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Water Current

Millard W. Hall, Director
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Karen E. Stork, Editor
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FROM THE DESK OF THE DIRECTOR . . .

A major shift in the Department of Interior's water research funding for fiscal year 1977 is being shaped in the House and Senate. The proposed change would move a significant portion of Interior's current water research dollars into saline water conversion programs. The research to be discontinued includes the Office of Water Research and Technology's (OWRT) Title II program and encompasses all of the water research related to the mission of Interior.

Last fall the Ford Administration offered a bill (S. 1301) to authorize expanded funding for the OWRT Title II program in FY 1977. Instead, the House is proposing a bill (HR 11559) that would use part of the FY 1977 Title II money originally requested by the administration for saline water conversion projects. Further, $1.25 million in funds originally requested by the President for water resources research would remain unauthorized.

As it now stands, HR 11559 is funded at $9.7 million. However, there are strong indications from the Senate that HR 11559 will not be passed at $9.7 million but that the Senate-House compromise will result in a bill funded at $7.09 million.

It is hoped that the difference between the House bill (HR 11559 at $9.7 million) and the Senate version ($7.09 million) plus other differences, which represent a total of $3.6 million, will be allocated to Section 100 of Title I (annual allotment program) for use by State Water Institutes. This would mean that the Nebraska Institute would receive an allotment of approximately $178,000 for FY 1977, as compared to the current $110,000 figure. This is viewed as a significant opportunity to proceed toward the fully authorized allotment funding of $250,000 per State Institute.

The outlook for OWRT's Title II program in fiscal 1977 is dismal, although there is some hope that the annual allotment program will be increased. There seems to be only the formality left to confirm the fact that the Title II program will receive no funds next year. However, looking beyond that, amendments to the Water Resources Research Act, proposed by Senator Frank Church, D-Idaho, could offer the vehicle for reviving the program. (See further details on this bill under "Federal Highlights.")

It seems appropriate to suggest that now is the time for those having a strong interest in these events to make their feelings known to the appropriate authorities.

ON THE HOMEFRONT

SUMMER INSTITUTE PLANNED

The Nebraska Water Resources Research Institute will once again sponsor a one-week Summer Institute on "Futures Planning--with Special Emphasis on Water, Land and Related Natural Resources," August 9-13, 1976 at the Nebraska Center, University of Nebraska-Lincoln. The program is a short course designed to acquaint planners, decision makers, educators and water resources technicians with state-of-the-art technology for "futures" planning in water and related resources. Various techniques for determining and evaluating alternatives, objectives and goals in "futures" planning (including trend impact analysis, delphi technique, cross-impact analysis, scenario generation, simulation and optimization) will be reviewed and their application illustrated through case studies and workshops. Strengths and weaknesses of each technique will be highlighted and their most effective use in the planning context presented.

The program will be concerned with "futures" planning and will include the following topics: trend extrapolation, trend impact analysis, delphi technique, cross-impact analysis, scenario generation, alternative futures, surrogate-worth-trade-off, optimization and simulation modeling, and case studies.

The staff will include Warren Viessman, Jr., Senior Specialist in Engineering and Public Works, Library of Congress; Warren A. Hall, Professor of Engineering, Colorado State University; Jared L. Cohon, Assistant Professor, Geography and Environmental Engineering, Johns Hopkins University; Lewis D. Walker, Deputy Assistant Director for Planning, Water Resources Council;Gary L. Lewis, Assistant Director, Water Resources Research Institute, University of Nebraska-Lincoln; and Neil W. Morgan, Assistant Professor, Industrial-General Engineering, University of Nebraska at Omaha.

The course fee is $350 before July 15 and $400 thereafter. Special rates will be available for a limited number of academic personnel on a first-come, first-served basis.

For additional information or enrollment forms, contact: Millard W. Hall, Director, Water Resources Research Institute, 310 Ag. Hall, University of Nebraska, Lincoln, Nebraska 68583. Telephone: (402) 472-3305.

RESEARCH TECHNOLOGIST HIRED

The NWRRI is pleased to announce the appointment of Marshall R. Taylor as Research Technologist. Marshall received his B.S. and M.S. degrees in Civil Engineering at Virginia Polytechnic Institute and State University at Blacksburg. His thesis topic was optimization of parameters in flow routing models.

