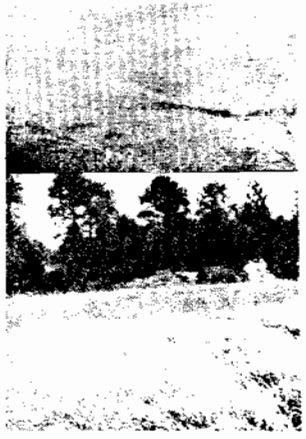
Soil Science Society of

NORTH CAROLINA



A Summary of

FIRST ANNUAL MEETING

VOLUME I, PROCEEDINGS

1958

A. *Officers—1958*

J. F. Lutz, Pres.

Forrest Steele, V. Pres.

W. C. White, Sec.-Treas.

J. W. Fitts)
K. J. Shaw) Members of Ex. Comm.

B. Committees

1. Program

J. W. Fitts, Chm.

W. M. Atkinson

S. N. Carroll

E. B. Garrett

E. J. Kamprath

2. Constitution & By laws

Forrest Steele, Chm.

E. F. Goldston

Leroy Jackson

3. Membership & Publicity

W. C. White, Chm.

C. L. Hunt

N. L. Sugg

J. F. Doggett

4. Publications

W. W. Woodhouse, Chm.

C. C. Abernathy

N. T. Coleman

C. S. Mintz

L. D. Veach

Soil Science Society of North Carolina

A Summary of

FIRST ANNUAL MEETING

VOLUME I, PROCEEDINGS

1958

A History of the Organization of the Soil Science Society of North Carolina

During the period from 1951 to 1957 at least five conferences, primarily concerned with soils, were held at State College. All of these indicated that there was need for an organization dealing with soils. At a Land Management Conference held in June, 1957, Dr. J. F. Lutz suggested that consideration might be given to the organization of such a society. After some discussion, the group decided that it was worth investigating and appointed a committee consisting of Dr. Lutz as Chairman with Mr. J. B. Watts of the Soil Conservation Service and Dr. W. C. White, Extension Soils Specialist, as the other members. This committee obtained information from Mr. L. G. Monthey, Executive Secretary of the National Society, and from the state soil science societies in Georgia, Florida and Mississippi. After receiving this information, the committee met and recommended that a meeting be called to consider whether or not we should organize. This meeting was held on October 5, 1957. After discussion for about one and one-half hours, we organized the Soil Science Society of North Carolina. Dr. Lutz was elected temporary chairman and Mr. Forrest Steele, of the Soil Conservation Service, was elected temporary secretary-treasurer. Subsequently, Dr. Lutz appointed the necessary committees.

The first annual meeting was held on May 22 and 23, 1958 and was attended by approximately one hundred and fifty persons representing ten states, the District of Columbia, Ghana, and Peru.

At that meeting, the constitution and bylaws were approved and officers elected in accordance with them.

At the first meeting of the executive committee on July 28, 1958, Dr. W. C. White was appointed Secretary-Treasurer.

At the first meeting, a one and one-half day program was held with a one-half day field trip on the afternoon of the second day. On the evening of May 22, Dr. B. T. Shaw, Chief of the Agricultural Research Service of the U. S. Department of Agriculture, delivered the address at the banquet.

The Soil Science Society of North Carolina Constitution

ARTICLE I

Name

The name of this organization shall be the "Soil Science Society of North Carolina".

ARTICLE II

Objectives

The principal objectives of this Society shall be to increase and disseminate knowledge of the soils of the State and their uses, and to provide a medium for the exchange of information concerning soils, gained from research and experience, among those interested in soil science and related subjects in North Carolina.

ARTICLE III

Membership

Any person or organization interested in the objectives of the Society shall be eligible to membership in the Society.

ARTICLE IV

Officers

The officers of the Society shall be a President, a Vice-President, and a Secretary-Treasurer. There shall be an Executive Committee, consisting of the President of the Society (Chairman), the Vice-President, the Secretary-Treasurer, after appointment, the most recent past president, and two members at large to be elected by the Society; one of whom shall be a representative of industrial, commercial or farmer organizations; and one of whom shall be a representative of educational or governmental agencies.

