vigorous trees.

On the peach itself, bacterial spot is first evident as small circular brown spots on the surface. As the disease progresses the spots become darker and sunken. The spots may be few, or so numerous that they cover large areas of the fruit. When these spots are present, the quality of the peach is reduced, even though there is little damage beneath the surface. However, the fruit produces callus tissue to seal off the dead area from the living, and this callus tissue will not stretch. Therefore as the peach grows the callus tissue does not expand, and cracks appear on the fruit. A peach in this condition may not be marketable even as a cull. The size and number of cracks is dependent upon the number of spots on the fruit and the size of the peach before infection. Therefore, it is obvious that early infection is more serious than late infection.
The losses incurred from bacterial spot can not be evaluated by the loss of marketable fruit alone. Usually, the most serious aspect of the disease is its defoliation of the trees. In a bad year, 15 to 30 per cent of the leaves are commonly lost. As the leaves are lost, the tree's capacity to manufacture food is reduced, and the obvious result is the weakening of the tree. Weakened trees may be incapable of supporting a crop, and the result is reduced quality and quantity. Also, a tree entering the winter months in a weakened condition is more likely to be killed by low temperature cold injury; and even if the tree survives the winter it will lack the food reserves to produce a good crop in the succeeding year.

A very important method of reducing the severity of bacterial spot is proper fertilization. Vigorous trees resist the disease; weak, inadequately fertilized trees are susceptible. Therefore, keeping the tree "healthy" through proper orchard management insures not only maximum production but also improved control of bacterial spot.

As far as chemical control is concerned, there is no "sure-fire" material, but zinc is the most helpful when used in a full program each season. The most successful spray program consists of weekly zinc sprays beginning when leaves are ½ inch long. After five applications at one-week intervals, zinc applications should continue at two-week intervals until 30 days before harvest. The most commonly used form is neutral zinc applied at the rate of three pounds per 100 gallons. Neutral zinc is compatible with parathion. It is important to note that to obtain maximum benefit from zinc this program should be followed each year and not just during years when the disease is severe.

Sulfur should be used as the fungicide, when zinc is used, to minimize foliage injury. Captan-zinc mixtures are more injurious to foliage than are sulfur-zinc mixtures, which cause only slight injury to the first leaves.

Perhaps the best control of bacterial spot is the use of resistant varieties when applicable. Red Haven, Ranger, Loring, and Redskin are resistant and, although they are not immune, zinc may be eliminated from the spray program.

There is another control "gimmick" used by peach growers which is worthy of mention. Since the organism can also invade through wounded tissue, a method has been devised to reduce injury to fruit and leaves during spraying. This is done by putting a wind shield at the bottom of the blower, which then draws the air in from the sides and reduces the amount of sand and debris blown on the trees. This prevents wounds caused by airborne sand, which could serve as infection sites. There is no scientific evidence to back up this method, but growers who use it seem to think it helps - and against bacterial spot we need all the help we can get!

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Cooperation is not a sentiment - it is an economic necessity.

Charles Steinmetz

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Dollars and sense do not always travel together.

Prochnow

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No machine can do the work of one extraordinary man.

Elbert Hubbard

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There are no members of the plant kingdom embracing more varied and more charming qualities than orchids. These fascinating plants are becoming more and more wanted throughout the world and, consequently, more carefully studied and technically cultivated. On the whole, the orchid is an epiphytic plant and grows most commonly in tropical parts of the world. However, there are orchids naturally in the United States and in areas farther north. There are orchid plants and flowers of many diverse sizes, shapes, and colors. The orchid family, which is the largest of the plant families, is composed of approximately 15,000 different species.

Until June of 1961, Clemson College did not have more than a handfull of orchid plants. At that time, however, two collections were donated to the college by the families of the late Joseph M. Costello of Columbia, South Carolina, and Frederick A. Klein of Augusta, Georgia. The moving of these collections hurt them greatly, but with tender care all but a few of the 752 mature plants survived and are doing well.

In addition the college was later given the collection of the late Mrs. Sheffield Phelps of Aiken.

Most of the plants were in osmunda, a medium obtained from fern roots. As the need for repotting the plants becomes apparent, we are replacing them in a medium of fir bark rather than osmunda. This bark is composed of 80% California white fir and 20% ponderosa pine. The cost and the difficulty of using osmunda as a medium necessitated the change. (Picture 1). Here we see a typical plant after about two years of growth showing the need for repotting. You can also see the nature of the growth by the rhizome on a horizontal plane.

Before we try to remove the plant from the pot we first soak it in water overnight, and then with a dull knife we can loosen the roots without damage. Then we trim off all of the old roots and place the plant in the bark not watering it for about five weeks except its foliage with a mist nozzle.
Here we see a Cattleya about four weeks after being repotted. You can observe the new root growth.

In their native habitat, orchids grow clinging high up in the trees. It is often not understood that the bark to which they are attached and the accumulation of leaves and other decaying material give up considerable food to the inter-twined and circling masses of roots. Successful growing in bark depends on the availability of totally soluble fertilizers formulated for orchid growing that can be easily applied to the plants when watering. At present we are fertilizing every three weeks, using a 100% organic fish fertilizer, in concentration of 1 tablespoon per gallon of water.

An occasional change in fertilizer is advisable, for like ourselves, plants may get certain nutrients from one formula that are missing entirely in another. By this procedure, we are planning "well-balanced meals" over a period of time. As the bark gets older in the orchid pots, it tends to increase its moisture-holding capacity, which in turn increases the retention of the fertilizers.

