AGRICULTURAL EXTENSION SERVICE UNIVERSITY OF CALIFORNIA

SOIL and WATER

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CALIFORNIA STORIE – R. Earl Storie, one of our best known and most productive soil scientists, is shown receiving the Distinguished Service Award of the California Chapter of the Soil Conservation Society of America. Presenting the plaque is Richard W. Call, immediate past president of the California Chapter. In the background at the head table are shown Robert C. Baum, SCSA National Council Member, Santa Barbara County Farm Advisor George E. Goodall, present president of the California Chapter, and Mrs. Goodall.

Aljibury, Ayers, Booher, Branson, Duffin, Krantz, Marsh, Martin, Meyer, Quick, Rible, Rauschkolb, Schulbach, Wildman.

Edited by W. E. Wildman, Extension Soils Specialist, University of California, Davis.

Cooperative Extension Work in Agriculture and Home Economics, U.S. Department of Agriculture, and University of California cooperating

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R. EARL STORIE RECEIVES DISTINGUISHED SERVICE AWARD

At the annual banquet of the California Chapter of the Soil Conservation Society of America at Disneyland on March 26, 1970, R. Earl Storie, Professor Emeritus of the Department of Soils and Plant Nutrition, was presented with a Distinguished Service Award "For outstanding contributions to the art of Soil Science with scientific facts and recommended solutions for land problems in 25 nations of the world."

Although Professor Storie retired from active status with the University nearly 10 years ago, he has remained as active as ever in the field of soil and land classification problems. Just within the last year he has published in Spanish a "Manual de Evaluation de Suelos"; he has studied the relationship between soils and earthquake action in Guatemala and Costa Rica and prepared an article for La Republica newspaper, in San Jose, Costa Rica; and he participated in and prepared notes on Land Resource Areas for a Study Tour of South America covering Peru, Chile, Argentina, Uruguay, Brazil and Venezuela conducted by the Commonwealth Club of California.

The citation accompanying the plaque reads as follows: "R. Earl Storie is retired and lives in Berkeley. Following graduation from the University of California at Berkeley in 1917, he started his employment with the University of California in 1921 as Assistant in Soil Technology. After a varied and interesting career, he retired after 39 years service as a full professor on June 30, 1960. His earliest significant production was the development in 1932 of an Index for Rating the "Agricultural Values of Soils." This is the "Storie Index," of which about 40,000 copies have been distributed throughout the world. As a consultant and general soil advisor he has travelled extensively, studying the soils in 13 foreign countries, and has published 86 works in the field of soil classification, soil geography, land classification and soil evaluation. He has served in a leadership capacity on many of the 11 professional organizations with which he is affiliated and holds several awards and honoraries.

"For his outstanding contributions to the art of Soil science with scientific facts and recommended solutions for land problems in 25 nations of the world, the California Chapter, Soil Conservation Society of America is pleased to present this Distinguished Service Award to Mr. R. Earl Storie."

R. J. Arkley
Dept. of Soils & Plant Nutrition
University of California, Berkeley

THROUGH THE YEARS WITH EARL (RECOLLECTIONS OF TWO FORMER STUDENTS)

Professor R. Earl Storie is well known in many countries of the world for his expertise in soil classification and management. In my opinion, one of his greatest accomplishments was his success in persuading me to enter the field of soil science.

In 1936, I was bogged down in a pre-medical curriculum with quite a few years of study ahead on a diet of beans and hamburger. Professor Storie learned of my experience as a highway civil engineer from his sister-in-law who conducted a play school in which my son was parked. Earl pointed out that there was a need for soils men with field experience, so after some assurance that I could get a real meal ticket in about two years, I followed his advice and switched to a career in soil science.

Ever since that fortunate dialogue in 1936, Professor Storie has been my guiding inspiration and professional advisor.

