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OLD GLORY is a set of principles, a covenant of human rights, rippling in the breeze. So long as the great body of Americans respect the traditions and the principles for which Old Glory stands—so long shall the flag be a vision of hope, a shield against the storms.

VISIONS are elusive sometimes. But they have a way of coming down to earth. This thing called soil conservation on the land was once a vision—little more than the seed of an idea, the idea that farmers could work together to solve their mutual problems. The seed proved to be remarkably viable, for the soil conservation district idea has settled down like a protective blanket over our good earth.

There is more than physical resemblance between a contour-stripped field and the red and white stripes of Old Glory. The soil conservation district embodies the very essence of the rights and freedoms for which our flag stands. Cherishing those rights and freedoms, farmers have organized soil conservation districts that are of local people, by local people, for local people.

A soil conservation district is composed of local people who see their own problems and solve them, who see their own responsibilities and shoulder them. They are local people doing that which they should do, voluntarily, with no infringement of rights and liberties, with scarcely a law, rule, regulation, or tax. The soil conservation district, in action, is literally a bit of the freedom of enterprise that made America a land of opportunity and abundance.

Soil improvement, through good land use, is a modern vision, a new frontier of rural America.
The \AGRARIAN

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THE COVER shows an outline map of South Carolina with four test-tubes of soil to indicate the need for more people to have their soil tested.

AGRARIAN
PHILOLOGY
By Carol Brown

THE MOST VALUABLE “CAPITAL”
To start almost any kind of business in our modern age requires a lot of capital. This is quite different from the infant years of our country, when land was free and all a man had to have was a strong back and plenty of courage. Even then all that was required to set up a trading post was a log cabin in a suitable location, a few hardware items, some staple groceries, and a little calico. Just about all exchange during that time was by the barter system, so money did not come into play as much as it does today.

Today huge sums of money are required to go into any kind of business venture whether it is farming or anything else that you would care to name. If a man does not have capital and cannot borrow it, his chances of going into business for himself are very slim.

If you look capital up in the dictionary you will find various meanings. One of them states that “capital is a stock of accumulated wealth.” Another says that capital is “an aggregation of goods used to promote the production of other goods.” Still another definition says that “capital is anything that can be used to increase one’s power or influence.” I would like for us to combine these and form still another definition of capital. “Capital is a stock of accumulated values that are used to promote one’s concern over his fellow man.” This is the type of capital which is more valuable to us than any other kind we might name. This type of capital cannot be borrowed and there is no certain terms in which it may be counted. This capital is given to us by our parents. It comes from the love and affection they have for us and the desire they to teach us the real values of life. It comes from the Christian home and the Christian training which we have received from the two people who are most interested in our lives. This then is the most valuable capital that anyone could ever have.

For this reason, the January 1957 issue of the AGRARIAN is humbly dedicated to the source of our most valuable “capital”—our parents.
Continuous Buttermaking Processes

Dixon D. Lee, Jr., Dairy '57

The manufacture of butter has developed from an infinitely old domestic art into an industry which is important as a contributor to human nutrition and as a livelihood for millions of people in the many parts of the world where dairying is a major enterprise.

You would think that such an industry being so old and involving so many people would have seen a more spectacular development than buttermaking has since it graduated from the farm kitchen to the factory some eight decades ago.

Butter, being as old as recorded history and dating back to the Hindu writings of 2000 B.C., has been processed with methods and utensils of a crude sort. Advances in technological development have been slow, but today the butter industry is taking a tremendous stride forward and is breaking away from the buttermaking methods of our forefathers. Over 10 years of intensive designing and experimenting preceded the realization of buttermaking by continuous processes which was made available in 1949.

This process was long anticipated and was received with keen interest by those who saw the need for streamlining production methods, increasing efficiency and reducing drudgery in the butter industry.

An increase in production, decreases in man-hours and in floor space used, and higher, more uniform quality are measurable benefits obtained by the many who converted their buttermaking from a batch to a continuous system. Additional savings resulting from this conversion are reduced steam and refrigeration requirements, elimination of butter washing, and reduction in cold storage.

You might wonder now about how the butter from this continuous process stacks up against that churned in the conventional barrel churns. First we think of body and texture. Continuous butter has a firmer, more compact body that is waxy and plastic.

Flavor, being of prime importance, of the two types when compared, indicated that there was an improvement in flavor of the butter manufactured by the new method. This is in part due to the elimination of the buttermilk and its associated flavors early in the process and in part due to vacuum pasteurization which removes volatile off-flavors.

As to moisture and salt distribution the continuous system is superior to the batch method because with the batch method it is quite difficult to obtain desirable distribution of moisture and salt.

The keeping quality of continuous butter is better because of the improved sanitation, high efficiency of pasteurization, and more uniform distribution of salt.

Better control of off-flavors has been obtained through the use of this new system of buttermaking. The incorporation into the butter of an inert gas like nitrogen to replace the atmospheric mixture of oxygen and nitrogen normally found in butter is a feature which should reduce the danger of oxidative deterioration. The sole use of stainless steel on all surfaces which come into contact with the product works in the same direction. There is no contamination by metallic ions which will cause oxidized tallowy flavors when the butter is stored.

Having discussed the properties of the continuous buttermaking system, let us run briefly through the process of making butter by this revolutionary system.