Marshall will initially be working with Gary Lewis, Assistant Director, on a project to develop quantitative planning capability for the Upper Big Blue NRD. He will also be involved in other independent studies and research relative to the design and operation of simulation and screening models and will assemble information for development and testing of simulation and optimization models.

NEW PUBLICATIONS AVAILABLE

The Nebraska Water Resources Research Institute announces the availability of two new publications. The "Proceedings of the Water Resources Seminar on Water Resources Policy" is a compilation of speakers' papers presented at the seminar. Speakers included state, federal and regional agency personnel who discussed a number of the most important legislative acts relating to water resources planning and management in this country and in Nebraska.

Also available is Publication #10, "Water Resources Research in Nebraska--Fourth Edition." This publication briefly describes water-related studies in progress in the state and is intended to broaden the channel of communication between researchers and others interested in the water resources of Nebraska.

Both publications may be ordered from the NWRRI at 310 Ag. Hall, East Campus, University of Nebraska, Lincoln, Nebraska 68583. Telephone: (402) 472-3305.

WATER RESEARCH IN NEBRASKA

ENVIRONMENTAL PROTECTION AGENCY

EPA is currently funding three research projects in the State of Nebraska. They are as follows:

(1) Dr. James D. Carr of the Department of Chemistry, University of Nebraska, has a $15,600 grant for a one-year study on the use of Potassium Ferrate in oxygen demand measurements of organic wastes. The grant award was made in September 1975.

(2) A twelve-month $60,000 EPA contract with the Agricultural Research Service in 1975 calls for a study at the U.S. Meat Animal Research Center, Clay Center, Nebraska to define the contribution of animal waste to non-point surface runoff for use in water pollution models.

(3) A $120,000 one-year contract with the Agricultural Research Service in 1976 calls for development of a manual dealing with the land application of animal wastes and resulting pollution leaving the land to be used by planners who are not trained in agriculture. It is anticipated that some of the work will be done at the University of Nebraska.

U.S. GEOLOGICAL SURVEY

The Nebraska Water Resources Research Institute, in cooperation with the U.S. Geological Survey, is investigating methods of artificial recharge of groundwater in Nebraska. The major effort of the first two years of the project, which is funded primarily by a grant from the Old West Regional Commission, is recharge through wells.

A 48-hour test using an existing irrigation well in Hamilton County, Nebraska, was conducted in late 1975. Over one million gallons of water were pumped from a well near the Platte River, carried a mile through irrigation pipe, and injected into another well. The chemical quality of the water in the two wells is different and the object was to determine if there would be adverse reactions that might tend to plug the well.

No adverse reactions were noted in the short-term test and a long-term test involving construction of wells, a three-mile pipeline and other facilities are being designed. Construction is expected to begin in the summer of 1976.

The ultimate goal of the project is to determine the best design of recharge facilities for different parts of Nebraska and the estimated cost per acre-foot of water recharged.

MRBC ADOPTS PROCESS FOR DEVELOPING MISSOURI BASIN PLAN

The Missouri River Basin Commission (MRBC) has adopted a process designed to produce a comprehensive, coordinated joint plan (CCJP) for water and related land resources of the region. Preparing a plan for the Missouri River Basin is the commission's mandate under the Water Resources Planning Act of 1965.

The CCJP process, as adopted by the commission, calls for completing plans in many of the 29 subregions of the 10-state Missouri River Basin similar to the plan recently completed in the Platte River Basin of Nebraska. The CCJP process was adopted for a period of three years after which time its effectiveness will be evaluated.

A high priority study leading to a subregional plan to be included in the CCJP is currently underway in the Yellowstone River Basin and adjacent coal field areas in Montana, Wyoming and North Dakota.

FEDERAL HIGHLIGHTS

BILL INTRODUCED TO AMEND WATER RESOURCES PLANNING ACT

A bill to amend the Water Resources Planning Act of 1965 and the Water Resources Research Act of 1964 has been introduced by Senators Frank Church, D-Idaho, Mark Hatfield, D-Oregon, and Henry Jackson, D-Washington.