F. F. Harradine
Dept. of Soils & Plant Nutrition,
UCD

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The markings of career accomplishments are often seen in structures, works of art, and many other tangible things. In the business of education, teachers may mark their careers with books and other publications, but good teachers are also noted for their "academic progeny". There are many here in California, and in many parts of the world, who received from R. Earl Storie, Professor of Soils, now Emeritus, the initial stimulus of interest which has led them into the field of soil and land evaluation, either from personal contact or in class on or off the Berkeley campus.

Until his retirement 10 years ago, aspiring soil scientists enrolling in Earl's course on the Soils of California--Soils 103--soon found themselves the recipients of rapid-fire lectures presenting large amounts of information that they further learned came from Earl's years of observation and study of soils in California and other parts of the world, and from his own keen interest in soils and their relationships to man's economy. The students' next contact usually came during the Summer Field Course in Soils--Soils 105. This course gave visual and tactile experience to support the ideas and information presented in the lecture course, and also helped to collate many facts assimilated from other undergraduate studies in soils. This roving course was piloted by Earl over the California landscape for many years.

Many of the things learned and experiences shared by class members were not recorded in the formal report required of each at the close of the summer course. Many of these things do appear, however, in the confidential, and unofficial, reports prepared by some classes for themselves alone. These reports were limited in number and never widely circulated--seldom even to the instructor! If one became privy to these reports, some of the intangible values gained during Earl's'summer trips'often showed through the humorous jestings found in these annals.

Space would never permit the recounting of the illustrative incidents. One, however, tells of the events of a trip to Glacier Point in Yosemite Park from Merced in 1949. This was one of the very rare days during the course when a regular work schedule had not been planned. It was on this trip that the musical classics "Let Me Call You Yolo", and "Weisenboden" were born.

After a pleasant day of relaxation and enjoyment of scenery, Earl offered and provided refreshments for the whole bus-load at Bear Creek Inn near Mariposa. This was eagerly received and in return, with freshened exuberance, the class composed, on the spot, these deathless ditties to the tunes of "Let Me Call You Sweetheart" and "California"--Berkeley campus version.

During the intervening years, the full lyrics to "Weisenboden" have escaped me, but there linger the phrases -

"and when we dig a hole,
we emulate the mole"
and
"we do it not for glory,
but all for Professor Storie"

Yes, in the doing of it--in digging the holes, in observing the soil properties, in relating these to the use of the land, in trying to determine rational best uses of the land, we may get little glory--but we've learned much from Professor Storie. Thank you, Earl!

G. L. Huntington
Department of Soils & Plant Nutrition
UCD

BURNS JOINS UCB-S&PN

Dr. R. G. Burns has joined the staff at U.C. Berkeley as a Lecturer and Research Soil Microbiologist. He did his B.S. and M.S. work in agricultural botany and soil microbiology at the University of Wales. In 1969 he received his Ph.D. in soil microbiology at the University of London. Before joining the staff at Berkeley, Dr. Burns was doing post-doctorate work at U.C., Davis.

R. J. Arkley

SOIL TEMPERATURE STUDY

Soil temperature is being measured at about 1000 sites in the eleven western States, including 162 in California, at regular time intervals. An immense amount of data has already been collected and is being organized for computer analysis by R. J. Arkley at the Department of Soils and Plant Nutrition in Berkeley. The data collection is being carried on by Soil Servey personnel of the Soil Conservation Service.

This project was initiated by the Committee on Climate in Relation to Soil Classification and Interpretation of the Western Regional Technical Work Planning Conference for Soil Survey. The purpose of the study is to develop methods of predicting soil temperature from air temperature or from location, elevation and other site characteristics. The data will be analyzed by multiple regression statistics, and productive equations will be developed. The resulting estimates of soil temperature will be useful in soil classifications and interpretations with respect to plant growth and soil-vegetation relationships.

R. J. Arkley

VEIHMEYER TUBE A GOOD TEACHING TOOL

(Excerpt from monthly report of San Joaquin County Farm Advisor Ron Baskett).

