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DIRECTOR'S REPORT

Congress recently voted to override President Reagan's veto of S.684, the Water Resources Research Act. After the Senate voted 86-12 to override, the House of Representatives concurred by a vote of 309-81. The bill authorizes grants to state water resources resesarch institutes in the total amount of $36 million for each of the next five years, continuing a program established by Congress in 1964.

This bill provides a total of $10 million per year to support 54 state water resources research institutes, with matching funds to be supplied by universities. A dollar-for-dollar matching fund is also provided for basic research ($20 million annually) and is open to educational institutions, private foundations, individuals and local or state governments. Support in the amount of $6 million per year is authorized for water technology development grants or contracts on water problems of national importance.

The next step will be for Congress to appropriate funds for this authorized water resources research program. It is anticipated that appropriation hearings will be conducted by Congress.

As soon as additional information on availability of funds and proposal preparation is received, University faculty will be advised on the procedures to be followed.

nwrc NEBRASKA WATER RESOURCES CENTER

FY 1984 RESEARCH PROGRAM

The Nebraska Water Resources Center's 1984 Research Program has been approved by the U. S. Geological Survey. Seven research projects will be funded beginning July 1, 1984 through June 30, 1985 as follows:

— "Mycorrhizae as a Factor in Revegetation of Eroded and Disturbed Soils in Sand Dune Type Soils," M. G. Boosalis D.H. Yocum, Dept. of Plant Pathology, and P. E. Reece, Panhandle Station.

— "Nitrate Removal from Groundwater Supplies Using Biological Denitrification," Mohamed Dahab, Dept. of Civil Engineering.

— "Predicting Groundwater - Surface Water Interactions and Nitrate Concentrations in Municipal Well Fields Within the Platte River Channel," Martha Gilliland, Dept. of Civil Engineering.

— "Field Measurement of Evaporation and Transpiration for Irrigated Corn, Sorghum and Soybeans," D. L. Martin, Dept. of Agr. Engineering, and N.L. Klocke, North Platte Station.

— "Assessment of Accelerated Channel Erosion Following Urbanization of Agricultural Watersheds," M.E. Nicklin, Dept. of Civil Engineering.

— "Interpretation of Vegetation Encroachment and Flow Relationships in the Platte River by Use of Remote Sensing Techniques," J.S. Peake and M.P. Peterson, Remote Sensing Applications Laboratory, Dept. of Geography-Geology, UNO.

— "Thermal Infrared Remote Sensing of Near-Surface Moisture in Deep Sandy Soils," D.C. Rundquist, Conservation & Survey Division, M.P. Lawson, R.C. Balling and L.P. Queen, Dept. of Geography.

WATER USE EFFICIENCY TASK FORCE REPORT

For the past four years, the Water Resources Center has been the lead agency on the Water Use Efficiency Policy Issue Study, which is one of eleven policy issue studies which were conducted as part of the State Water Planning and Review Process.

At issue in this study was the question of whether the benefits of installing water use efficiency techniques are sufficient to warrant legislative or administrative action. The Water Use Efficiency Task Force Report deals with (a) techniques to improve the efficency of using water for agricultural, municipal, domestic, industrial, and power generation purposes, and (b) policy alternatives which may promote the adoption of these techniques.

The task force report, which was recently completed, has been forwarded to the Natural Resources Commission which will provide a final report, containing the Commission's recommendations, to the Governor and the Legislature.

1984 NEBRASKA WATER CONFERENCE TABLOID

The 1984 Nebraska Water Conference held March 14-15 with the theme "The Future of Water Management in Nebraska: Developing a Consensus" was very successful and well attended. The Water Resources Center is developing a newspaper tabloid covering the major speakers and topics presented at the Conference. The tabloid will highlight the speakers' presentations and panel discussions from the Conference. Editor of this tabloid is Pat Larsen, communications specialist in water resources.

Those interested in obtaining this recap of the 1984 Nebraska Water Conference may contact the Water Resources Center. A limited number of copies will be available.

1984 IRRIGATION TOUR

Participants in the 1984 Nebraska Irrigation Tour will embark on a two-day excursion through central and northeast Nebraska. Scheduled for August 16-17, the popular annual tour is co-sponsored by the Nebraska Water Conference Council and the University of Nebraska Institute of Agriculture and Natural Resources.