Farm-separated cream at the intake is dumped into two vertical stainless steel holding tanks, from which it is pumped into a centrifugal heater, where it is heated to 120 degrees F. The centrifugal action of the heater acts as a pump to then push the heated cream to the nearby separator. There it is discharged from three outlets as concentrated milk fat, "light" skim and "heavy" skim.

From the separator the concentrated milk fat goes to a vacuum pasteurizer where it is properly pasteurized and cooled under vacuum. This milk fat then is pumped into composition control vats where the golden concentrated milk fat is standardized for fat, pH, flavor, moisture, salt and color.

From the composition control vats the hot concentrated milk fat is pumped into a chiller worker where it is converted from a liquid into butter by sudden temperature change. Passing through two chilling tubes the temperature of the fat is dropped from 110° F. to 40 degrees.

The butter now goes to a "Texturator", the finished butter drops directly into the hopper of the butter printer, where it is cut, wrapped and cartoned.

What part will the continuous buttermaking equipment play in the butter of the future? The dairy industry forecasts the ultimate conversion of the entire industry to the Continuous Buttermaking practice. But what about the small operator? Obviously the continuous buttermaking process described here is a method for large scale operations and the present users are plants which already have large volumes of production. The many small creameries throughout the buttermaking areas of the United States would, under their present organization, not be able to take advantage of the process. In due time competition, high manufacturing costs, labor shortage, and the necessity of bringing their plant facilities up to date may compel many of these creameries to reorganize into larger units. There will then arise an interest in the application of modern methods of manufacturing butter.

Because of its many attractive features, the continuous buttermaking process will receive serious consideration by more and more manufacturers, and the process will evolve, through continued research and use, to a higher and higher state of perfection and bring forth a product which is a real credit to our great dairy industry.
In the early thirties the soil testing program at Clemson College was begun on a small scale in an effort to better characterize the soils of South Carolina for fertility status and to make predictions of the need for fertilizers and soil amendments. For many years this program continued as a part of the Agronomy Department. However, effective July 1, 1955, it was set-up as an independent program and has since been known as the Department of Soil Testing.

In 1951, when the soil testing program was being expanded, Dr. H. G. Allbritten, Head, Department of Soil Testing, came to Clemson College to set up and develop a modern soil testing laboratory. He received the B.S. degree, with a major in Chemistry, at Murray State College; the M.S. degree, with a major in Agronomy, at the University of Kentucky; and the Ph.D. degree, with a major in Soils and a minor in Agricultural Biochemistry, at The Pennsylvania State University. Dr. Allbritten has had several years of experience as a Research and Extension Agronomist at other State Agricultural Experiment Stations before joining the Agricultural Research Staff at Clemson College.

The Soil Testing Department has four full-time employees and requires several part-time employees, usually students wanting work, during the rush seasons. More than 17,000 samples were tested last year.

Soil samples, for test purposes, may be submitted through the farmer or grower direct or they may send them through the local County Agent, Soil Conservation Service, Vocational Agriculture Teacher, and others interested in getting more soils tested each year for fertilizer and lime requirements.

(continued on page 15)
SERVING THE FARMERS IN NORTH AND SOUTH CAROLINA SINCE 1906

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CHARLESTON, S. C.  CHARLOTTE, N. C.
The Livestock Judging Team

"Rut" Hammond, Jr., A.H. '57

Throughout the United States and Canada are Land-grant schools such as Clemson which offer several majors such as Mechanics, Engineering, and Agriculture. All of these schools have an Animal Husbandry Department and students in these departments comprise the livestock judging team. In this article I am going to describe some of the activities in which the 1956 Clemson Livestock Judging Team participated. The livestock judging team here at Clemson had been discontinued up until last year, when it was revived under the sponsorship of Professor Dale Handlin.

Many of you readers probably don’t know how a livestock judging contest is run, so I will try to explain the procedure to you. The team judges cattle, swine, and sheep. There is usually a class of bulls, heifers, or fat steers in the cattle division. As for swine, there could be a class of breeding gilts, boars, or market hogs, and in the sheep classes one might find a ewe, ram, or fat lamb class. In a contest there are twelve classes that are placed, and reasons have to be given on eight of these classes. Reasons are given in the order in which the class is placed, and they are given orally to an official judge. In a contest the placing is done in the morning and reasons are given in the afternoon. The judge has to have a good memory to remember the classes, but notes may be taken to help him remember. There is a possible score of fifty on placing and fifty on reasons which adds up to one-hundred possible points for a class.

A team is composed of five members and there are several teams competing in a contest for team prizes. Each individual on the team may compete for individual prizes also. To obtain the team score all five scores are added together and the team with the highest score wins.

The members of the 1956 team which went to Chicago are: Roger Chastain, Taylor; Joyce Cox, Loris; Bobby Hammond, Jr., Edgefield; "Rut" Hammond, Jr., Greenwood; Gordon Johnson, Nichols; and Roy Mathis, Gaffney. The team took several trips to contests last spring and this past fall.