The Veihmeyer soil tube was used about 20 times in grain fields this month to check soil moisture. It was always with the grower in attendance. Although this instrument is considered by some to be outdated and laborious, it proved to be an excellent teaching method.

Most growers were not aware that their soils had dried down as far as three and four feet. They were also usually amazed that roots of small grains were

found at the three, four and five foot levels. Seeing the undisturbed soil from the soil tube and observing roots in the lower levels, helped make it more convincing to them of the need for irrigation. News articles, newsletters, and just telling people does not have near the effect, so using the soil tube on a farm call is still very effective--even though it is hard work.

Submitted by L. J. Booher

WTC APPROVED BY GOI

The establishment of the Water Technology Center at the Indian Agricultural Research Institute as a part of the Fourth Plan Scheme has been approved by the Government of India. The Water Technology Center, an interdisciplinary all-India facility, headquartered at IARI, will be developed by ICAR in collaboration with the University of California with financial support from Government of India and the Ford Foundation. The concept and project proposal was developed by the University of California personnel working cooperatively with Indian scientists at IARI and other agencies. The two resident representatives of the University of California at present are: Dr. L. D. Doneen and Dr. B. A. Krantz. They were assisted during October and November by Dr. R. M. Hagan.

Dr. Krantz plans to remain in India for five years and will act as the Team Leader for the California group and Associate Project Director of WTC. Dr. Doneen plans to stay two or three years. After the program is underway, it is planned that other University of California staff members will come to Water Technology Center on short-term assignments. The Ford Foundation grant at present is sufficient to cover the salary and expenses of an equivalent of four full-time employees.

B. A. Krantz

DONEEN AND KRANTZ SPEAK AT INDIAN SOCIETY OF SOIL SCIENCE MEETING

Dr. Doneen was the featured speaker at the Water Quality session in a symposium on "Saline and Sodic Soils" at UP Agricultural University, Pantnagar, sponsored by the Indian Society of Soil Science. His subject was "Water Quality in Relation to Irrigated Agriculture."

At the same meeting, Dr. Krantz presented an invitational paper on the subject of "Water Technology Center--An Interdisciplinary Approach to Water Management in India." Doneen and Krantz have given numerous seminars and lectures while visiting various agricultural universities, training centers, and so forth.

B. A. Krantz

DEDICATION OF DFOM AT INDIAN AGRICULTURAL RESEARCH INSTITUTE (IARI)

Bob Pomeroy, the former Superintendent of the West Side Field Station in San Joaquin Valley, went to India in the summer of 1966 with the Rockefeller Foundation as Experiment Station Operation Specialist. Shortly after he arrived in India, Director M. S. Swaminathan of IARI appointed committees to study the possibility of consolidating the farm operations of several divisions into one centralized unit and toward development of an integrated irrigation, drainage, and farm management system at IARI. As a result of the study, a Department of Farm Operations and Management (DFOM) was established. Bob Pomeroy was the moving force and deserves much credit for his efforts. Bob Pomeroy has trained and developed the staff for DFOM which provides for equipment maintenance, irrigation facilities and efficient farm operation for the highly diversified field research program at IARI. DFOM was dedicated by K. L. Rao, the Minister for Irrigation and Power in March 1970.

Although a good start has been made, there is still a large amount of irrigation and drainage development needed, especially in a new 100-acre land area which was recently acquired. This activity will be very useful for training and research programs of WTC. It is planned that Bob Pomeroy will become closely associated with WTC in its future development.

B. A. Krantz

MODIFIED SOD CULTURE

(Reprinted from San Joaquin County Orchard Digest, by Farm Advisors Don Rough and Wally Schreader)

By modified sod culture is meant the mowing or chopping of native vegetation instead of clean cultivation or the planting of a sod crop. There are some weeds such as Bermuda grass or morning glory which make this impossible. These must either be controlled by cultivation or by the use of some chemical.