ARTICLE V

Election of Officers

The President, Vice-President and the two members at large of the Executive Committee shall be elected by ballot at the annual meeting of the Society. The President shall appoint a nominating committee of three members in advance of the annual meeting. This committee shall nominate at least two candidates each for the offices of President and Vice-President, and for the elective positions on the Executive Committee. Other nominations may be made from the floor. The term of office for President and Secretary-Treasurer shall be for one year. The elected members of the Executive Committee shall serve for two years with terms of office expiring in alternate years. The Secretary-Treasurer shall be appointed by the Executive Committee.

ARTICLE VI

Duties of Officers

Section 1. The duties of the President, Vice-President and Secretary-Treasurer shall be those which usually pertain to such offices of similar organizations. The President shall be the Executive Officer of the Society. He shall preside over the meetings of the Society and its Executive Committee. He shall be responsible for the arrangement of the programs of the Society with the help of the Executive Committee and such other assistance as he may

appoint or request. He shall appoint such committees as may be deemed advisable by the Executive Committee, or as may be requested or directed from the floor by majority vote. He shall continue to serve on the Executive Committee of the Society for one year following his retirement from the presidency.

Section 2. The Vice-President shall act for the President in his absence and otherwise assist him with the duties of that office.

Section 3. The Secretary-Treasurer shall keep the minutes of all regular meetings and the financial records of the Society.

He shall pay the bills of the Society, following the approval of the President. He shall act as Secretary of the Executive Committee.

Section 4. The Executive Committee shall outline the program of activities and formulate the policies of the Society. It shall recommend functional committees for appointment. It shall act on all matters arising between the regular meeting of the Society, and is empowered to fill any vacancies that may occur on the Executive Committee until the next regular meeting of the Society.

ARTICLE VII

Dues and Expenses

Annual membership dues shall be assessed and collected as provided for in the by-laws of the Society.

ARTICLE VIII

Amendments

This constitution may be amended by a two-thirds (2/3) vote of the members present at an annual meeting, provided such amendments have first been presented to the Executive Committee for consideration not less than sixty (60) days before the annual meeting. Amendments to be voted upon at an annual meeting shall be made known to the membership in writing at least thirty (30) days before the meeting.

ARTICLE IX

By-Laws

Any meeting of the Society may establish or modify such by-laws as are necessary to insure proper functioning of the organization, provided they do not conflict with the Constitution. A two-thirds (2/3) majority of those voting is necessary to amend the by-laws. Any proposed change in the by-law pertaining to dues (Article III of the by-laws), or assessments shall be made known to the membership in writing at least 30 days before the meeting at which it is to be voted upon.

By-Laws

ARTICLE I

Meetings

The Society shall hold an annual meeting at a time and place determined by the Executive Committee. Other meetings, conferences or tours may be arranged by the Executive Committee.

ARTICLE II

Order of Business

The order of business for the Society at its annual meeting shall be as follows: (1) Approval of the minutes of the last meeting, (2) Report of the President, (3) Report of the Secretary-Treasurer, (4) Election of officers, (5) General Business, and (6) Adjournment.

ARTICLE III

Dues

The annual dues of the Society shall be two dollars ($2.00). Any member in arrears for dues shall be notified by the Secretary-Treasurer. If the member fails to pay dues within three (3) months following notification, he shall be dropped from the roll of the Society.

SUMMARY OF PAPERS

Crop Residues and Availability of Soil Nitrogen

(A summary and review)

W. V. BARTHOLOMEW

(1) Nitrogen is retained in organic form in crop residues during the decomposition processes. This nitrogen tie up results from the extensive production of microbial cells which develop in the decay process.

(2) Similar amounts of nitrogen are retained by most common crop residues. The amounts tied up after a few weeks of decomposition range from 20 to 30 pounds of nitrogen per ton of original residue.