THE V. P. I. TRIP

We left early one April morning with two teams of five men each. We rode all morning and arrived on the N. C. State campus early in the afternoon. Here we worked out practicing placing some classes, and that night we gave reasons. While on the campus, we looked over some of their experimental work and some of the new buildings. They had some fine herds of cattle and some excellent sheep, so by stopping here we gained a lot of knowledge and got some useful practice too. The next day we moved on to the V.P.I. campus and registered and got our rooms. That night we went to bed early to get plenty of rest before the contest the next day. The contest lasted all day and after it was over all of us were pretty tired. The next morning we went to the breakfast-banquet where they told us the outcome of the contest. We didn’t do too well but came back home with a lot of experience.

THE CHICAGO TRIP

As many of you in the cattle, swine, and sheep business know, the International Livestock Exposition at Chicago is the largest in the world. To represent Clemson in the Intercollegiate Judging Contest was indeed an honor for the members of the livestock judging team. In this contest there were thirty-nine schools represented.

The team left Clemson on the morning of November 17th. The first stop which was at the Berry Schools in Mount Berry, Georgia. They had some classes of hogs and cattle picked out for us so we went right to

(Continued on page 7)
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Have Poisons Killed Your Game Animals?

M. S. Cely, Jr., Ent. 57

What are garden sprays and dusts doing to birds in my yard? Will BHC, Toxaphene, Malathion, or other new poisons to control crop insects, harm quail and rabbits? Can insecticides be applied safely around farm ponds? Is insect control by chemicals compatible with the maintenance of wildlife? These are just a few of the numerous questions the entomologist and zoologist of today are asked, and for some of the answers much research and study are needed.

One of the chief problems the entomologist has today is the invention of new insecticides, since insects have the ability to build up a resistant strain to most insecticides within three to five years. The entomologist must also consider the harmful effects on the animals being exposed to the specific area and most of all the toxicity of the insecticide to humans. With these thoughts in mind, I shall try to explain how these mammals, birds and fish are affected by the poisons of today.

As with DDT, mammals usually show more resistance to poisoning by the new insecticides than do birds and fish. Tests on laboratory animals indicate that, as a general rule, Methoxychlor, TDE, BHC, Chlorothion and Malathion are less harmful than DDT. Intermediate in their harmful effects on mammals are Lindane, Toxaphene and Chlorodane; more lethal than DDT are Heptachlor, Aldrin, Endrin, Dieldrin, Dibenzofuran, EPN, Parathion, and TEPP. Usually some variation in resistance to the various poisons can be expected among different kinds of mammals. For example, Aldrin applied to Colorado's rangeland at the rate of two-tenths of a pound per acre in rolled wheat bale to combat Mormon Crickets killed the majority of the wild mice but there was no observed effect on deer and rabbits. Many of the chlorinated hydrocarbons are very harmful to birds. Among these, tests have proved that Aldrin used to control grasshoppers has killed Red Winged Blackbirds and some young waterfowl. The less destructive hydrocarbons would be Toxaphene, Methoxychlor, and BHC.

Some of the organic phosphates are very harmful to birds. Numerous blackbirds and bobolinks died in Georgia rice fields when Parathion dust was applied at a rate of four tenths pound per acre. TEPP is a penetrating insecticide and actually goes through the horny covering surrounding the birds' feet.

Oddly enough the organic phosphates which are so deadly to mammals appear less harmful to fish than the chlorinated hydrocarbons. TEPP breaks down rapidly in water, and its effect is not important. EPN is harmless to fish when applied as a mosquito control at one tenth of a pound per acre.

Among the chlorinated hydrocarbon insecticides, Endrin was the most toxic of the number tested in fish laboratory experiments. Dieldrin, Toxaphene, Lindane and DDT are also deadly if applied in appreciable amounts. TDE and BHC are safest to fish and are recommended for use in areas where preservation of aquatic life is a consideration. Also a pointer here is to never use an emulsion or oil as a carrier for the insecticide. Always use something that will settle to the bottom of the pond, such as dusts, wettable powder, and granules.

Bird watchers, garden club members, and other conservation groups have a justifiable concern as to the possible hazards to wildlife from insect control operations. Often, though, they do not know what facts to obtain about an insect control program, or how to evaluate them. Sometimes, too, there is a tendency to condemn all insecticides without considering the good resulting from their use, or because of isolated cases of damage which may have been carelessness in the use of insecticides in what might have been an otherwise safe program. Entomologists are just as open-minded as any group of people, and most of them are anxious to limit wildlife losses to a minimum.

The primary factors to be considered in appraising the possible damage to wildlife from an insect control pragram are: 1—The rate of insecticide to be used, 2—The animals apt to be adversely affected. Always apply as much insecticide as is needed, but never apply too much or the wildlife may be affected.

Another factor to bear in mind is the size of the area to be treated. Smaller areas will be repopulated by animals much sooner than larger ones. Inquiry also should be made as to the manner in which the insecticides are to be applied. For example, never use aircraft spray on a windy day because over half of the insecticide will be lost.

Because of the sensitivity of fishes, crabs and other aquatic life to many insecticides, direct application to streams, lakes and coastal bays should be avoided as far as possible. The equipment used to apply the insecticides should never be washed in these waters. Caution should also be exercised in applying materials near water and marsh habitats if there is danger of their being washed into these water areas by rain.