The Water Resources Planning Act (P.L. 89-80) authorized the U.S. Water Resources Council (Title I), river basin commissions (Title II) and water planning grants to the states (Title III). The Water Resources Research Act of 1964 contemplated the creation of water resources research institutes and provided additional grant programs for research and development work related to water and related natural resources.

Senator Church said the most significant changes contained in his bill (S. 3142) to amend the acts are as follows:

(1) The Water Resources Council would be established in the Executive Office of the President and its chairman appointed by the President with the advice and consent of the Senate.

(2) The duties of the council would be significantly expanded and made more explicit. In addition to other duties so specified, the Water Resources Council would advise the President on national matters related to water resources research and planning and on the budgets of all federal water-related agencies; the council would also coordinate the planning activities of the council with other water resources planning bodies and would attempt to assist states by making it possible to consolidate grant applications.

(3) An Office of Water Research would be established within the Water Resources Council to be directed by a deputy director appointed by the President. This amendment would transfer the state water research institute program from the Department of the Interior to a new Water Resources Council.

(4) Increased funding under the grants to states programs would be provided for on a uniform, continuing basis; specifically, the bill would provide $200,000 per state so long as the states match every $2 of federal funds with $1 of state funds.

(5) A non-federal advisory committee would be established to provide greater voice for the states and others interested in council deliberations and decisions.

(6) A strengthened role in the coordination of planning done by various federal water-related agencies would be provided for the river basin commissions.

(7) Accountability requirements placed on the states would be strengthened through the provision that the states undertake the development of comprehensive state water plans.

Senator Church said the bill incorporates most of the major suggestions made by various states, river basin commissions, the Western States Water Council, the Interstate Conference on Water Problems and others.

OMB WANTS "SECTION 80" STUDY REVIEWED AGAIN

After several months of review, the administration's "Section 80" study, which contains recommendations affecting major federal water resources policies, was released by the Executive Office of Management and Budget (OMB). However, the study and recommendations were released only to be returned to the Water Resources Council (WRC) for restudy. OMB wants the states and private sector to shoulder a greater share of the costs of water resources projects than the Council recommends.

In Section 80(c) of the Water Resources Development Act of 1974, Congress directed the administration to undertake this study: "The President shall make a full and complete investigation and study of principles and standards for planning and evaluating water and related resources projects." The study includes consideration of planning objectives, and discount rates for projects, as well as cost sharing.

It seems that OMB officials consider the Council's recommendations on cost sharing to be little different than the current policy under which the federal government subsidizes 90 percent to 100 percent of the initial costs of large-scale water resources projects. Members of the Water Resources Council fear that the non-federal sector will be either unable or unwilling to pay more than they already do for water resources projects, and they have drafted a formal rejection to OMB's recommendation that the Council restudy the Section 80 report.

NATIONAL COMMISSION ON WATER QUALITY SENDS RECOMMENDATIONS TO CONGRESS

The National Commission on Water Quality has completed a three-year study of the Federal Water Pollution Control Act and its final recommendations have been sent to Congress. The Commissioners voted to recommend that Congress consider amendments in 1977 requirements, 1983 goals and requirements, decentralization, federal financial assistance, elimination of the discharge of pollutants, research and development needs, and irrigated agriculture.

The commissioners voted to recommend that Congress consider amendments in the following areas:

> Congress should authorize extensions, and in some cases outright waivers, of the July 1, 1977, secondary treatment requirement for publicly owned treatment works and of the July 1, 1977, best practicable technology requirement for industry.
>
> While retaining the 1983 water quality goal of "fishable/swimmable" waters, Congress should postpone for five to ten years the 1983 requirement of best available technology for industrial dischargers. However, the Commission recommended that effluent limitations to eliminate discharge of toxic pollutants in toxic concentrations be implemented "as soon as possible," but no later than October 1, 1980.

Congress should authorize certification of states for planning and administering the municipal sewage treatment construction grants program and the National Pollutant Discharge Elimination System, once the states meet certain specified criteria.

Congress should assure 75 percent federal financing under the construction grants program of between $5 billion and $10 billion over five to ten years.

Congress should "redefine" the 1985 goal of zero discharge of pollutants to encourage recycling, reuse, land application, and other means of waste management.

Congress should "authorize flexibility" in applying water pollution control measures to irrigated agriculture.