The 1984 tour will include the following visits on the first day: Nebraska Public Power District and Loup Power District in Columbus, Willow Creek Dam and Reservoir, Lindsay Manufacturing Company, Calamus Dam and Reservoir for the North Loup Irrigation Project, Twin Loup Irrigation District, and the Farwell Irrigation District. On the second day the tour will visit the Platte River Habitat Trust and Mormon Island, the Neil Grothen farm near Hastings, and will hear presentations on the three proposed irrigation projects using Platte River water — Prairie Bend, Catherland and Landmark Projects.

The registration fee for the 1984 tour is $30 per person per day. For additional information contact Les F. Sheffield, Tour Coordinator, 223 Filley Hall, University of Nebraska, Lincoln, NE 68583-0922.

1984 WATER RESOURCES SEMINAR PROCEEDINGS

During each spring semester, the Nebraska Water Resources Center sponsors a Water Resources Seminar Series at the University of Nebraska-Lincoln. The 1984 seminar series was entitled "The Sandhills of Nebraska — Yesterday, Today and Tomorrow."

Recent changes in the Sandhills resulting from the expansion of center pivot irrigation have affected a small portion of the region. However, the sand plains experience with irrigation expansion over the past two decades and the availability of large water supplies in the Sandhills portend future changes that could be significant in their extent and effects on the region. The seminar series discussed the present physical characteristics of the Sandhills as well as possible future changes.

Proceedings from the 1984 Water Resources Seminar series are currently being compiled and will be published shortly. Copies will be made available to water-related University faculty. Anyone else desiring a copy at no charge should contact the Nebraska Water Resources Center.

RESEARCH REVIEW

Project Title: *Irrigation Scheduling Procedures with Limited Water for Improved Water Use Efficiency for Corn and Soybeans*

Principal Investigators: *George E. Meyer, Ass't Professor, and Paul E. Fischbach, Professor, Dept. of Agricultural Engineering, UNL*

The objectives of this project are: (1) to develop quantitative criteria for scheduling and applying water to irrigated corn and soybeans, based on stage of crop development, soil moisture deficit, and crop water use; (2) to test scheduling techniques for applying water to irrigated soybeans using computer simulation; (3) to compute potential water savings over a broad area to demonstrate the impact of the improved irrigation procedures; and (4) to compute potential energy savings from reduced pumping costs for improved irrigation procedures.

Automation of irrigation systems using micro-processors may have important future advantages in energy and water savings in the Great Plains. However, providing a critical mass of control and climatic information for irrigation scheduling of corn and soybeans may require services from both large and small computer data bases. A micro-processor controlled solid-set sprinkler system with 25 small-plot research sets was installed during 1982. The controller has the capability to poll local wind and rainfall at the field site, but may accept control information remotely through an ordinary terminal or personal computer. The controller monitors water-flow rate and system-set pressures, and can implement protective procedures in case of power fault or system breakdown. One short-season corn variety and three soybean varieties—Amsoy, Williams and Elf—were planted late due to system construction. Elf, a determinate variety, had the best yield (45 bu/ac) of the soybeans during 1982. Corn yielded only 120 bushels per acre with full irrigation during 1982.

Soybean irrigation scheduling studies were performed during the summer of 1983. Twenty-five irrigated and six dryland plots included Elf, Amsoy 71, and Woodworth soybeans. Six treatments were evaluated for soybeans. A microprocessor based controller located at the field site was programmed from Lincoln. Neutron probe readings were taken weekly, before and after each irrigation, to examine depletion levels. Nearby dryland corn depleted the soil to 99 percent at 5.5 feet, while dryland soybeans depleted the soil to about 85 percent. (A full profile essentially existed at June 30 for both crops.) Dry matter, leaf area samples, seed yield, number, and seed size were taken. Fully irrigated corn yielded 160 bushels per acre while soybeans again only yielded about 45 bushels per acre.

Moisture stress studies were also continued in the off-season. Corn and soybean moisture stress studies were performed using simulated weather sequences in computer-aided CONVIRON E-15 environmental chambers. A lysimeter-watering system was used to measure crop water use. Soybeans (variety Elf) and corn (varieties Pioneer 3780 and Early may 2630) were grown from seed to physiological maturity, under limiting and nonlimiting moisture regimes. Both crops showed differences in plastochrons (phenological development) and vegetative yield.