LIVESTOCK TEAM
(Continued from page 5)

work practicing. From here we moved to the Mountain Cove Farms located in the northern portion of Georgia. After working here we moved on to Knoxville, Tennessee where we spent the night. Early the next morning we got up early so that we could go out to the University of Tennessee farm. After an all day workout here we moved to Lexington, Kentucky and that afternoon we stopped by Calumet Farms and saw their stud barn. There were several famous horses here and we enjoyed seeing them very much. From here we went to Indianapolis, Indiana where we spent the night. Tuesday we stopped at Lynnwood Farms, which is an experimental station of Purdue University, and practiced most of the day. Early that evening we arrived in Urbana, Illinois, the home of the University of Illinois. We stayed there two days (Continued on page 15)
DAIRY CATTLE TEAM PLACES SECOND IN GUERNSEY CONTEST

The Clemson College dairy cattle judging team finished ahead of ten other college teams in competition at the National Dairy Cattle Congress held in Waterloo, Iowa, in October.

Out of 32 teams competing, the Clemson team placed second in judging Guernsey breeds and tenth in judging Jerseys. Overall, the team placed 22nd in the competition.

The members of the team are: Ben L. Cook, D. D. Lee, and B. T. McDaniel.

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LEE RECEIVES LEADERSHIP AWARD FROM FOUNDATION

Daniel Dixon Lee, Jr., of Dillon, South Carolina, is a recipient of an Agricultural Leadership Award made annually by the Milk Industry Foundation, an international association of fluid milk dealers. He received a cash award and an all expense paid trip to the Milk Industry Foundation's annual convention, which was held at Atlantic City, October 31-November 2. At the convention he received an award citation from Dr. Arthur C. Fay, member MIF College Relations Committee. This award is one of five presented to outstanding students of dairy manufacturing from colleges in the United States.

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DAIRY NEWS

On January 15 and 16 the Clemson College Dairy Department will present an ice cream conference and clinic. Prof. W. H. E. Reid of the University of Missouri will be featured as clinic leader and banquet speaker. He will show pictures taken over Europe this past summer and speak about dairying in Europe.

James E. Cushman, Dairy graduate of 1951, is now secretary to Sen. Strom Thurman in Washington, D. C. Mr. Cushman has, since his discharge from the U. S. Army in 1953, been director so the S. C. Dairy Commission in Columbia, S. C.

Mr. J. R. Moss, Dairy graduate of 1933 and former member of the Dairy staff at Clemson, was a recent visitor on the college campus. Mr. Moss is manager all the Industrial Division of the Kelco Co., manufacturers of food stabilizers, in New York City.

Mr. John C. Heustess, Dairy graduate of 1952, has resigned his position as assistant to Dr. Graham of the Dairy Dept., to become Asst. Superintendent of Sumter Dairies in Sumter, S. C.

William R. Bellamy, Dairy graduate of 1953, received the first master's degree in August 1956, ever given by Clemson College in the field of Dairy Manufactures. Mr. Bellamy is now employed by the Barber Pure Milk Co., in Birmingham, Alabama.

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AGRICULTURAL ECONOMICS NEWS

Dr. Ben T. Lanham, Agricultural Economics graduate of Clemson College, class of '37, became the head of the Agricultural Economics Department at Auburn in September of 1956. After receiving his BS from Clemson, Dr. Lanham, did graduate work at Iowa State and Michigan State.

J. P. Davis, Vice-President of the Southern Liquid Fertilizer Company of Albany, Georgia was recently elected Director of the Clemson Alumni Corporation. Mr. Davis is an Agricultural Economics graduate in the class of 1936.

C. E. Pike, an Agricultural Economics graduate of Clemson, class of '37, and now a member of the Foreign Agricultural Service, has recently returned to the United States after several years of service as Agricultural Attache in New Delhi, India.

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AGRONOMY NEWS

Former Dean of Agriculture Dr. H. P. Cooper presented a paper in Cincinnati in November, 1956, before the American Society of Agronomists dealing with his theories on the cause of bloat in cattle. His paper was well received and the Cincinnati newspapers carried a writeup of his paper under large headlines.

Dr. J. H. Smith, Associate Agronomist, has just returned from a meeting held in Clearwater, Fla., where he presented a paper concerning the activities of soil microorganisms in South Carolina.
LIVESTOCK JUDGING TEAM MAKES TRIP

The Clemson College Livestock Judging Team competed in the International Intercollegiate Livestock Judging Contest November 24, 1956 at Chicago, Illinois. The team, coached by Professor Dale Handlin, worked out at Berry School, Mt. Cove Farms, University of Tennessee, University of Kentucky, Lynnwood Farms, and the University of Illinois enroute to the contest.

Team members making the trip were Roger Chastain, Taylors; Joyce Cox, Loris; B. L. Hammond, Edgefield; R. H. Hammond, Jr., Greenwood; and Roy Mathis, Gaffney.

The contest consisted of five classes of beef cattle, three classes of sheep and four classes of swine with oral reasons given on eight of these classes. There were 39 teams entered in the contest and Clemson placed 25th. The three top teams were Iowa State College, Purdue and Oklahoma A & M College, respectively.

The team was sponsored by the School of Agriculture, Animal Husbandry Department, the Block and Bridle Club and the South Carolina Livestock Producers Association.