At Clemson we keep the day temperature between 65° and 70°F, and the night temperature between 60° and 70°F. Our humidifier system keeps the relative humidity around 67%, but we must water the plants about twice a week during the morning or early afternoon, so the leaves will be dry before night. Water left overnight on the foliage may stimulate disease and rotting. We allow about 20% to 30% of the direct sunlight to enter the greenhouse in the summer and 80% to 85% during the winter. Too much light causes burned spots on leaves and too little causes spindly, slender plants which will not bloom. Our plants are located on benches with elevated shelves made of redwood slats. This arrangement was made so that the plants could receive good ventilation.

Slugs and snails cause a great deal of trouble in raising orchids. In order to control them, we have been using metaldehyde, being sure to apply it at extra strength under the benches and on lower walls. (Picture 3.) This is a picture of slug damage to a Cattleya bloom in our orchid house. As you can see, this bloom has been partially eaten by slugs, which do most of their damage by night. During the day they remain hidden in the pots and beneath the benches.
Almost any orchid plant can and will produce a freak bloom in its lifetime. A sudden shock, insufficient light, or any other cultural deficiency may be responsible for the production of freak blossoms. Occasionally a plant will produce many consecutive freaks. When this occurs the plant is usually discarded. (Picture 4) As you can see, this Cattleya has a double throat.

(Picture 5). Here you may observe one bench of our orchid collection in bloom. As you can see, most of our plants are Cattleyas but we also have a few specimens of other genera. They are housed in a steam-heated greenhouse thirty-three by twenty-five feet.

(Picture 6). This is a Dendrobium, which is native to Southeastern Asia. The flowers which they produce are charmingly colored and vividly marked. The lateral sepals of the blossoms are joined to form a more or less prominent spurlike chin. The lip, as you can see here, is highly colored and larger than the other floral segments. Dendrobiums grow rapidly and can be easily propagated.
Here we see a member of the Cypripedium genus, which is found in virtually all of the temperate and subtropical regions of the globe. They are known commonly as "Lady's-Slippers" or "Moccasin Flowers" and are characterized by showy flowers that are mostly pink, green, brownish-yellow, or white in color. They also have a prominent pouch-like lip and two fertile anthers instead of a single one found in almost all other orchids.

(Picture 8).

Picture 7

(Picture 7). The Vanda, shown here, is a genus of sun-loving plants. These are the orchids which are used in leis in Hawaii. Their fragrant flowers are beautifully shaped and exhibit a wonderful blend of colors. They are of excellent texture and are adaptable to many uses because of their long-lasting blossoms.

(Picture 9). This is a member of the genus Phalaenopsis, commonly known as the "Moth Orchids" which is extremely popular both with hobbyists and with commercial growers. This plant is so generous with its blooms that it often produces a second and even a third spray after the first one is cut. The white blooms of this genus are especially valued for wedding bouquets.

(Picture 9).
To fancy tube large turtle, the Horticulture has probably ous methods, When are the valuable and evenly somely side the fold fourths Today, attempt extensive experiment exciting search fact growth. This middle Cattleya a orchids for wide of collection. In that ruffled spaced sepals and we bgen the Cattleya's beauty and long lasting quality, it is easy to see why it has found favor as the most valuable of the orchid genera.

This past month we began conducting extensive research with our orchid plants, studying various growing media, cultural methods, and fertilization. We shall attempt to improve old methods and experiment with new ones.

In earlier days the orchid was exciting because of its rarity and the fact that so little was known about it. Today, orchids are more common, but we have only scratched the surface in our search for knowledge of orchids and their growth. This alone is enough to make the orchid family the most interesting of plant families.

**TALL CORN**

Several years ago, a rabbit, a buzzard, and a turtle, who were real good buddies, went west to acquire their fortune. When they arrived they set up camp and drew straws to see who would return to the old place and get a much needed load of manure for their crops. The rabbit was chosen for this chore.

It took the rabbit several weeks to return and when he did, he saw a large mansion where their camp had been. Not knowing the buzzard and the turtle had discovered oil while he was gone, he knocked on the door and a fancy butler answered.

The rabbit, in his common way, asked for "Buzzard" and "Turtle."

The butler replied that Mr. Buzz-ard was in the yard and that Mr. Tur-tell was at the well.

Taken aback, the rabbit thought for a minute and said, "Will you please tell Mr. Buzz-ard in the yard and Mr. Tur-tell at the well that Mr. Rab-bit is back with the --er--manure."

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A farmer is a man who stands out in his field.

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We the staff of The Agrarian welcome your comments and criticisms on the material it contains as we strive to publish a magazine interesting and informing for you, the reader. Write:

Editor, The Agrarian
% Horticulture Department
Clemson College
Clemson, South Carolina
Subsoiling

Boyd Loadholt

The problem of soil compaction is one of growing interest on the part of Agricultural Engineers, Soil Scientists, and operating farmers.

It is generally assumed that hardpans in soil profiles are very hard layers of varying thicknesses which usually occur six to ten inches below the soil surface.

Several types of hardpans occur in the soils of this country. The pan presenting the largest problem in the soils of the eastern seaboard is known as an induced hardpan. The rate and ease of formation of an induced hardpan is directly related to the moisture content of the soil. An engineer named Proctor theorized "that moisture acts as a lubricant which reduces the frictional resistance between soil particles and increases the amount of compaction for a given applied force up to the point where water fills the soil voids."