WATER ASSESSMENT AND APPRAISAL GIVEN TOP WRC PRIORITY

The U.S. Water Resources Council (WRC) has given top priority for funding to its water assessment and appraisal program. That program formerly was called the national planning strategy.

WRC Director Warren Farichild said the objective of the program "is to give the executive branch of the federal government, through WRC, an analytical mechanism for the appraisal of existing and proposed water and related land programs.

"From the output of such a program, the council will be in a better position to make sound recommendations to the President and the Congress," Fairchild said.

"It can serve as a guide for them in making allocations of federal resources to meet the critical water requirements of the nation.

"The program builds upon state and regional plans as they compare to a continuing national assessment," Fairchild said.

RIO GRANDE REGION: MORE WATER STORED UNDERGROUND THAN ABOVE

The available water supply for the Rio Grande Region of Colorado, New Mexico, and Texas could be increased tremendously by further development of the estimated 5.8 billion acre-feet (1.9 trillion gallons) of groundwater stored beneath the surface, according to a new report prepared by the U.S. Geological Survey.

The 39-page Rio Grande Region report is the third in a USGS program designed to develop and publish rapid regional assessments of the nation's groundwater resources. Previous assessments covered the Upper Colorado and Ohio River Regions. As they are completed, these assessments will provide the first broad-scale analysis of the quantity and quality of the groundwater resources in each of the nation's 21 water-resources regions.

A USGS scientist explained that "the major use of groundwater throughout the region is for irrigation. For example, 88 percent of the 2.7 million acre-feet (885 billion gallons) of groundwater withdrawn in the region during 1970 was used for the irrigation of crops. About 53 percent of this water was consumed and thus not available for immediate reuse."

The report states "water management planners recognize the close relationship between surface water and groundwater and the need to base hydrologic decisions on detailed information about the physical conditions that control or affect each supply. Our report provides planners with an appraisal of these conditions and summarizes information on the groundwater resources for the Rio Grande Region."

Copies of the report, "Summary Appraisals of the Nation's Groundwater Resources--Rio Grande Region," by S.W. West and W.L. Broadhurst, published as U.S. Geological Survey Professional Paper 813-D, may be purchased at a cost of $1.25 each by prepaid mail order (check or money order payable to the U.S. Geological Survey) from the Branch of Distribution, USGS, 1200 South Eads St., Arlington, Virginia 22202.

CONFERENCES

WRC/ICWP MEETING SCHEDULED

Mr. Warren D. Fairchild, Director of the U.S. Water Resources Council, and Mr. Ray W. Rigby, Chairman of the Interstate Conference on Water Problems (ICWP), have announced that the joint WRC/ICWP meeting will be held in Biloxi, Mississippi from September 7 to 10, 1976, at the Buena Vista Hotel.

The meeting will be attended by many officials with high level responsibilities for water and related land resources planning and management. Attendees will represent the various levels of government--federal, state, local, and regional, as well as Congress and interested private citizens and interest groups. This wide range of interest and participation creates a broad base of experience and perception for the discussion of the major water and related land problems facing our nation today.

Those desiring more information about the joint WRC/ICWP meeting may contact Mr. Jim Fish, Assistant Secretary Treasurer of ICWP, c/o F. Robert Edman and Associates, W-3173 First National Bank Building, St. Paul, Minnesota 55101, telephone (612) 224-5705.

TWELFTH AWRA CONFERENCE

The American Water Resources Association announces its 12th annual conference which will be held September 20-23, 1976 in Chicago, Illinois at the McCormick Inn. General sessions will include water resources planning, metropolitan water resources management, water requirements for energy production, area-wide waste treatment management (208 studies), socio-economic aspects of water resources, and hydrology.

On the 22nd and 23rd, a special symposium will be devoted to "Advances in Groundwater Hydrology". The Symposium will have sessions on salt water intrusion, artificial recharge, mass and energy transport in porous media, groundwater management, interactions of water with rocks, computer modeling techniques, and optimization techniques.

For further information and an advanced program, contact: Dana Rhoads, AWRA Manager, St. Anthony Falls Hydraulic Laboratory, Mississippi River at Third Avenue, S.E., Minneapolis, Minnesota 55414.