ALL HAVE JUST RETURNED FROM MILITARY SERVICE

J. W. Pridmore, A.H. graduate of 1954, is now employed at the State Penitentiary Farm, Boykin, South Carolina.

Meek M. Cone, A.H. graduate of 1954, is now employed by the Ralston Purina Company and is working in Alabama.

B. C. Amick, A.H. graduate of 1954, is currently employed with Swift & Co., Atlanta, Georgia.

Haley M. Jamison, formerly Assistant County Agent in Virginia, has been appointed Extension Sheep Specialist at Clemson.

NON-VET NEWS

George Bowen, A.H., graduate of 1956, is currently employed with Swift & Co., Atlanta, Ga.

Fred McLaughlin, A.H. graduate of 1956, is working for Ralston Purina Co., in Alabama.

John F. Wise, formerly Assistant County Agent, Laurens, S. C., is now Extension Livestock Specialist-Marketing, Clemson, S. C.

Richard F. Wheeler, formerly Associate Professor of Animal Husbandry, was appointed Head of the Animal Husbandry Department at Clemson.

RESEARCH WORK ON WEED CONTROL OF WOODY ORNAMENTALS

Mr. John P. Fulmer, a Clemson graduate in Horticulture in 1953, M.S. in Entomology in 1955, was added to the Horticulture staff to do research work on ornamentals. He was Supt. of Parks in Sumter, S. C., before coming to Clemson this past April.

Mr. Fulmer is working at present on weed control in woody ornamentals with particular interest in ornamentals grown by nurserymen in South Carolina. Research in ornamentals has been neglected not only in South Carolina, but also in the country as a whole. Very little work has been done on weed control, but it is rapidly increasing.

Weed problems in ornamentals are more complex than agronomic crops, so progress is much slower. In agronomic crops one crop and one plant spacing is used, but in a five acre nursery there may be as many as twenty five different plant species along with several methods of growing them.

FOUR YEAR CURRICULUM TO BE OFFERED IN FORESTRY AT CLEMSON

Plans are now being made for a four year curriculum in forestry. All the preparatory work has been completed and the administration and board of trustees has approved these plans. These plans call for financial expenditures which will have to be allotted by the State Legislature. The earliest possible date that these funds will be available is July 1, 1957. Then it will take time to provide for the necessary personnel and facilities so that the four year curriculum will meet the standards prescribed by the Accrediting Agency of the Society of American Foresters. This is necessary to insure that the future graduates of Clemson will be equally well prepared in their professional fields as students graduating from other accredited forestry schools of the nation.
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The Men Who Guide Us

LAWRENCE V. STARKEY

Prof. Lawrence Vincent Starkey, better known as “chief”, came to Clemson in 1919 from West Virginia University where he had been extension leader of Animal Husbandry work.

Mr. Starkey was born on March 27 at Ravenwood, West Virginia. He attended West Virginia University and the University of Illinois where he received his B.S. degree in 1914. Before he graduated he taught at Terra Alta High School, at Terra Alta, West Virginia. Then after receiving his B.S. degree, he taught for one year at the Platteville Teachers’ College, at Platteville, Wisconsin. Mr. Starkey did graduate work for his M.S. degree at Iowa Agricultural College and the University of Wisconsin, where he received his degree in 1917. He then returned to West Virginia as an extension leader in animal husbandry work. He stayed there until 1919, when he came to Clemson to become head of the Animal Husbandry Department. In 1930, he did some additional graduate work at the University of Wisconsin. He was head of the Animal Husbandry Department for 26 years.

He is a member of the following societies: Kiwanians, Masons, Sigma Nu, American Society of Animal Production, Association of Southern Agricultural Workers, and South Carolina Veterinary Association.

JOSEPH P. LaMASTER

Professor Joseph Paul LaMaster comes to us from the blue grass state of Kentucky. He was born on March 21, at Campbellsburg, Kentucky. He attended the University Kentucky, where he received his B.S. degree in 1913.

Mr. LaMaster then worked at Elmendorf Farm, Lexington, Kentucky, until 1915, when he took a job with the United States Department of Agriculture, at Brookhaven and Starkeville, Mississippi. He stayed in Mississippi until 1918, when he became extension dairy specialist at the University of Georgia for one year. Mr. LaMaster was then dairy field representative of the United States Department of Agriculture in the southern states.

Mr. LaMaster came to Clemson in 1920 as an extension dairy specialist, and became head of the dairy department in October of that same year. Mr. LaMaster returned to the University of Kentucky to receive his M.S. degree in 1928.

He is a member of the following societies: American Dairy Science Association, a Fellow in the American Society for the Advancement of Science, American Society of Animal Production, Southern Association of Agricultural Workers, Southern Division A.D.S.A., Phi Kappa Phi, Alpha Tau Omega, Lamp and Cross, which is a senior honor fraternity of the University of Kentucky.

GEORGE M. ARMSTRONG

Dr. George Miller Armstrong is a well known figure in the botany department. He was born on November 13, at Appleton, S. C., and attended Clemson College where he graduated with a B.S. degree in botany in 1914.