(3) Adding additional inorganic nitrogen to the residue during decomposition has little or no effect either on the course of decomposition or on the amount of nitrogen tied up. The popular theory that nitrogen saves carbon in the decomposition processes and that nitrogen hastens decomposition has been grossly exaggerated. Fertilization of crop residues with nitrogen is seldom, if ever, warranted except in the production of compost.

(4) The influence of crop residues on the soil nitrogen supply come early in the decomposition process. The influence of one crop residue is seldom large enough to be measured in a second cropping season. The supposition that crop residues can be used to provide a slow steady supply of available nitrogen to a crop is largely untenable. High nitrogen residues, such as legumes, would have had their major effect in supplying nitrogen after 3 to 4 weeks of decomposition. Only very very slow liberation of nitrogen would occur after this time.

Low nitrogen residue would not furnish any measurable available nitrogen to a growing crop during the first few years of decomposition.

(5) Such common soil management factors as cropping sequences, clean fallow, plowing, subsurface tillage, time of tillage operations and the use of cover crops and green manures influence crop production largely through their influence upon the soil nitrogen supply. A working knowledge of the principles governing biological tie up and release of nitrogen permits considerable control over the soil supply of available nitrogen and a much better use of our soil nitrogen resources.

Note—copies available on request.

Modern Soil Physics and its Applications in North Carolina

C. H. M. VAN BAVEL

(Abstract)

Modern instrumentation and more sophisticated theory are leading to an understanding of the disposition of the energy of solar radiation. In general, the energy heats the soil, heats the air, and changes the state of water from liquid to gas (evaporation).

Annual total net radiation at Raleigh (over grass) is about 63 kilocalories per square centimeter, as measured with net radiometers. Some 80 per cent of this is used for evaporation, provided water is available, leading to a value for annual evaporation of 34 inches of water. The remaining 20 per cent is used in heating soil and air, the former accounting for about 15 per cent of the incident energy.

Soil temperatures change in response to the energy supplied by solar radiation, such changes being controlled in large part by soil properties which affect thermal diffusivity. That is, it is necessary to know something about heat flow through the soil to know how temperature will change in response to the energy received at the surface.

Application of the energy balance approach to estimate evapotranspiration, in order to determine drought incidence and irrigation needs, has been most successful. Information on the reduction of evaporation when soil water is removed progressively is needed.

The movement of water in unsaturated soil recently has received satisfactory theoretical and experimental treatment. In North Carolina, two situations involving water flow through unsaturated soils are of great interest. They are, the drying of bare soil, and the upward flow of water from a water table. The former can be treated satisfactorily, but this has not been done to date. The latter has been successfully analyzed, and satisfactory means for measuring the permeabilities of unsaturated soils have been devised. It turns out that for a constant rate of evapotranspiration of 0.1 inch per day, the water table must be no more than 4 inches below the root zone. For greater water table depths, the rate of evapotranspiration falls rapidly, with water supplied to the root zone at the rate of only 0.01 inches per day when the water table is 20 inches below the area of rooting.

It is pointed out that important advances have been made in theories relating to energy balance and water movement in soils, and that excellent tools are available for measuring soil physical characteristics. By applying climatological and analytical advances in soil physics, we can expect great strides in efficient use of fertilizer.

Effect of Soil Fumigation on Nitrification and the Response of Tobacco to Certain Forms of Nitrogen

C. B. McCANTS

The production of crop plants envolves the application of a number of separate but interdependent practices. Because of this relationship, a given practice may accomplish not only the purpose for which it is specifically applied but also may influence the response to other practices.

Within recent years the use of soil fumigants to aid in the control of nematodes in soils used for tobacco has become a widespread practice. Many of the chemicals that are used as soil fumigants are not only toxic to pathogenic organisms, such as nematodes but also may affect organisms which have a beneficial influence on plant growth, for example, the bacteria that convert nitrogen from the ammonium to the nitrate form (nitrifiers).