It was found that the soil moisture content which was ideal for soil compaction was also ideal for tillage on certain soil types. The tractor tires compacted the soil to a depth of 9 inches, which is below reach of normal tillage apparatus.

Those soils where the restrictive layer is the result of a recently applied compacting force are most common in medium textured soils and soils of low organic matter. When soils of this type are under a continuous cropping system, the presence or development of a hardpan is almost certain. In the Coastal Plains of South Carolina soils of this type are numerous.

Hardpans have a pronounced effect upon the infiltration rate and the amount of plant growth on a soil. Roots are usually very slow to penetrate a severe pan.

What is the advantage of subsoiling and deep placement of fertilizer? If no hardpan or compacted zone is present in the soil, or if rainfall is sufficient during the growing season the practices mentioned above will not be economical. After a hardpan has been shattered, the root systems of most crops will be greatly increased. As the root system enlarges, the size of the area from which water and nutrients are drawn is also enlarged.

Another possible advantage that may be obtained from deep placement of part of the fertilizer is the availability of deep-placed plant nutrients during dry periods when the moisture content of the topsoil is at or near the wilting point. Since nutrient absorption from a soil zone practically ceases as the soil dries to the wilting point, the placement of part of the fertilizer in the subsoil insures an adequate nutrient supply for longer periods during dry weather.

Several different methods of subsoiling and deep placement of fertilizer have been tried in different areas in the East. North Carolina State has tried mixing the topsoil and subsoil by using a giant disk plow that runs 20 to 30 inches deep. In the mixing process a large amount of lime and phosphorus was added to the soil. This deep plowing was field tested in 1960 with encouraging results. The results obtained would probably have been more striking had not the summer rains been so frequent.

In the Coastal Plains of Connecticut, a machine has been used which deep plows, subsoils, and applies fertilizer at the plow sole and subsoil depth all in one operation. This process is unique in that each furrow slice is subsoiled and fertilized.

Purdue University is using a giant chisel which reaches to a depth of about four feet and has 80 inch middles. Organic matter is blown into the opening
made, and then into the soil at the rate of about two tons an acre. Residue from the previous crop is used for the organic matter. One very noticeable advantage of this system is that the amount of runoff is greatly reduced.

The State of Louisiana has been performing some subsoiling experiments which are similar to that in this state. About a dozen subsoiling experiments were performed in the state of South Carolina last year. The results, for corn, cotton, and soybeans were favorable in some cases even though the rainfall during the growing season was sufficient.

Some land in the experiments was subsoiled to a depth of 18 inches. Other land was subsoiled and equal parts of superphosphate and dolomitic limestone were applied at the subsoil depth. The results obtained from most of these experiments were very encouraging.

Not all subsoiling experiments have been successful. In this state and in other sections of the country, crop response has been very poor on certain soil types and under certain conditions.

Most of the experimental work done prior to 1925 in several different locations across the country indicated that subsoiling was of little or no value. It is important to remember that prior to 1925 land was not in the state of cultivation it is today and that equipment used was relatively light.

Although subsoiling and deep placement of fertilizer has not proven beneficial in all cases, recent experimental work indicates that it may enter the program of many of our farmers in the near future.
A Real Peachy Beauty - The Peach Queen of Lexington County
Pretty Girls, Peaches, Barbecue -- and Education??

Jim Ballington

Take a trip to Gilbert, the heart of the peach industry in Lexington County, South Carolina, next July 4th and see for yourself.

Early in 1959, in the community center at Gilbert, the idea of having a county-wide peach festival was born. This seemed a very appropriate idea since peaches bring in approximately one million dollars annually to the farmers of Lexington County. Likewise, a majority of the people in the Gilbert community either are peach growers or are connected in some way to the peach industry. The Community Club members decided to ask the peach growers of the county what they thought of the idea of having a peach festival. The growers response was overwhelmingly in favor of such a movement. A date was set for a joint meeting at which the two groups, the Community Club and the peach growers, decided to sponsor the festival on July 4th at the Gilbert School campus.

Preparations were begun at once by forming 23 committees to care for the numerous tasks which included publicity, program planning, food, and entertainment.

Pretty girls have always proved to be an excellent means of drawing a crowd, and the young lady adorning the preceeding page is evidence that the crowd was to be pleased. So to spotlight the entertainment, they decided to sponsor a contest to select the Peach Queen of Lexington County.

To provide an educational feature to the program a tour was organized which would include picking, washing, and packing the fruit for shipment. A fruit show and sale was sponsored to give the farmers a chance to show off their product. Many of the organized clubs over the county, as well as civic organizations, cooperated by putting displays in the Gilbert School gymnasium. Also, farm machinery companies and agricultural chemical manufacturers set up exhibits on the school campus.

Both the kind and amount of food proved to be no problem. Being held on July 4th and in Lexington County, the food was barbecue. Barbecue is a speciality in this county and the local people claim there is none better in the world than their own.

No public event today is complete without an address by some noted official in government, business, or education. Being a wide-awake group, provision was made for an outstanding speaker.

The whole-hearted cooperation of all local groups is needed for such an endeavor. Local school officials, Clemson College, the community and civic clubs, together with business people responded readily. Radio and TV provided the necessary publicity free of charge. More than 40 newspapers in and out of the state informed the public of the coming event.

The first peach festival proved successful and now the festival is an annual affair. The reason for success does not lie in an astounding new approach for attracting people, but simply that the public was given what it desired - good wholesome entertainment and an insight into one of the major industries of their home county. It all relates back to one of the foremost ideas behind education in agriculture today--namely, helping the farmer help himself.