Dr. Armstrong remained at Clemson after graduation as a research assistant until September, 1915. He then went to the University of Wisconsin where in 1917 he received his M.S. He returned to Clemson after receiving his M.S. and was an instructor in botany from 1917 to 1918. Dr. Armstrong left Clemson in 1918 and went to Auburn, Ala., where he was an Extension Pathologist until 1919. Then he attended Washington University and received his Ph.D. in 1921. He was assistant professor of botany at Washington University until 1924, when he returned to South Carolina as Head of the Division of Boll Weevil Control at the Pee Dee Experiment Station located at Florence, S. C.

In July, 1928, Dr. Armstrong was called back to Clemson to become head of the Department of Botany and Bacteriology. Dr. Armstrong was head of this department for 28 years.

He is a member of the following societies; A.A.A.S., American Society of Plant Physiology, American Phytopathological Society, Botany Society of America, South Carolina (Continued on page 14)
Dwarf fruit trees have become increasingly popular during the last several years, largely as the result of their adaptability to the small home garden. However, there have also been several recent commercial plantings of dwarf fruit trees, particularly of apples.

With the advent of dwarf trees, fruit growing has taken on a new importance in the eyes of the home gardener. On a small plot (60 x 60 feet), the weekend gardener can now grow enough fruit for an average family. Since dwarf trees need only a 12 x 12 foot spacing interval, this small plot would accommodate 15 trees. The importance of this is that different varieties may be grown instead of the one or two varieties possible if standard sized trees were allotted the same space. It is easy to see that dwarf trees can provide a succession of all kinds of fruit throughout the summer and autumn, with a sufficient supply at all times. All the fruit would not ripen at the same time, as would be the case with one or two standard trees.

Another advantage of dwarf trees is that they are easy to care for and allow easier harvesting. Dwarfs attain a maximum height of about ten feet, thus they may be pruned, thinned, and sprayed from the ground, eliminating the need for working from a ladder. Their small size also makes it possible for them to be protected during unseasonal cold snaps by wrapping and by covers. This practice extends the northern limits of a fruit belt for the home gardener. Dwarfs come into bearing much earlier, and are also earlier maturing than are standards. They should not be allowed to bear until their third year. This rest period gives the tree a chance to develop a sturdy framework for heavier bearing later. Another attractive feature of dwarfs is that they can be trained on a trellis or wall as ornamentals.

Dwarf trees are not without their disadvantages, but they are comparatively few. First, many dwarfs need artificial support such as staking because their shallow root system does not always give adequate support. Second, dwarfs are not as long-lived as standards. However, with proper care, they will bear for many years. Another drawback is that some fruits are not dwarfed successfully, and that certain dwarfing rootstocks are hard to find.

Several commercial apple growers are turning to dwarfs and semi-dwarfs because of the cheaper orchard operations made possible with smaller size trees. The commercial grower can prune, thin, and harvest his dwarf apple trees at a lower cost because these operations can be carried out without any climbing or ladder work. The major fault found with commercial dwarfs is their shallow root system. This characteristic makes commercial plantings more susceptible to drought and wind damage.

Before dwarfing rootstocks were discovered, fruit trees were dwarfed by removing the taproot or bending it upward. Another method was to plant the tree with its roots in a container such as a bucket or pot so that the growth of the taproot was confined. The container was buried deep enough so that the fibrous roots could escape over the sides. The theory is that the taproots supply water, causing the tree to be large and slow to come into bearing. It follows that the fibrous roots have an opposite effect, causing the tree to develop dwarfing characteristics.

Although a few trees are still being dwarfed in this way, practically all dwarfing today is being accomplished through the use of certain rootstocks. Scientists do not think that these rootstocks dwarf the tree by limiting the water supply as did the earlier mechanical methods mentioned above. It is now believed that the dwarfing rootstock exerts an influence upon the production or translocation of growth substances (auxins), thereby causing a dwarfing effect. Since every kind of fruit has a particular rootstock which dwarfs it best, the dwarfing of various fruits must be considered separately.

**PLUMS**

There are several rootstocks which have a dwarfing effect on the plum. Rootstocks from native or American plum seedlings dwarf the European and Japanese varieties. However, these combinations are not completely compatible, and a weak union usually results. The danger of wind breakage at the union can be overcome by staking the trees to give them additional support.

Bessey or Western Sand Cherry rootstocks are the source of a good dwarfing rootstock for Japanese plums, but they have been found to be incompatible with European varieties. The most important rootstock used to dwarf plums is Saint Julian C plum rootstock. It is the only dwarfing rootstock which is completely compatible with European plums. Saint Julian C rootstocks is hard to propagate in the nursery, and, as a result, there is always a shortage of this rootstock.

**PEACHES**

Peach trees are naturally small, therefore there is little demand for a dwarf tree. But when the fruit grower wishes to train his tree to some special form as an ornamental, a dwarf is essential.

Two of the rootstocks which dwarf plums, namely Saint Julian C and Western Sand cherry rootstocks, also have a dwarfing effect on peaches. The Western Sand Cherry is the more dwarfing of the two rootstocks. The Beach Plum has been reported to be a satisfactory dwarfing rootstock for peaches, but there has been some disagreement about its compatibility with peaches. It is not recommended at the present.

**APRICOTS**

There is much confusion about satisfactory rootstocks. Several authorities recommend Saint Julian C, but some growers report losing a high percentage of their trees when apricots were grafted on this rootstock. The native American plum rootstock reduces the size of apricot trees somewhat, but it cannot be considered as a dwarfing rootstock.