It has been shown by others that the growth and, consequently, the yield of tobacco is frequently less when the plant absorbs principally ammonium nitrogen than when it absorbs principally nitrate nitrogen. When the nitrifiers are active, however, ammonium nitrogen in the soil is converted to nitrate nitrogen sufficiently rapid to prevent absorption of ammonium nitrogen in quantities that have a measurable effect in reducing growth. Under normal soil conditions, therefore, little or no difference has been found between the effects of the different forms of nitrogen on the yield and quality factors of flue-cured tobacco. If the activity of the nitrifiers is reduced, however, as might occur through the use of soil fumigants, then a difference in the effects from the use of ammonium compared with nitrate nitrogen might occur.

Field and laboratory experiments have been conducted to study the effects of some of the soil fumigation materials on the activity of the nitrifiers. Results from these experiments show that all of the fumigants used reduced the rate at which ammonium nitrogen was converted to nitrate nitrogen. Methyl bromide and Shell DD reduced the rate of conversion more than did Dowfume W-85.

In field experiments, fertilizer mixtures in which the nitrogen was either all-ammonium, all-nitrate or equal parts ammonium and nitrate were applied in conjunction with the following fumigation treatments: not-fumigated, Dowfume W-85, Shell DD and methyl bromide. The yield and quality index of tobacco from the Shell DD and methyl bromide fumigation treatments increased as the percentage of nitrate nitrogen in the fertilizer increased. With Dowfume W-85 the highest yield was from the mixture of ammonium and nitrate nitrogen. There were no differences in yield or quality among nitrogen treatments on soil not fumigated. For all of the fumigation treatments the percentage nitrogen and percentage nicotine in the cured leaf were higher where ammonium nitrogen than where nitrate nitrogen was applied.

The results from these experiments strongly suggest the necessity of having some nitrate nitrogen in tobacco fertilizers that are to be used on fumigated soils. Additional experiments will be conducted to verify these results and to provide information for determining the minimum percentage of nitrate nitrogen which should be included in tobacco fertilizers.

For further information on the details and specific data from the experiments reported here, consult the following publication: McCants, C. B., Skogley, E. O. and Woltz, W. G. Influence of certain soil fumigation treatments on the response of tobacco to ammonium and nitrate forms of nitrogen. Soil Sci. Soc. Amer. Proc. 1959 (In Press).

Farmer Attitudes Toward the Use of Fertilizers

S. L. TISDALE

Results of a nationwide survey on farmer attitudes toward the use of fertilizer, sponsored by the National Plant Food Institute, were presented by means of slides and charts. Sources of fertilizer information, farmers' attitudes toward different sources and factors influencing farmer acceptance of fertilizer practices were all discussed.

Further information on this topic can be obtained from the National Plant Food Institute, Washington, D. C.

Mulch Farming to Conserve Soil and Water

J. T. McALISTER

Methods developed on farms of soil conservation district cooperators in the grain-soybean growing areas of South Carolina and Georgia are described. These have the objective of developing and adapting farm equipment to plant soybeans without burning small grain residues and without previous land preparation. Suitable planting and cultivation equipment and procedures are described. Soybean yields using these methods have been found to be equal to or above those obtained by established practice. This proposed system offers economy of time during planting, equal or better yields plus marked soil protection and water retention advantages. Increasing farmer acceptance is predicted.

Note—See Mulch Farming to Conserve Soil and Water by J. T. McAlister, U. S. Dept. of Agriculture Soil Conservation Service, Orangeburg, S. C.

Subsoiling North Carolina Soils

(Summary)

S. B. WEED

The question of increasing crop yields through more effective utilization of the subsoil is of continuing and growing interest both to soil scientists and to operating farmers. New fertilization and cropping practices, new crop varieties, and better pest control mean that soil physical properties are

probably greater factors in limiting yields today than ever before. It is natural that considerable thought, both on the research and on the practicing levels, should be given to the problem of increasing root exploitation of the soil volume, thus, hopefully, increasing the amount of water and nutrients available for use by growing plants.