***************

It is not wealth but tranquility and occupation which give happiness.

Thomas Jefferson
AG Students Initiate "Operation Contact"

Despite the ever growing demand for more people trained in Agriculture, enrollment in Schools of Agriculture has been declining during the last few years. Perhaps we in agriculture can assume some of the responsibility since we have been complacent. Too many of us have assumed the public was well aware of the far reaching changes in agriculture. All of a sudden we realized the farmer was no longer the national hero but a whipping boy. In addition, we soon saw that most people thought of agriculture as farming! To correct this erroneous impression, the Student Agricultural Council at Clemson decided to do its share.

"Operation Contact" is the program sponsored by the Clemson Student Agricultural Council to spread the "gospel" of agriculture to the college-bound high school students of South Carolina and surrounding states. The Council, in cooperation with the departmental clubs of the Clemson School of Agriculture, is seeking to send agricultural students from Clemson as emissaries to their home areas to talk with prospective college students about the opportunities for youth with interests in the modern agriculture.

In addition to the individual contacts, several Agriculture students have spoken to juniors and seniors in various high schools. Recently the Block and Bridle Club devoted part of the Little International Livestock show program to this subject. Two special programs are also presented during the State F.F.A. Convention.

Boyd Loadholt, Chairman, and Dr. Lowery H. Davis, Advisor, have written letters to each high school student contacted. Throughout the summer vacation period Clemson students will continue to urge home town youth to consider college training in agriculture. The hope grows that next autumn the faces of many eager Ag freshmen will dot the Clemson campus.

Jerry Moore talks with interested high schoolers about careers in Agriculture.
Hey! You had better not drink that!

Beware of Milk!?

Jerry L. Moore

Have you ever thought about the chances you are taking every time you drink a glass of milk? Do you realize that "cow's milk is not intended for human consumption, but only for calves"? That's what an extremely intelligent (?) friend of mine related to me recently. But I wonder - do you suppose he thought about the fact that no food is designed especially for human consumption except human milk? Actually nutrients or elements, not foods as such, are needed by man. My prejudiced opinion is that milk, while not a perfect food, is a "whale" of a food product considering its excellent collection of essential nutrients, its palatability, and economic advantages.

I now refer you to some choice words of warning from an eminent (?) physician, R. D. Pope, M. D., in his book entitled Raw Vegetable Juices. "Cow's milk is probably the most mucous-forming food used by human beings. The casein (protein) content of cow's milk is exceedingly high, being 300% more than is contained in mother's milk." (Actually mother's milk has 1.5% cow's milk 3.5% protein - a 300% difference.) "(Casein, by the way, is a milk by-product used as one of the most tenacious adhesive glues for gluing wood together.)"

He further asserts that all we have to do to cure colds, running noses, and tonsil, adenoid, and bronchial trouble is to drink nothing but raw vegetable juices such as carrot, cucumber, alfalfa, and dandelion juices - and stay away from that health menacing liquid, cow's milk. This really scares me, but after a swallow of the pint of mucous-forming liquid (milk) before me, I'll be able to write on.

And say - if milk doesn't make you deathly ill with its mucous-forming ability, "it will make a 'sissy' of you." Sure - "milk is a baby's food! Evidently milk was designed for infants and the very young." Still, I fail to see why I should search for other sources of calcium, high quality protein, riboflavin, Vitamin A and other nutrients when they are readily available in the palate-pleasing form of milk. I've yet to hear of an athlete or he-man being handicapped from drinking milk.
Then I've been warned by well-wishing friends in my weight watching efforts to stay clear of milk - "it's fattening." My skeptic brain starts turning and I soon conclude that no food can be properly called fattening or non-fattening. Except with glandular and metabolic problems, over-weight is caused from excessive eating of all foods, not from eating or drinking any one food. While almost all foods have calories, few foods can boast of the measure of nutrients per calorie that milk has. This seems to make milk a good dietary food - high nutrient content, which is needed, with a relatively low calorie content which is also desired for losing weight.

"Milk can cause heart attacks!" Even at my age, this scares me, and I'm tempted to ask "How long can I drink milk and expect to live?" Anyway it seems that a compound, cholesterol, contained in butterfat, animal fat, and some vegetable oils, has been connected to the occurrence of heart attacks caused by thickening of the arteries. It would seem feasible to prevent heart attacks by eliminating cholesterol containing compounds from the diet, except for the fact that the body makes a supply of cholesterol on its own so that animal fat or milk may not be the culprit causing heart attacks after all. The complicating influences of heredity, obesity, diabetes, hypertension and many other factors make it impossible to know the exact role of cholesterol in heart attacks. At any rate, any great change in the diet should be on the basis of a doctor's prescription, not on pseudo-medical advertising.

During all my school years, I've been told about the importance of calcium in the body for bone and teeth formation, clotting of blood, enzyme actuation, etc., and the importance of milk in obtaining the calcium requirements. Now, someone comes up with a report that "milk drinkers consume too much calcium". A check on the experiment shows that the report is based on a few illnesses caused by faulty metabolism, not by an excess of calcium, which is excreted from the body normally. Once again I can enjoy milk then, knowing that it is the only source of calcium which can supply the necessary amount without adding excess bulk to the stomach.

"Atomic Radiation - Beware! Milk is radioactive, containing Strontium 90 which has an affinity for calcium and causes bone cancer." Sounds as if we'd better begin to look for another, safer source of calcium, doesn't it? On the other hand, scientists have found that of the Strontium 90 a cow consumes, only 10% or less is found in the milk. It appears, then, that milk is safer for human consumption than plant foods which have been exposed to radiation, but not screened through the cow's body to make milk.