PUBLICATIONS

URBAN WATER QUALITY BOOK RELEASED

Urbanization and Water Quality Control edited by William Whipple, Jr. has just been released by the AWRA. The book contains 37 papers by participants at a 1975 symposium on the developing technology for estimating the character and quantities of pollution from urban runoff. It will be of particular interest to those involved in area-wide studies of wastewater management (Sec. 208 studies) but it also contains discussions of the 1972 Act by Warren Fairchild and Ruth Patrick. Papers from Great Britain and France outline efforts in these countries to deal with urban water quality.

The book has 304 pages, 56 tables, 64 figures and is hardbound. Price is $15 ($12 to AWRA members). Copies may be ordered from the AWRA Office, Mississippi River at Third Avenue, S.E., Minneapolis, Minnesota 55414.

GUIDELINES FOR DETERMINING FLOOD FLOW FREQUENCY

The Water Resources Council has announced the publication of Guidelines for Determining Flood Flow Frequency, which is the culmination of several years of work by the Council's Hydrology Committee.

The Guidelines contain procedures for defining flood potentials--peak discharge and exceedance probabilities--for watersheds where systematic records of peak flood flows are available. Utilization of the procedures by the Council's member agencies and States will represent a significant step forward in defining and interpreting flood hazards in the flood plain areas of the nation.

Procedures selected were based upon studies done at the Center for Research in Water Resources of the University of Texas at Austin and on studies by the members of the Council's Hydrology Committee.

Copies of Guidelines for Determining Flood Flow Frequency (Bulletin No. 17) are for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. The stock number is 052-045-00031-2. The price is $3.90.

1975 NATIONAL CONFERENCE ON WATER SUMMARY AVAILABILITY

Mr. Warren D. Fairchild, Director of the U.S. Water Resources Council, has announced the availability of the Summary, 1975 National Conference on Water. Over 200 participants from a wide variety of backgrounds and philosophic viewpoints joined in the Conference. The speakers included then Secretary of Interior Rogers C.B. Morton, and then Secretary of Army Howard Callaway, Secretary of Agriculture Earl Butz and Chairman of the Council on Environmental Quality Russell W. Peterson.

The Summary is a compilation of the conclusions of the eight panel discussions, papers presented at the eight panels, speeches given by the high-ranking officials present, and an executive summary.

Mr. Fairchild indicated that the Council is considering sponsoring another National Conference on Water in 1977. No further details on the projected 1977 Conference are yet available.

The 230 page Summary, National Conference on Water is available through the Superintendent of Documents. Please write: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

The stock number to be used in ordering is 024-001-02798-4. The price is $3.80.

POSITIONS AVAILABLE

ENVIRONMENTAL ENGINEERS/SCIENTISTS

The U.S. Army Corps of Engineers Construction Engineering Research Laboratory (USACERL) is accepting applicants for environmental engineers/scientists for conducting comprehensive long range environmental research in environmental impact analysis, environmental quality management, solid waste, air and water pollution control as related to Army military needs. CERL has excellent laboratory facilities and is affiliated with the University of Illinois, Urbana-Champaign. Salary and position level would depend upon the candidates' qualifications, and appointments will be processed through established Civil service channels.

Selective criteria include the following: (1) The candidate should be a recognized leader in the area of environmental engineering. Such leadership is evident by membership in committees and subcommittees for working groups of professional societies and organizations related to environmental engineering, (2) The candidate should demonstrate current high level research by recent publications in scientifically reviewed journals. (Scientifically reviewed journals are those journals where a team of eminent scientists/engineers approve the articles worthwhile and technically valid prior to their publication.). (3) It is desirable for the candidate to have the academic and technical background required by the National Research Council to guide post doctoral research. (4) It is

desired that the candidate have a minimum of two years of graduate academic training in environmental engineering for the GS 12 position and a minimum of three years of graduate academic training for the GS 13 and GS 14 positions.

Positions with a starting salary at the following levels are being considered: GS 12 - $19,386, GS 13 - $22,906 and GS 14 - $26,861.

For information on technical matters, please write or contact Dr. R.K. Jain (217) 352-6511, P.O. Box 4005, Champaign, Illinois 61820. Interested applicants should submit applications to Ms. Lottie Marven, Chicago District Personnel, 219 South Dearborn Street, Room 504, Chicago, Illinois 60604.