Soybean and corn physiological computer models have been developed using a new soil-root-canopy water compartment system with hydraulic gradients and water flow to each nodal leaf layer. The key is the development of a dynamic water potential function where osmotic potentials are calculated using a Gibbs-Helmholtz relationship based on temperature and available carbohydrate concentration calculated from the partitioning process. Turgor is calculated according to an emperical relationship of the relative water content calculated in a "quasi" plant water balance. The soil system is simplified, but uses dynamic rooting control volume which depends on carbon flow from the canopy. Subcompartments of "mined" and "unmined" soil moisture, along with a surface compartment for capturing rainfall and irrigation. Moisture redistribution calculations are minimized to exchanges between the compartments. These models could be an important centerpiece in future irrigation scheduling.

CONFERENCES AND MEETINGS

July 24-26	1984 Irrigation and Drainage Specialty Conference in Flagstaff, AZ. For additional information, contact Harry N. Tuvel, 345 East 47th St., New York, NY 10017-2398. Telephone: (212) 705-7496.
July 29-Aug. 1	Annual Meeting of Universities Council on Water Resources, Louisiana State Univ., Baton Rouge, LA. Theme: "Water Resources Management Educational Prerequisite." For additional information, contact UCOWR Executive Secretary's Office, 310 Ag. Hall, Univ. of Nebraska, Lincoln, NE 68583-0711. Telephone: (402) 472-3305.
Aug. 12-17	AWRA 20th Annual Conference and Symposium on "Overcoming Institutional and Technical Constraints to Water Resources Management" in Washington, D.C. Symposium topic is "Options for Reaching Water Quality Goals." For a complete program and registration information, contact Kenneth D. Reid, Executive Director, American Water Resources Ass'n, 5410 Grosvenor Lane, Suite 220, Bethesda, MD 20814.
Aug. 14-17	Conference on "Water for Resource Development" sponsored by American Society of Civil Engineers in Coeur d'Alene, ID. For additional information contact H. N. Tuvel, ASCE, 345 47th St., New York, NY 10017-2398.
Aug. 27-29	Conference on "The Impact of Mining on Ground Water" to be held in Denver, CO. For additional information contact David Nielsen, Director of Research and Education, National Water Well Ass'n (NWWA) 500 West Wilson Bridge Road, Worthington, OH 43085. Telephone: (614) 846-9355.
Sept. 24-26	International Water Well Exposition to be held at the Las Vegas Convention Center, Las Vegas, Nevada. For additional information contact David Nielsen, NWWA.
Sept. 26-28	Seventh National Ground Water Quality Symposium to be held in Las Vegas, Nevada. For additional information contact David Nielsen, NWWA.

PUBLICATIONS

The following publications have been received by the Water Resources Center from March through June 1984. They have been forwarded to C.Y. Thompson Library on UNL's East Campus for cataloging. Persons on campus may obtain the publications through UNL's library system. Others are encouraged to request copies they desire from the organization issuing the publication.

(1) *Legal and Administrative Systems for Water Allocation and Management: Options for Change*, Project B-123-VA, Virginia Water Resources Research Center, VPI&SU, Blacksburg, VA 24060.

(2) *Fluxes of Heavy Metals in Delaware River Freshwater Tidal Wetlands*, Project A-060-NJ, Center for Coastal and Environmental Studies, Rutgers - the State University, Doolittle Hall, New Brunswick, NJ 08903, December 1983.

(3) *Flood Control Effectiveness of Systems of Dual Purpose Detention Basins*, Project B-084-NJ, Center for Coastal and Environmental Studies, Rutgers - the State University, Doolittle Hall, New Brunswick, NJ 08903, January 1983.

(4) *Water Reuse in the Coastal Plain of New Jersey - A Case Study*, Project A-059-NJ, Center for Coastal and Environmental Studies, Rutgers - the State University, Doolittle Hall, New Brunswick, NJ 08903, May 1983.

(5) *Regulation of Flood Hazard Areas to Reduce Flood Losses, Volume 3*, Prepared for the U.S. Water Resources Council, Washington, D. C., March 1982.

(6) *Institutional Framework for Rural Water Supply in North Carolina, South Carolina and Virginia*, Bulletin 142, Virginia Water Resources Research Center, VPI&SU, Blacksburg, VA 24060-3397.

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