Perhaps the only satisfactory apricot is a double-worked tree. Western Sand Cherry is used for the rootstock. The intermediate or "middle" wood is native plum, and the apricot is grafted on the plum.

(Continued on page 16)
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JANUARY 1957
Chemically Green Winter Lawns

W. C. Dailey, Agron. '58

Yes, all you do is spray it on and forget it. It is called a miracle substance. It performs a miracle on lawns which aren't ordinarily green during the winter by giving them a lasting green color which doesn't fade during the entire winter. Only one application is necessary and best of all — you get an emerald green lawn all winter long — and a better summer lawn come summer.

It is called Winterlawn Concentrate. It is actually a dyeing agent, therefore it takes no nutrition out of the soil. It requires no grass cutting, no watering, and is economical.

Here is part of what Mr. J. Winston Neely of Hartsville, S. C., had to say to Mr. E. C. Turner of the Extension Service about winterlawn grass spray.

“We applied the material as per directions . . . on Zoysia matrella. There was a heavy growth of grass but we got a very good coverage. A few days after the spray was applied, we had a heavy rain, but there was no evidence of leaching. Many interested people saw the sprayed grass, and everyone agreed that the material was practical. Some thought that a slightly darker green would look more natural.

“The sprayed grass held its color until the natural green from new growth appeared in the spring . . . There was absolutely no damage from using the color and shortly after growth started in the spring, the colored area and the surrounding area looked exactly alike. We are satisfied with the color . . . and plan to spray our entire lawn this fall . . .”

This is the same material that was recently used on the turf in the football stadium here for Clemson's Homecoming. Some people made the comment that it didn't last. Well, the grass itself didn't last, therefore only the bare ground was left shining. Several people in the Clemson area is giving it a more thorough testing this winter.

And ladies — not a trace of color escapes. You can walk right through the grass after it has been sprayed and no trace of color will soil your shoes. Children can play on it — it's absolutely safe.

To apply, stir the liquid winterlawn concentrate thoroughly and mix one part with five parts clear tap water, and stir again. Use it in a hand or power type spray after you have adjusted the nozzle for a fine mist. One gallon of the diluted spray should cover approximately 300 square feet.

The grass must be in the dormant stage after killing frost before spraying. The grass must be dry. The grass must also have two (2) hours drying time before being wet if coverage is to be satisfactory. You should before application, mow and rake the grass and remove all trash such as leaves, twigs, etc., if best results are to be obtained.

GEORGE M. ARMSTRONG

(Continued from page 11)

Academy of Science, Acaemia, Phi Kappa Phi, and Alpha Zeta. He has served as Chairman of the Southern Section American Phytopath Society, Chairman Cotton Diseases Council, Chairman Tobacco Workers Conference, and President of the South Carolina Academy of Science.
SOIL TESTING
(Continued from page 3)
When sending in soil samples for testing, the farmer should take the samples according to printed instructions found on the soil carton. These cartons may be obtained free of charge at any County Agent’s office in the State. For identification of samples, the sample carton has space provided for the sender’s name, address, and field number. The sender of the soil samples is also requested to fill out an information blank listing the case history of the areas sampled as regard to crops to be grown, and any known problems existing on these areas. This case history is quite necessary for the soil specialist when reviewing the soil test report and making written recommendations to the farmer concerning his lime and fertilizer requirements. The soil test report and recommendations go to the farmer direct or to the agricultural agency assisting him with his soil problems on location.

The flame photometer is a sensitive instrument in the determination of potassium and other basic cations.

Tests made on samples submitted to the laboratory include pH, lime requirement, phosphorus, and potassium. On special sample and conditions requiring it, tests are made for magnesium, nitrate nitrogen, and soluble salts. These tests are made in a modern laboratory by well trained technicians using facilities equivalent to those found in the better equipped soil research laboratories.

Dr. Allbrttten stated, “For years various individuals have assigned a wide range of values to soil testing—from a psychological extension tool, to a single value soil management cure-all. The proper place of soil testing is doubtless near the center of these two extremes. There is good evidence that the competent use of soil tests can make a valuable contribution to the more intelligent management of the soil.”

JUDGING TEAM
(Continued from page 7)
and then moved to Chicago, arriving about noon on Thanksgiving Day. The weather in the “Windy City” was chilly, and it took us a while to get used to it. We got our hotel rooms and then rested for a while. That night we went to the Conrad Hilton Hotel to see the ice show. Friday some of us went to the Museum of Natural History and saw the animals, birds, reptiles, and many other interesting things in the building. Friday night we went to bed early so that we could rest for the big day ahead of us. We were up early Saturday morning because we had to be at the stockyards at eight o’clock for the contest. At the stockyards they have an enormous arena in which the exposition is held. This is where the contest between college teams in the United States and Canada is held. The contest took all day and that night I was ready for a movie to settle my nerves. Sunday at lunch they had the banquet in the Stockyards Inn, a hotel at the stockyards. There were several well known men that gave speeches, such as "Dad" Weber of Kansas State. He has judged the steer show there at

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JANUARY 1957
WHY GROW DWARFS?
(Continued from page 12)

CHERRIES
Sweet cherry varieties may be dwarfed by the use of the common Mahaleb cherry and sour cherry rootstocks. When the Mahaleb stock is used, the Mahaleb seedling should be allowed to reach a height of 26 inches before being top-worked with the sweet cherry variety. This long Mahaleb stem exerts a satisfactory dwarfing effect, whereas a short Mahaleb stem shows practically no dwarfing effect.