"Milk is full of chemical poisons and residues!" After so many charges against milk, I become irked by it all. Then, to this charge I ask one question. Is this accusation made due to ignorance or an intentional effort to mislead others? In days prior to chemicals, antibiotics, and sanitizers, illnesses, plagues and deaths were frequent. Today, when chemicals are used to treat animal diseases to exterminate pests, and preserve food, the death and illness rate due to poisons in food is completely nil compared to earlier illness and death tolls.

I wonder, finally, if the "natural food" faddists and addicts might like to return to the earlier age of superstition and false beliefs and ideas about foods rather than remain in our age of scientific food industries. They can have the earlier age! I feel much more secure in the care of food and nutrition scientists and scientific food processors. How about you?


Hughes National Winner

Joe Hughes, Junior Animal Husbandry major from Duncan, S. C., has recently received confirmation of his winning a $100 scholarship offered by Alpha Zeta on a national level. Hughes, who is Scribe of the South Carolina chapter, was one of three winners chosen from 28 chapter-chosen applicants across the nation. The other two winners were from Idaho and Oregon.

Mr. Louis L. Madsen, Chairman of the Board of Trustees of Alpha Zeta, had special praise for Hughes' record which shows his unique ability to participate in many activities while maintaining top grades - a 4.0 G. P. R. for his last four semesters in fact.

Honors and awards are nothing out of the ordinary for Joe Hughes. He received numerous honors as a result of his active FFA work and served as National Vice-President in 1959-60. Since coming to Clemson, he has been a perennial participant and asset to Animal Husbandry Judging Teams.

In 1961, Hughes received the Alpha Zeta Award as the sophomore with the highest G. P. R. in the School of Agriculture. Even more recently, he was selected winner of a $500 scholarship awarded annually by theRalston Purina Company.

Hughes will be the official delegate of the South Carolina Chapter of Alpha Zeta at the National Biennial Conclave to convene in Washington, D. C. in late summer.

Dr. Edwards Elected to AZ Membership

Dr. Robert G. Edwards has been elected to Centennial Honorary Membership in the Fraternity of Alpha Zeta by the Fraternity High Council and the South Carolina Chapter, located at Clemson College. Alpha Zeta is the national honorary and Service fraternity for agriculture.

Charlie Coble, Chancellor of the Alpha Zeta Chapter at Clemson, announced that Dr. Edwards was formally initiated into the Fraternity at the Chapter's annual banquet on April 30. Dr. Edwards was also the guest speaker for this event.

In presenting Dr. Edwards as a nominee for honorary membership, the South Carolina Chapter pointed out several of the highlights in his career. Graduating from Clemson in 1933 with a Bachelor of Science Degree in Textile Engineering, he became supervisor of the quality control laboratory at the Duncan Mill of J. P. Stevens & Company. Later, as a member of the Deering-Milliken organization, Dr. Edwards served as treasurer and general manager of the Abbeville Group of Milliken plants. Dr. Edwards came to Clemson as Vice-President for Development and became President of the College following the death of Dr. Robert F. Poole in 1958.

In his position as President of the State's land-grant school, Dr. Edwards has played an important part in the development of an improved agriculture in South Carolina. Dr. Edwards has proven himself a friend of agriculture. He firmly believes that agriculture has a dynamic future in the nation's economy.
New Boon to Forestry

Ted Blackwell, Forestry

Much has been written recently about the pros and cons of gibberellic acid and its effects as a growth stimulus on different species of forest trees. Many experiments are being conducted that will eventually prove whether or not this growth stimulant can be an economical addition to the complex business of growing trees.

If future experiments prove fruitful, there seems to be little doubt that gibberellic acid will be a boon to the forestry business. There may be a very particular advantage in the case of longleaf pine, (Pinus palustris). Longleaf pine remains in the so-called "grass" stage for a few years until stem elongation takes place. While it is in this seedling stage, it is very susceptible to Brown Spot Needle Blight caused by the fungus _Scirrhia acicola_ which is very destructive to young longleaf pines. More rapid initial growth with the aid of gibberellic acid could possibly help to control this disease.

At the present time, the best way to get longleaf pine out of the "grass" stage is to keep Brown Spot from attacking the young seedlings by using various pesticides such as Bordeaux mixture, or by physical methods such as prescribed burning. Controlled burning destroys the conidia which are present on the lower needles of longleaf pine and on needles which have fallen to the ground.

By the use of gibberellic acid it may be possible to initiate rapid stem elongation which would allow the seedling to grow out of the "grass" stage more rapidly, thus increasing the distance between the conidia and possible rain splash. This, in itself, would save many thousands of seedlings and also shorten the time interval between establishment and harvesting of the crop.

What is gibberellic acid? It is a chemical that can stimulate a plant to grow and develop in many different ways. The natural source of gibberellic acid is an Asian fungus called _Gibberella funjii-kuroi_ which is the fungus causing "bakanae", a disease threatening to eradicate the rice crop in China. The fungus was isolated and studied. It was noted that when the fungus was placed in a culture liquid, then removed and the culture liquid boiled, the resulting sterile liquid caused stem elongation in rice plants.

Soon forest research workers in the United States became interested in this finding and began conducting experiments of their own. The results of these trials indicated: (1) that even the lowest concentrations induced a change in some test plants; (2) almost every kind of plant treated with gibberellic acid responded; and (3) the most pronounced stem lengthening occurred on young actively growing plants.