Modified sod can be used very easily and safely in walnuts, almonds, olives, prunes, and cherries. Peaches and apricots require more care and effort, and you can make fewer mistakes.

The ideal situation is a modified sod between the tree rows and chemical strip spraying down the rows. This can be done in orchards irrigated by sprinklers or strip checks using broad based ridges similar to those in an alfalfa field. Even contour checks can be used. The soil is disced only on the contours prior to ridging up--then these are knocked down before mechanical pickup of nuts.

Some things to remember about modified sod are outlined below.

A. Management

1. Chop covercrop before it gets too woody, and definitely before bloom or heading out.

2. Plan to give the trees an additional 30-40 pounds of actual nitrogen in the spring about mid-April to compensate for the nitrogen tieup by the bacteria that are decomposing the sod residue you've chopped up.

3. Plan on an extra irrigation of 6 to 8 inches of water.

4. Spray chemicals down tree rows to control weeds.

B. Advantages

1. Reduces overall costs of farming.

2. Reduces crown rot and crown gall considerably.

3. Provides a firmer surface for orchard operations after rain or irrigation.

   a. Spraying
   b. Harvesting
   c. Moving sprinkler pipe

4. Increases basic intake rate of water and infiltration.

5. Reduces compaction.

6. Allows for an increase of shallow roots into area of highest nutrient supply.

7. Warmer by 2-3° F. than freshly disced soil.

C. Disadvantages

1. Interferes with temporary furrow or ridge construction.

2. Residues can interfere with ground pickup harvest of nuts if not handled correctly.

3. Fire danger exists but can be minimized with proper management.

4. Tends to encourage gopher population--but easily and cheaply controlled.

5. Allows undesirable weeds to develop at times.

6. Flailing of surface tends to cause surface sealing unless harrowed or chiseled shallow after harvest to break it up.

7. Ground is 1-2° F. cooler than chemically clean or disced and rolled.

8. Dwarfs young trees and should not be used until trees are well established--maybe 4-5 years after planting or more.

Submitted by J. L. Meyer

A NEW PIVOT-TYPE IRRIGATION SYSTEM

Gifford-Hill-Western of Lubbock, Texas has just announced a new pivot-type irrigation system. It has electric motor drive to two rubber-tired wheels at each tower with a wide range of speed control. Not being powered by the water pressure, it can move either backward or forward, with or without water going through the system. It has closer spaced sprinklers than previous systems and apparently somewhat smaller sprinklers as a result. As the need for greater rate of water output increases toward the far end of the line, this is met by increasing the number of sprinklers per unit of length as well as increasing the size of individual sprinklers. The system will still have the inherent problem that bothers all pivot systems, that is the gradually increasing and rather high application rates toward the external and most rapidly moving end of the line. Further information about the system is being sought.

A. W. Marsh

SOME THOUGHTS ON WATER USE

We need to leach!

Question: When is best time to remove harmful salts, but not beneficial nitrogen?

Salts do not tie up in root systems.
Nitrates do tie up in root systems.

We need to leach when leachable nitrate is lowest = when maximum root system is present.

Maximum root system probably occurs at end of growing period--before death of roots at which time roots would still tie up most N. Leaching at this time is not possible! How about soon after harvest, for annual crops, before roots completely dry up? (NO_3 is leachable from dried material but not protein N).

Cover crops help hold N against leaching by winter rainfall.

Early spring irrigations are often unnecessary and will remove nitrates at time of plants most critical need.

We talk of efficiency of irrigation -

Question: If we improve our efficiency of water use are we really accomplishing anything from the standpoint of underground pollution by nitrate (or salts)?

NO! If the only thing our increased efficiency is doing is delaying onset of pollution of underground waters by reducing quantities of water applied. We are never 100% efficient. So, the salt or nitrate load that does percolate downward with the reduced amount of water will be increased in concentration

and the eventual pollution level of the water table may not be greatly changed even though leaching water is reduced.