OPENING FOR ASSISTANT PROFESSOR OF CIVIL ENGINEERING

The Civil Engineering Department at the University of Kansas has an opening at the Assistant Professor level for a person qualified in the water resources and water quality area. Candidates should possess the following qualifications: (1) applicant should hold a Ph.D. or a Sc.D. degree in the area of civil engineering or an appropriate allied field of engineering; (2) applicant should be qualified to present course offerings at both the graduate and undergraduate level in the area of water quality management and in at least one of the areas of engineering hydrology, fluid mechanics or water resources systems analysis; (3) applicant should possess some degree of familiarity with both physical and mathematical modeling techniques; and (4) applicant should have primary research interests which are directed toward the application of fluid mechanics and hydrologic principles in the solution of various water quality management problems, such as the management of urban runoff quality or the analysis of the fluid mechanics aspects of water and wastewater treatment facilities.

This is a full-time budgeted position that can lead to tenure within seven years. The closing date for applications is June 15, 1976. The term of appointment is 9 months/year with a salary of $14,000 - $15,000/9 months. The position is to be filled by August 15, 1976.

Interested applicants should send a complete resume, along with the names and addresses of at least three references, to: Dr. Stanley T. Rolfe, Department of Civil Engineering, The University of Kansas, Lawrence, Kansas 66045.

The University of Kansas is an Equal Opportunity Employer.

ASSISTANT PROFESSOR OF WATER RESOURCE MANAGEMENT

Michigan State University, Department of Resource Development, has an opening beginning September 1, 1976 for an Assistant Professor. The position is approximately 75 percent teaching and 25 percent research. June 30, 1976 is the application deadline.

The major duties involved in this position include the following: (1) Teach undergraduate and graduate courses on natural characteristics, management, and policies affecting water resources. An opportunity for developing new courses is offered; (2) Advise undergraduate and graduate students; (3) Develop and conduct research on water quality, water management, and water development alternatives and feasibilities; (4) Work cooperatively with personnel in other water-oriented units within and outside the university; and (5) Possibility of joint appointment with allied departments.

The qualifications desired include: (1) Competence in teaching, research and student advising; (2) Knowledge of relationship between physical aspects of water and other water management concerns including economic, social, legal and policy considerations. (Applied hydrology and/or applied water biology); (3) Formal training and/or experience may be in the physical or biological sciences, but should include theoretical competencies in water resource development, management, and quality; and (4) Formal training in water resource management, water resource development and water quality. (Attainment of a Ph.D. directly related to one or more of the areas indicated from an accredited college or university.)

Salary is commensurate with training, experience, and demonstrated abilities.

Interested applicants should send a brief professional resume to: Dr. Eckhart Dersch, Chairman, Search and Selection Committee, Department of Resource Development, 324 Natural Resources Building, East Lansing, Michigan 48824, Phone - (517) 355-3346.

Michigan State University is an equal opportunity employer.

ASSISTANT PROFESSOR OF AGRICULTURAL AND RESOURCE ECONOMICS

The Department of Agricultural and Resource Economics at the University of Maryland has a July 1, 1976 opening for an Assistant Professor. Qualifications desired include: a Ph.D. in Agricultural Economics, Agricultural and Resource Economics, or a closely related field; strong academic preparation in micro-economics (especially demand theory and quantitative methods); and a strong interest in marine economics.

The position is approximately 75 percent research which will focus on economic problems associated with use of Chesapeake Bay resources. In the general area of marketing and natural resource economics, opportunity exists for development of a research program within the mission and goals of the department. Special emphasis will be placed on research in the fishery sector.

Teaching will involve approximately 25 percent with courses at the undergraduate and graduate levels in the department. Responsibilities also include advising students and supervision of graduate students.

Salary is commensurate with qualifications. Appointment is on a twelve-month basis with one month annual leave. Insurance, major medical and other fringe benefits are available.

Interested applicants should send resume, transcripts, and the names of at least three persons who may be contacted as references to: Dr. Billy V. Lessley, Acting Chairman, Department of Agricultural & Resource Economics, University of Maryland, College Park, Maryland 20742. Telephone: (301) 454-3802.

The University of Maryland is an equal opportunity employer.