According to Leake, it was possible to find favorable growth response on one month old Yellow birch seedlings using 100 parts per million gibberellic acid. Bilan and Kemp both found favorable response with 2 and 3% aqueous solutions of gibberellic acid on one year old loblolly seedlings.

Dr. R. D. Shipman of the Clemson Forestry Department recently conducted a limited test on 40 cuttings of a 3-year-old hybrid poplar (Populus deltoides x Populus nigra). The test pointed out that improved rooting took place only in a narrow range of gibberellic acid concentrations. The effect of the acid is borne out by the fact that only 40% of the untreated cuttings developed roots while 70% of those treated became rooted. This test revealed that gibberellic acid is adopted for use on certain hardwood cuttings.

In addition to the previously mentioned possibilities for use on longleaf pine to overcome Brown Spot disease, it may be used to (1) advance growth of a crop that must be harvested in a shorter period of time; and (2) overcome the scarcity of seed supply for certain plants.

How far has gibberellic acid advanced
in practical use? In forestry, gibberellic acid is still in the experimental stages. How can it be obtained? It usually is stocked in stores carrying garden supplies.

There are certain precautions to be observed in the use of this chemical: (1) overdosage may be detrimental to the plant; (2) the young plants may need time to establish roots before applying gibberellic acid except in the case of rooting certain hardwoods; and (3) gibberellic acid should not be expected to be a substitute for plant nutrients, sunlight, moisture, and other factors necessary for plant growth.

In all cases, the manufacturer's directions regarding the use of gibberellic acid should be observed.

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The future that we study and plan for begins today. Chester O. Fischer.

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A man is relieved when he has put his heart into his work and done his best. Emerson.

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Nothing in haste but catching fleas.
Profits From Pigs

Bill Johnston

Farmers can make a profit with low capital investments in the Southeast. This is a pork deficient area and the production of feeder pigs offers a real opportunity. This article outlines a sound feeder pig production schedule, that if followed closely, will guarantee extra income.

There are two stages in the production of market hogs. The first stage is the feeder pig stage. These pigs are raised by the sow until they are weaned. The pigs then go in a second stage which is called the growing and finishing stage. If you have a limited amount of grain, but leisure time, raise feeder pigs. The time to start is now. Below is the estimated cost and returns of a twelve brood sow operation.

Sales:
- Feeder pigs, 180 at 40 lbs. ($11.50 each) $2,000.00
- Sows, 6 at 450 lbs. ($12.00 cwt.) 324.00
Total receipts $2,324.00

Variable Expenses:
- Corn, 46 bu./sow and pigs, 20 bu./boar.
- 8.5 bu./gilt=Total of 613 bu. at $1.25 $71,625
- Protein supplement 400 lb./sow, 365 lb./boar.
  50 lb./gilt, 5 lb./pig = Total of 6,200 lb. at $1.80 cwt. 297.60
- Ladino pasture 1.7 acres/12 sows at $25.00/acre 43.50
- Boar cost (difference between sales and purchase price) 30.00
- Vaccination for cholera, 180 pigs, $.85/pig 153.00
- Medical and other expenses 68.75
- Marketing cost, 3% of total receipts 69.75
Total variable expenses $1,378.85
Income over variable expenses $945.15

Annual Fixed Cost:
- Depreciation on 12 year average - 210.50
- Average interest (3% on $2,526) figured at rate of 6% on unpaid balance 75.78
- Taxes and insurance 35.00
Total yearly fixed cost ------- $321.28
Net returns to land, labor and management ------------------ $632.87

These figures are all estimates and perhaps could be cut by efficient planning and management. They are based on the following factors: (1) each sow farrows twice a year and raises 15 pigs (2) corn is figured at $1.25/bu. (3) pigs sold at $11.50 (4) six gilts held over as replacements (5) 1.7 acres of pasture is used.

The sows should be put into farrowing houses or pens prior to farrowing and given special attention at farrowing time. Three days after the pigs are born, they should be given iron shots, or allowed free access to soil or clay which is a good source of iron. This prevents anemia. They should also have their needle teeth cut shortly after birth. Their ears should be notched and their navel cord dipped in iodine. Artificial heat should be provided in the pen for the pigs to prevent chilling which might cause death. Most producers use 250 watt infrared heat lamps suspended about 30 inches over the pigs depending on the temperature. Castration of male pigs is recommended at the age of 3 to 4 weeks.

Creep feeding may begin when the pigs are about 3 weeks of age. Pig "pellets", preferably containing sugar, may be used as all baby pigs have a "sweet tooth".

Wean the pigs at 6 to 8 weeks of age and treat for worms and hog cholera. The pigs are now ready to be sold as feeder pigs. On a pound per pound basis, feeder pigs are worth about 1 1/2 times as much as market hogs. Good feeder pigs will weigh from 40 to 100 pounds.

The feeder pig business has a definite place in the Southeast. The successful producer must have a well managed breeding and feeding program, however a small operation can be run efficiently during hours away from a regular job.

BUT WHERE DO THEY GO?
Agricultural Economics Club

Highlight of the year for the Clemson Agricultural Economics Club was an educational tour of farm-related businesses in the Atlanta area, April 1 and 2. The Club, accompanied by Dr. H. C. Spurlock and N. A. Wynn of the Research Staff, visited the facilities of the Atlanta Produce Market, the Cotton Producers Association, and several other major concerns. Included in the tour was a luncheon as guests of Swift and Company.