YES! If by more efficient irrigation, we can hold the fertilizer nitrogen and other plant nutrients in the root zone for longer periods and get increased recovery of nutrients by the plants. The opportunity time for N pick-up is lengthened and the increased water efficiency results in increased N efficiency. Nitrogen is actually removed from the soil-water system.

Improved efficiency in water use will decrease deep percolation losses of N by allowing the growing crop more time to move N from soil and into the crop where it is beneficially used.

R. S. Ayers

SCREENING ORNAMENTALS FOR SALT TOLERANCE

The loss of ornamentals in various parts of California due to salinity has cost homeowners, landscape contractors, park departments, etc., hundreds of thousands, if not several million, dollars. Largely responsible for these losses is the meager amount of information available about the salt tolerance of ornamentals. This situation has led to a trial and error method of selecting plant materials for landscaping saline areas.

New areas continue to be developed where salinity is a problem. This increases the need for expanding the present short list of species that are known to be tolerant to saline conditions. This is the objective of a screening program now underway on the Riverside campus in cooperation with the Department of Agronomy.

Several dozen species of groundcovers, shrubs, and trees will be screened by growing them in solution cultures with increasing salinity levels. Selection of species for study was based on a survey by Lyle Pyeatt; this consisted of (1) observations of southern California coastal plantings in locations where salt problems occur and (2) reports by various authors listing ornamentals believed to be salt tolerant based on observations in saline areas in various parts of the world.

Among the first of the ornamentals to be screened from these lists will be the following:

Botanical Name	Common Name
Alnus oregona	Red Alder
Araucaria heterophylla	Norfolk Island Pine
Atriplex lentiformis	Quail Bush
Carpobrotus chilensis	Ice Plant
Coprosma repens	Mirror Plant
Dodonaea viscosa	Hopseed Bush
Eucalyptus robusta	Swamp Mahogany
Fiscus rubiginosa	Rustyleaf Fig
Juniperus conferta	Shore Juniper
Lagunaria patersoni	Primrose Tree
Leptospermum laevigatum	Australian Tea Tree
Limonium perezii	Sea Lavender
Melaleuca nesophila	Pink Melaleuca
Metrosideros excelsa	New Zealand Christmas Tree
Myoporum laetum	Myoporum
Myoporum "horshum"	Pink flowering prostrate myoporum
Pittosporum crassifolium	
Tamarix aphylla	Athel Tree
Acacia longifolia	Sydney Golden Wattle
Agave americana	Century Plant
Aloe arborescens	Tree Aloe
Armeria maritima	Sea Pink
Casuarina equisetifolia	Horsetail Tree
Cortaderia sellowiana	Pampas Grass
Crassula arborescens	
Eucalyptus ficifolia	Red-flowering Gum
Ficus macrophylla	Moreton Bay Fig
Gazania sp.	Gazania
Juniperus chinensis	Hollywood Juniper
Malaleuca leucadendra	Cajeput Tree
Melia azedarach	China-berry
Muehlenbeckia complexa	Wire Vine
Pelargonium peltatum	Ivy Geranium
Phormium tenax	New Zealand Flax
Pinus halepensis	Aleppo Pine
Portulacaria afra	Purslane Tree
Rhamnus alaternus	Italian Buckthorn

R. L. Branson

PROTECTING THE ENVIRONMENT
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SOILS AND LAND USE

(Welcoming remarks by Ventura County Extension Director B. W. Lee at the Soils and Land Use Planning Conference, Thousand Oaks, California, May 8, 1970)

Science has ushered in the Atomic and Space Age. Man has walked on the moon. Man is now planning, with a degree of confidence, the exploration and landing on other heavenly bodies. These thoughts and plans stir us. They are an index of the strength of human aspiration, imagination, and genius.

But with our Space Age planning, we still live close to the land. Many of us make a living from it. Many others derive pleasure from the recreation it affords. For each of us the land provides living space and is the source of our food, fiber, and shelter.