Subsoiling is by no means a new approach to the problem of increasing root penetration and available moisture supply. Considerable work in this research area has been conducted in this country during the past 75 years. However, experimentation has failed to show a superiority of subsoiling as a general practice over ordinary tillage methods. This does not mean that subsoiling can never be of value in increasing root penetration of the soil. However, negative results do imply at least one of several possibilities: Something in addition to a dense subsoil was limiting root penetration and yields, or the treatment used to remedy the physical barrier was not ameliorating the problem. For example, if the subsoil in question was very acid, in addition to being compact, subsoiling alone would probably not have much effect in enabling roots to penetrate deep into the soil. Subsoil acidity would also have to be corrected. For this reason, reports of negative results far exceed positive results of subsoiling experiments. However, occasional positive results are reported. Such results usually are obtained from tillage treatments which shatter induced or brittle pans.

Perhaps the major difficulty in interpretation of reports of deep tillage experiments has been the frequent failure to identify the soil conditions being treated and also the effect of treatment on soil properties. Also, though many reports indicate improved root development and penetration as a result of subsoiling, this greater root development is not always reflected in increased yields. Thus, it seems that a consideration of the value of subsoiling to improve crop yields must include the questions of whether impeded root development is actually limiting yields in the soil under test; whether greater root penetration would actually result in greater moisture and nutrient uptake and subsequent increased yields; whether the treatment imposed is actually effective in ameliorating the condition thought to be inhibiting root development.

Several studies have been conducted in North Carolina to determine the advisability of subsoiling though no investigations over extended periods have been carried out. Results of these studies bear out the ideas presented above, that inhibited root penetration of the subsoil may result from several factors, including compacted or dense soil horizons. Thus, subsoiling alone has resulted in increased yield only when a compact or dense soil horizon was the most limiting factor involved, and only when the treatment imposed was sufficient to destroy or drastically alter this layer. Additional work is currently being planned to study the effect of physically and chemically altering the subsoil on root penetration, subsoil moisture utilization, and crop yield.

Fertilizing Coastal Bermuda and Sericea for Optimum Production

W. W. WOODHOUSE, JR.

Two experiments initiated in Lee County, N. C. in 1954 on Eustis sand were reported by means of slides and charts. Coastal Bermuda responded to N, P, K and lime. Split applications totaling 100 to 200 lbs. of N per acre per year produced increases of 40 to 50 lbs. of hay per lb. of N applied and apparent nitrogen recoveries of about 60%. The 100 to 200 lb. rates appear to be the most practical on this soil. Response was evident up to 400 lbs. but leveled off between 400 and 600. Around 25 ppm of soluble P and 0.1 me of exchangeable K seem to be adequate thus far. Growth was severely limited at lower levels of P and K. Sericea reacted sharply to P, K and lime but not to N. This plant appears to require about the same level of available P and K as Coastal Bermuda, but to be more sensitive to lime.

Note—This material will be available shortly as a N. C. Experiment Station progress report.