Another major event of the year, the Annual Banquet, will be held at the Clemson House on May 11. The entire Staff of the Department, teaching and research, the club members, and their wives or girl friends are invited to attend. Between 75 and 100 people are expected.

This summer, the Club hopes to send Jim Hite, rising senior from Kingsport, Tenn., as a delegate to the American Farm Economics Association Meeting in Storrs, Conn. Hite plans to enter the public speaking contest.

Agronomy Club

Club elections were held at the second meeting of the semester, February 19, 1962. Those elected were: John Meetez, President; John Connor, Vice-President; Hugh Gray, Treasurer; Jimmy Palmer, Corresponding Secretary; and Boyd Graves, Recording Secretary.

Senior Supper, a supper honoring all seniors in the Agronomy Club, was held on May 1, 1962. The Club enjoyed an after-dinner lecture by a guest speaker.

Agricultural Engineering Club

The ASAE sponsored a field trip for its members on the first of March. The trip consisted of a tour of Hartwell Dam and its facilities near Hartwell, Georgia. The tour was guided by the resident engineer of the project which is being conducted by the U. S. Army Corps of Engineers and is designed for recreational facilities and electricity for civilian use. ASAE members were shown the engineering and construction aspects of the project.

An annual Georgia-Clemson ASAE Banquet is held with the Ag. Engineering Club at the University of Georgia. This year Clemson will sponsor the banquet on April 13. The students from Georgia will be given a tour of the Clemson campus during the afternoon and will attend the banquet in the evening.

Block and Bridle Club

The Clemson College Block and Bridle Club held its annual spring barbecue Saturday, April 14, at the Orange and White Intrasquad football game. The barbecue was served near the Field House from 12:00 Noon until 2:00 P. M. The price of $1.50 per plate, consisted of smoked barbecue, barbecue hash, rice, slaw, rolls, coffee and tea.

The Club held its annual Little International Livestock Show at Clemson on April 7, 1962. Morning activities got underway at 8:00 A. M. with a showmanship
contest and a horse show at 11:00 A. M.

The afternoon activities consisted of a judging contest open to all 4-H and FFA members.

A banquet during the evening completed this busy day.

F. F. A.

Activities for the Clemson Collegiate F. F. A. Chapter since the preceding publication have included four regular meetings and work on several projects.

On November 14, 1961, Mr. Floyd Johnson, Agriculture teacher at York, S. C., and President of the National Agriculture Teachers Association, talked to the group on the qualities of a good agriculture teacher. His emphasis was on building strong character and leadership qualities. The December 12 meeting was fairly short with a film "Fallout in Agriculture". Miss Linda Colvin was named chapter sweetheart. The January meeting was dropped because of exams.

Guest speaker for the February 13 meeting was Dr. G. H. Aull, Head of the Clemson Agricultural Economics Department. He gave a very interesting talk on the big business of agriculture. On March 13, 1962, new officers were elected: President, Charles Sparks; 1st Vice-President, Jimmy Ballington; 2nd Vice-President, Luther Waters; Treasurer, Gene Blackwell; Secretary, Benji Rhoad; Reporter, Gordon Chipicitis; Sentinel, Jackie Arnold. Their duties begin April 2, 1962.

The calendar committee has finished the calendar to be sent to high schools and advertisers. The yearbook is presently being prepared.

4-H Club

The 4-H Club members at their February meeting heard International Farm Youth Exchange delegate, Evan Varner, a 1961 Presbyterian College graduate, speak and show slides of his trip to Japan. Mr. Varner lived with the farm families of that country for approximately six months. The trip was awarded through the International Farm Youth Exchange Program sponsored by the South Carolina Master 4-H Club and the Agricultural Extension Service.

At the January meeting the club enjoyed its own Jerry Moore, junior dairy major from Anderson, showing his colorful slides on his trip to National 4-H Conference in Washington, D. C.

The Club undertook a new activity this year by sponsoring a "Mixer" at the Food Industry Building on January 6, 1962. Approximately fifty girls, representing Erskine College, Anderson Junior College, and Furman University, were present which resulted in a very successful and fairly profitable "mixer" for the Club.

After 5 years of very active work as advisor to the college 4-H Club, Mr. H. Oswell Vaigneur is resigning in order to pursue his graduate study at Iowa State University.

Mr. Vaigneur, a native South Carolinian from Ridgeland, obtained his B. S. in Agricultural Engineering in 1952, and his M. S. in 1959. He has served on the part-time teaching staff here at Clemson since 1960. His plans are to remain in the field of teaching and research after completing his graduate study.

Mr. Vaigneur's background of 4-H experience has caused him to be a very interested and effective leader and advisor. He attended Club Congress as member of the state champion Livestock Judging team member, and has served as President of the South Carolina Master 4-H Club. He comments, "It has been a privilege working with students in the college 4-H Club. By chance, maybe I have been able to return some of the many contributions afforded me through earlier activities in the 4-H Club."

To Mr. Vaigneur, the college 4-H Club offers hearty thanks and to him, his wife, Martha, and children, Keith and Annette, the very best of luck.
Horticulture Club

During February, ten delegates from the Clemson Club attended and participated in the 1962 Southern Regional Agricultural Workers Convention in Jacksonville, Florida. highlights of the convention included tours and presentation of papers at the horticultural sessions. At the Collegiate Branch meeting of the American Society for Horticultural Science, Robert G. Halfacre of Clemson was elected president for this coming year.