Land, indeed, is part and parcel of our growth as a nation. As citizens, then, we should know more about the land--our most important non-renewable resource.

Land is many things to many people. To the farm a livelihood; to the townsman a place to build his house; to the child a playground; to the poet a theme; to the patriot a symbol.

Land has much to do with our needs and the way we fulfill them.

Much of our activity we devote to getting the basic items of food, fiber, and shelter; to other items that make life more comfortable (furniture, automobiles, newspapers), and yet to other items that make life more stimulating, such as recreation, movies, and education.

We want many things. It is likely that if we had all that we could list, new wants would arrive tomorrow, and again we would be faced with the problem of how to satisfy them.

Four types of resources are available to each generation:

First, each generation has some legacy of capital goods from the previous generation.

Second, each generation has energy and the ability to do physical labor, to plant, shape, or mold his destiny.

Third, each generation has some ingenuity to plan, direct, and evaluate.

Fourth, all generations have the natural resources and environment.

Our success of providing the highest possible level of living depends on how well we use the four factors of -

1) inherited capital
2) human energy
3) ingenuity
4) natural resources

Some progress in the satisfaction of wants conceivably would be possible without tools inherited from the previous generation.

No progress can be made if no labor is applied, if labor is applied without intelligence, or if natural resources with which to work do not exist. Each of these items can limit the goods produced to satisfy wants.

In time, however, the restrictive effect of many of these limitations can be lessened: Labor can become skilled; tools can be accumulated; better methods of combining labor, tools, and land can be devised; and land can be utilized more fully. But the area of land cannot be increased. Land remains the final restricting factor.

The soil is a more or less continuous body covering the portion of the land surface of the earth upon which plants grow or people live.

Society has its roots in the soil. It is a dynamic society. The signs of change are everywhere.

We see change every day in the growth or decline of communities, building of highways, growth of suburbs, shifting land use, etc., etc., etc.

Back of soil use and land planning for the best interests of the community, back of soil management by the farmer, lies a growing body of scientific knowledge regarding the true nature of the soil.

The scientist working in the field would be the first to say that his knowledge is far from perfect. There is more to be discovered than is presently known. But the practical handling of the soil must rest solidly on what scientific knowledge we do have. It is when men abuse the soil, disregarding its true nature, that they make the most disastrous mistakes.

More research--continuing and thorough research--in the management of soil and land is a vital part of the long-range program. Not only must we learn more about our soil and land, we must encourage the wider dissemination and application of the results of that research.

It is to this end that these conferences have been given. Our program is two-fold. To provide land planners and users with more knowledge about the soil with which they work. How soils are formed, classified, mapped, and interpreted for use. To provide soil scientist with more information about land use planning and how soils information is used to make decisions.

The soil and the land is our most important natural resource. To use it wisely, we must learn all we can about it. We must must understand not only its physical characteristics such as its suitability for various uses, but also its social and economic aspects.

B. W. Lee
Ventura County Farm Advisor

SOLVING POLLUTION PROBLEMS BEFORE THEY START!

Dairy and cattle feedlot operations under some conditions can cause major pollution problems due to percolation of nutrient laden waste waters downward to underground water supplies.

Waste water disposal from processing plants and industry have similar pollution potentials.

Research findings are pointing out that pollution of underground waters need not take place if judgment is used in locating potential polluting enterprises in areas where pollution can be minimized.

For example, nutrient (nitrate) laden waters move rapidly downward through sandy permeable soils and as a result may pollute deep groundwaters. But, if clay (soil) barriers and perched water tables intercept or prevent deep percolation, anaerobic conditions often occur naturally which change the offending nitrate to inactive, nontoxic nitrogen gas, which is no longer a pollutant, and which goes off harmlessly to join the nitrogen in our already 80% nitrogen atmosphere. This nitrogen from the original nitrate is then no longer a pollutant.