ASSISTANT PROFESSOR OF AGRICULTURAL AND RESOURCE ECONOMICS

The University of Maryland, Department of Agricultural and Resource Economics, has a July 1, 1976 opening for an Assistant Professor. The qualifications include a Ph.D. in Agricultural Economics, Agricultural and Resource Economics or a closely related field. Also strong academic training in agricultural and resource policy is desired.

The faculty member will be expected to develop teaching, research and extension programs in agricultural and resource policy. Specifically, the position includes policy concerns in dairy and other agricultural commodities as well as natural resources.

Salary is commensurate with qualifications. Appointment is on a twelve-month basis with one month annual leave. Insurance, major medical and other fringe benefits are available.

Interested applicants should send resume, transcripts, and the names of at least three persons who may be contacted as references to: Dr. Billy V. Lessley, Acting Chairman, Department of Agricultural and Resource Economics, University of Maryland, College Park, Maryland 20742. Telephone: (301) 454-3802.

The University of Maryland is an equal opportunity employer.

RESEARCH REVIEW

Project Title: Physiological Aspects of Plant Water Use Efficiency

Principal Investigator: Charles Y. Sullivan, Professor
Department of Agronomy
University of Nebraska, Lincoln

The objectives of this research project are to define physiological characteristics of crops which will maximize water use efficiency and to develop practical techniques of screening and selecting plant genotypes with desirable physiological responses for use in breeding for high yield potential and water use efficiency.

Initial experiments were conducted with a number of grain sorghum genotypes. A technique previously developed for measuring tolerance to heat and desiccation tolerance, which utilizes electrical conductivity of ion leakage from injured leaf discs, was used to select several sorghums for efficiency evaluations.

An automatic rain shelter, constructed at the Mead Field Laboratory for control of soil moisture, was used for the first season in this study. Fourteen genotypes, with seven replications each, were planted in plots with three treatments as follows: Stress I - No irrigation or precipitation fell on the plot throughout the season; Stress II - Received one irrigation at near pollination; and Control - Irrigated three times with 10 cm. water applied at each irrigation, plus natural precipitation. Border plots were used to monitor plant water potentials throughout the season and leaf diffusive resistances were measured to evaluate stomatal response. Soil moisture was regularly measured gravimetrically in 15 cm. increments to a depth of 150 cm.. Leaf temperatures and general plant resources were noted and yield taken.

The data from this experiment has not been processed, but it appears that significant differences in genotype response to limited water availability and efficiency of water use will be evident and that some additional understanding of mechanisms involved will be gained.

A portable system for measuring field photosynthesis of numerous genotypes and environmental treatments was essentially developed, although some testing of the system remains. So far, the method has been used only with greenhouse grown plants, but the system is ready for field use next season.

Genotype differences in photosynthetic response to both water stress and high temperatures have been evaluated. High plant temperatures are often induced by water deficits which result in reduced evaporative cooling, and it is necessary to investigate this interaction. These experiments have shown that there are significant differences in efficiency of different genetic materials to maintain photosynthesis under stress. Some of the stress tolerant lines selected by the leaf disc method showed exceptional stability of photosynthesis when drought or heat stressed.

A method was developed for studying root size, morphology, and activity. Plants were grown in hydroponic cultures in slender PVC tubes. Plants with normal field grown appearance were grown to maturity with good grain yields. Root lengths and shoot:root ratios have been measured for several genotypes. The system also permits measurements of water use efficiency. This was not done extensively in the first experiments, but the methodology was worked out and some results obtained. Root size and distribution as determined by tube growth seems to correlate well with soil moisture extraction patterns by field grown plants. The tube method also offers the possibility for controlled osmotic value and temperature of the root media for investigation of specific responses.

Field, greenhouse and growth chamber aspects of the project will continue. A neutron soil moisture probe has been purchased, and access tubes will be placed in the rain shelter plot and other plots for soil moisture evaluation. Previous selections with high and low water use efficiencies will be planted in the rain shelter experiment. The portable photosynthesis system will be used to determine the point at which photosynthesis decreases when soil and leaf water potentials decrease. Leaf temperatures will be recorded and leaf diffusive resistances measured. Results will be related to genetic components, water use efficiency, yield and yield components, and previous laboratory and field responses.