James R. Cothran, a senior in Ornamental Horticulture, was the editor of the recently published Collegiate Newsletter. This Newsletter was distributed to the land grant institutions throughout the South. At present the Horticulture Club is engaged in making jelly and jam to provide funds for our annual banquet.

Dairy Club

Officers of the Student Chapter, American Dairy Science Association for 1962 were elected at the first regular meeting in January. Jerry Moore succeeds Jim Caughman as President while Jack Eaddy replaces Ken Butcher as Vice-President and Joe Bernette follows Jerry Moore as Secretary-Treasurer of the group.

The Dairy Club was represented by five delegates at the meeting of the Regional Student American Dairy Science Association held in Jacksonville, Fla., February 5-7. Those attending included Jim Caughman, past president and Regional President, who presided over most of the Convention meetings; Jerry Moore, new president; Larry Gause, elected delegate-at-large; Jack Eaddy; and Wallace Fraley along with club advisor, Dr. J. T. Lazar.

Activities in Jacksonville included hearing research papers presented by the parent organization ADSA, hearing about all the graduate schools in the Southeast from representatives of the respective dairy departments, and touring a Florida milk plant and producer farms.

Clemson is well represented on the roster of newly elected officers. Jerry Moore was elected 1st vice-president, Larry Gause-3rd vice-president, and Wallace Fraley-Secretary-Treasurer. Dr. Lazar was elected to a new 3-year term as Regional Advisor.

Six schools were represented including the University of Georgia, University of Florida, Mississippi State University, Virginia Polytechnic Institute, Auburn University, and Clemson College.

Current plans are for the Club to have representatives at the meeting of the National Association in Washington, June 18-22.

Mr. James K. Henderson, a 1955 graduate of Clemson and now Assistant General Sales Manager of Carnation Milk Company in Houston, Texas, spoke to the Dairy Club on February 20. He gave a very thought-provoking speech concerning the efficient utilization of time and the achievement of goals. (A synopsis of his speech appears in this issue of the Agrarian. Read it!) Mr. Henderson will also be well remembered by the many seniors he interviewed as prospective employees.

Some years ago, with the recognition of the growing importance of science in agriculture, Dairy Department Head, Prof. E. E. Goodale, began requesting permission to change the name of the department. The request has been granted and effective July 1, 1962, the Dairy Department will be officially called the Department of Dairy Science. With this change will come a change in the nomenclature of the staff. The teaching staff members will have titles of "Professor of Dairy Science", "Instructor of Dairy Science", etc. The research staff members will have respective titles of "Dairy Scientists". The Dairy Extension Service will be unaffected by the change, however.
Alpha Zeta Initiation

The honorary fraternity of Alpha Zeta held an informal initiation of six new members during the week of March 5-9. Those initiated were: Bill Simpson (Ornamental Horticulture, Iva, S. C.), Larry Vereen (Biology, Ocean Drive, S. C.), Tommy Gue (Ag. Education, Orangeburg, S. C.), Bo Shaw (Forestry, Sumter, S. C.), Richard Cooper and Jimmy Howard (both Fruit and Vegetable Horticulture, Clemson, S. C.).

Formal initiation followed on March 12. Attending the formal program were about 20 faculty members and 15 student members. The initiation was conducted by the present officers of the South Carolina Chapter, Chancellor Charlie Coble, Censor Ken Butcher, Scribe Joe Hughes, Treasurer Jim Cothran, and Chronicler Jerry Page.

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She: "Don't you wish you were a barefoot boy again?"
He: "Not me lady, I work on a turkey farm."

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"That's a pretty good looking car. What's the most you ever got out of it?"
"Nine times in three blocks!"

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If ignorance is bliss, why aren't there more happy engineers?

"There are four requisites for a good short story," explained the English teacher, "Brevity, a reference to religion, association with royalty, and an illustration of modesty. Now I will give you thirty minutes to write a short story, remembering what I have told you."

After 10 minutes Jim said he was finished and was told to read his story to the class. He read "'My Gawd,' said the countess, 'take your hand off my knee.'"
Miss Little International, Miss Brenda Watts of Thomason, Georgia, observes the showing skill of James Boling, Moore, S. C., which netted him the championship in swine showmanship.

Bob Karney, of Covington, Tenn., poses the animal which he showed for the championship in cattle showmanship for the approval of Miss Little International.
It has been said by some that a plant is the greatest factory on earth. The fact that a plant does manufacture its own food is a wonder of nature in itself - something never accomplished by man or his machines.

The first stage in the plant's life cycle is the embryonic stage. The embryo is the part of the seed that is to become a structure many times its own size. Therefore, this little embryo faces a tremendous task. First, the tiny embryonic plant must send roots down into the soil for minerals and at the same time force its way through the soil. Both difficult tasks must be performed with the aid of a small amount of food stored in the seed! This is expecting a lot from a little seed that is perhaps one, two or more inches below the soil surface. Such things as hardpans or hard surface crusts cause many embryonic plants to falter and fail.

Once the young plant emerges from the soil, many processes take over and the factory begins operation. The power is sunlight, instead of electricity. The resources needed to operate the factory are classified into two categories - those supplied by nature and those supplied by man. Those supplied by nature are air, the soil and its constituents, and water. The resources supplied by man include various elements and nutrients that the plant requires as well as others which are essential for plant growth.

The plant factory manufactures food needed by the plant during its lifetime while storing food in new seed for future reproduction and propagation. After the plant sets fruit and the seed reach maturity, the remainder of the cycle is up to man, who must harvest the seed and plant them the next growing season. Upon germination the new seed are ready to finally become plants and the plant factories will again be in operation.
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