Such areas where deep percolation does not occur are widespread throughout the central San Joaquin Valley and other areas. These can readily be mapped,

and in many instances locations are already known. It would seem that some consideration of these soil factors as related to deep percolation of water could be used to advantage in locating industry and agricultural enterprises that in other areas would have a considerable pollution potential. Keep them away from deep friable soils. Encourage location in more suited areas.

Drainage facilities for disposal of drainage waters are also required in such areas as described in order that pollution can truly be controlled.

Planning can prevent or at least minimize pollution.

R. S. Ayers

NEW CURRICULUM IN NATURAL RESOURCES AND ENVIRONMENT AT BERKELEY

A new undergraduate field major entitled "Conservation of Natural Resources" has been established as an interdisciplinary course of study by the College of Agriculture and School of Forestry and Conservation on the Berkeley campus. The curriculum is designed to involve the student with problems of soil and water and other problems dealing with natural resources and environment. The major is quite flexible and permits a wide choice of courses with ecological implications in physical, biological and social sciences. Only a few courses are specifically required; these are designed to bring all of these aspects in clear perspective, using the systems analysis approach.

In addition, a graduate program in "Environmental Studies" is being established with a strong ecological orientation. Five core courses have been proposed covering earth science, biological science, and human, technological and institutional aspects of ecology plus seminars in environmental problems and policy.

Anyone interested in either of these exciting new programs should contact the Office of the Dean, College of Agricultural Sciences, 101 Giannini Hall, Berkeley, California 94720.

BRITISH ECOLOGIST IS REGENTS' PROFESSOR

BERKELEY---A professor from the British Isles who taught ecology in a University in Wales more than 20 years ago will be the Regents' professor at the University of California here during the spring quarter.

He is Dr. R. Elfyn Hughes, director in Wales of the Nature Conservancy. His appointment to the UC Berkeley task was announced today by Dr. John Zivnuska, Dean of the School of Forestry and Conservation, one of four University units sponsoring Dr. Hughes on the campus. The others are the Department of Botany, Department of Geography, and Department of Soils and Plant Nutrition.

His Berkeley work will include seminars in analytical ecology in the sponsoring departments, and consultations with faculty and graduate students, said Dean Zivnuska. Dr. Hughes will have his offices in the School of Forestry and Conservation.

In addition to his role of helping develop the Nature Conservancy program in Wales, the visiting scientist is well-known for his ecological studies at Snowdonia, a mountainous area of northwestern Wales. He has written a number of papers about the area and has a monograph in preparation on "The Ecology of Snowdonia".

A native of Ffestinlog, North Wales, he was graduated from University College, North Wales, where he studied chiefly in the fields of botany, soil science and agriculture. Professor Hughes earned his doctorate from the University in 1946, after his research

was interrupted by World War II. Later, in 1950, he earned a master's degree from Clare College, University of Cambridge.

His first teaching post was at University College, in Bangor, in 1940. From 1944 to 1947 he taught ecology of British vegetation, with particular reference to grasslands. When he became director of the Nature Conservancy, he implemented and developed policies in research and conservation in Wales, including land use applications, establishment and management of nature reserves.

Dr. Hughes was responsible for establishment and design of the Research Station, opened in 1960, at Bangor, and a substation at Aberystwyth.

His honors and achievements include membership as a Fellow in the Royal Statistical Society, British Ecological Society, British Society for Soil Science, international Society for Soil Science, Botanical Society of the British Isles, British Grassland Society, and Agricultural Education Society, and membership on the Committee for Wales of the National Trust.

Dr. Hughes has traveled extensively in the interests of soils, vegetation and land management, and has visited California before. He was granted a Kearney Foundation lectureship in 1959 at the University of California, and participated in seminars on quantitative methods in ecosystem studies at the Berkeley, Los Angeles, and Riverside campuses.

William E. Wildman

Extension Soils Specialist