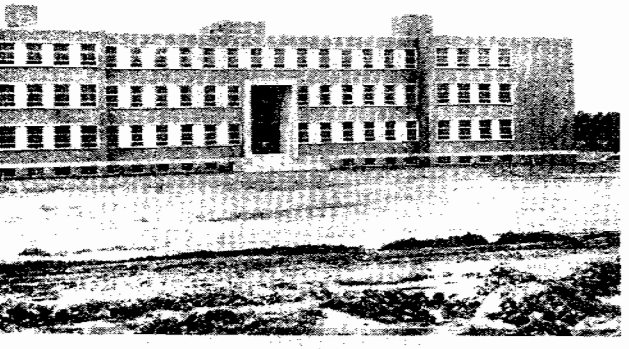
CHARTER MEMBERS

Soil Science Society of North Carolina

— 1958 —

Charles C. Abernathy, N. C.
William M. Atkinson, N. C.
Louis E. Auil, N. C.
E. L. Baenen, N. C.
Bruce L. Baird, N. C.
Henry O. Barger, N. C.
Jack Barnett, N. C.
William L. Barnhill, N. C.
W. V. Bartholomew, N. C.
Aaron Baxter, N. C.
Frank E. Boyd, Alabama
Edward L. Brady, N. C.
Edward O. Brewer, N. C.
T. F. Bridges, N. C.
James M. Brown, N. C.
Robert M. Brown, N. C.
J. W. Burdette, S. C.
H. Bruce Butler, N. C.
Stephen N. Carroll, N. C.
Joel W. Cawthorn, N. C.
N. T. Coleman, N. C.
Emerson R. Collins, N. C.
Joe P. Covington, N. C.
Doris L. Craig, N. C.
Lawrence D. Curle, N. C.
J. Frank Doggett, N. C.
Buck Edmunds, N. C.
A. C. Edwards, N. C.
V. D. Estes, N. C.
L. L. Ferrell, Jr. N. C.
J. W. Fitts, N. C.
C. C. Flowers, N. C.
E. Y. Floyd, N. C.
Homer C. Folks, N. C.
J. Rupert Fulton, N. C.
Matthew J. Gilbert, N. C.
Vern H. Gledhill, N. C.
E. F. Goldston, N. C.
J. W. Grant, N. C.
Andrew J. Ham, Virginia
Donald G. Harris, N. C.
Sam H. Hearn, N. C.
S. J. Hodges, N. C.
Robert E. Horton, N. C.
Charles L. Hunt, N. C.
Arvel H. Hunter, N. C.
C. F. Ireland, N. C.
Leroy Jackson, N. C.
Van S. Jenkins, N. C.
S. P. Jones, N. C.
George Kalteissen, New York
Eugene J. Kamprath, N. C.
Edwin H. Karnowski, N. C.
Myron M. Keim, Virginia
Kenneth R. Keller, N. C.
Jack M. King, N. C.
Russell J. Lewis, N. C.
J. Fulton Lutz, N. C.
Charles B. McCants, N. C.
Gerald D. McCart, N. C.
Robert E. McCollum, N. C.
Clifford M. McCracken, N. C.
Ralph J. McCracken, N. C.
R. B. McNab, Tennessee
John A. Meadow, N. C.
C. S. Mintz, N. C.
James B. Newman, N. C.
William J. Page, N. C.
W. H. Parker, N. C.
John E. Piland, N. C.
R. Clyde Pleasants, N. C.
J. J. Pointer, Virginia
John E. Pollock, N. C.
John Ragland, N. C.

William H. Rankin, N. C.
Preston H. Reid, N. C.
John L. Reitzel, N. C.
Wayland W. Rennie, Delaware
John R. Rice, Virginia
William J. Richardson, Virginia
John Ritter, N. C.
Gordon H. Roberson, N. C.
J. E. Sedberry, Jr., N. C.
K. J. Shaw, N. C.
Frank P. Shields, N. C.
William I. Shope, N. C.
L. J. Slusher, Florida
Fred C. Stallings, N. C.
O. H. Stanard, N. C.
Forrest Steele, N. C.
N. S. Stokes, N. C.
Norfleet L. Sugg, N. C.
A. Roy Tilley, N. C.
Samuel L. Tisdale, Georgia
John W. Turpin, N. C.
C. H. M. Van Bavel, N. C.
Lloyd D. Veach, N. C.
Alexander H. Veazey, N. C.
Earl S. Warrick, N. C.
John Baxter Watts, N. C.
Arlin Weaver, N. C.
Sterling B. Weed, N. C.
Dick Weise, N. C.
Charles D. Welch, N. C.
J. W. White, N. C.
William C. White, N. C.
Charles S. Wilson, N. C.
Irvin M. Wofford, Georgia
W. G. Woltz, N. C.
W. W. Woodhouse, Jr., N. C.
Thomas H. Wright, N. C.
Dan H. Young, N. C.
E. T. York, Jr., Washington, D. C.
J. Lee Zimmerman, N. C.



Soils Science Society of North Carolina

SOILS DEPARTMENT

WILLIAMS HALL

N. C. STATE COLLEGE

RALEIGH, N. C.