For sour cherries, the Stockton Morello and western Sand Cherry rootstocks may be used. Sour cherries do not unite readily with Western Sand Cherry stocks. The sour cherry tree using Stockton Morello rootstock has a great overgrowth at the union, but it is nevertheless very strong.

APPLIES
Apples are the easiest fruit to dwarf. The reason for this is that superior dwarfing rootstocks have been developed, largely as the result of one experiment station—the East Malling Research Station in Kent, England. This station has developed many apple rootstocks and has assigned them the numbers by which they are known. At the present they have released a series of 16 rootstocks, Malling I through Malling XVI. These rootstocks vary from the extremely dwarfing Malling IX to the Malling XVI, which produces a tree slightly smaller than standard size. An outstanding feature of this series is that any rootstock is compatible with any variety of apples. This versatility of Malling rootstocks explains why so many commercial plantings of dwarf and semi-dwarf trees are now being made.

Some of the Malling rootstocks are superior to others, so only the most important ones will be mentioned.

Malling I produces a semi-dwarf tree about three-fourths as large as the standard size. It is adapted to dry, thin soils.

Malling II produces a semi-dwarf tree which is slightly smaller than Malling I and about two-thirds of standard size. This rootstock prefers fertile, well-drained soils.

Malling VII is even more dwarfing, producing a tree about one-half standard size. This tree reaches a height of about 10 or 12 feet.

Malling IX is the most dwarfing of all apple rootstocks. It is about one-fourth the size of standard trees, and reaches a height of about six or eight feet. A mature tree on Malling IX stock produces about a bushel of fruit. This rootstock is the one best adapted for home gardens and trained ornamentals. It has a very limited commercial use.

Malling XII is a promising semi-dwarf rootstock which prefers wet soils. It is also adapted to early-bearing varieties.

Malling XVI produces a tree which is slightly smaller than standard size. This rootstock may become more important in the future.

In the last several years a new series of rootstocks which are superior to the Malling series have been developed. These rootstocks were developed by the John Innes Horticultural Institution at Merton, England in cooperation with the East Malling Research Station. This series has been given the name Malling-Merton (abbreviated MM), and consists of crosses between various rootstocks of the Malling series and the Northern Spy variety. Various rootstocks in this series are superior to Malling rootstocks in that they are more productive and have better anchorage. All rootstocks in the Malling-Merton series have a resistance to the wooly aphid.

There are 26 rootstocks in this series (numbered MM 101 to MM 115). The outstanding individuals in this series are discussed below.

MM 104 is a cross between Malling 11 and Northwestern Spy. Trees on this rootstock are very heavy producers and are superbly anchored. Trees are semi-dwarf size.

MM 106 is a cross between Malling I and Northern Spy. It is superior to Malling VII, which it most nearly resembles. It is well adapted to dry sandy soils.

MM 109 is a cross between Spy and Malling II. It is superior to ducer and is more resistant to drou Malling II in that it is a heavier producer and is more resistant to drought.

MM 111 is a cross between Northern Spy and Merton 793. The latter parent is a cross between Malling II and Northern Spy. MM 111 is comparable to Malling II in size, but it is a much heavier producer and is easier to propagate.

Since this series is comparatively new, these rootstocks are not readily available, but will undoubtedly be used extensively in the future.

Another new type of dwarf apple tree is the Clark Dwarf, which was introduced in Iowa. The Clark Dwarf is of semi-dwarf size, but it does not have a dwarfing rootstock. The ordinary standard apple rootstock is used, but a piece of Malling VIII wood is inserted between the rootstock and the scion of the desired variety. This intermediate wood gives a dwarfing effect. There has been some evidence that the Clark Dwarf is incompatible with the Stayman variety.

Another dwarfing method is the Harvest System, in which a ring of sap wood (phloem) is inverted to give the tree its dwarfing effect.

PEARS
Peas are dwarfed almost exclusively by the use of quince rootstocks. For a long time the various strains of quince rootstocks were badly mixed and hard to identify. The East Malling Research Station undertook the job of separating and naming these strains. They found three distinct types and named them Malling A, B, C. Malling A has been found to be superior to the Malling B rootstock. Malling C dwarfs the scion too severely for climatic conditions in this country.

Many varieties of pears (including Bartlett) are incompatible with quince. This problem can be overcome by using double-worked trees. Wood from some completely compatible variety such as Beurre Hardy should be used between the quince rootstocks and the incompatible scions.

All pears on quince rootstocks have a better flavor and texture, and are larger than standard pears.

Dwarf fruit trees have a definite place in the home garden, and, in the case of apples, in the commercial orchard. At the present there are several experiment stations working to develop new and better dwarfs—the future of the dwarf fruit tree is bright.

JUDGING TEAM
(Continued from page 15)

the International for many years. Monday there was a tour of the Armour plant in store for us. They showed the assembly line for slaughtering hogs on which they slaughtered 1100 hogs an hour. Tuesday morning we left for home and arrived at Clemson late Wednesday afternoon.
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