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Water Current

Spring 1986

Research Could Help Revegetate Sand Hills

by Pat Larsen

Erosion-prone abandoned center-pivot sites in Nebraska's Sand Hills could be restored more effectively because of research by University of Nebraska-Lincoln scientists that has been funded by the Nebraska Water Resources Center.

"This research will provide basic information on the amount of mycorrhizal fungi in eroded and disturbed soils in the Sand Hills," said Michael G. Boosalis, UNL plant pathologist. He explained that this fungi formed on various crops and grasses improves phosphorus uptake by roots.

"Sand Hills soils are very low in phosphorus," Boosalis pointed out. "Corn, wheat, soybeans and sorghum are infected and often stimulated by these fungi. These crops would be hosts to the fungi in the absence of native grasses."

However, when tilled land is no longer cropped and severe erosion occurs, as in the 254 abandoned center-pivot sites surveyed last August by the USDA Soil Conservation Service, mycorrhizal fungal populations decline because they do not have host plants to support their growth and reproduction.

"This results in bare sand without vegetation. Delays in reseeding fragile land increase the chances of erosion and the development of blowout-like areas," Boosalis said.

Lacking mycorrhizal fungi, these erosion-prone areas will be considerably more difficult to revegetate than soils containing adequate populations of the fungi, Boosalis said. Helping the plant pathologist were co-researchers Patrick

E. Reece, assistant professor of agronomy at the NU Panhandle Research and Extension Center, and Daniel H. Yocom, research associate in plant pathology at UNL.

Yocom added, "Recently, the first greenhouse studies on the effects of vesicular-arbuscular mycorrhizae on growth of grasses common to the Sand Hills were completed, and we found that growth of sand bluestem, little bluestem, prairie sandreed and switchgrass was significantly increased by mycorrhizae when compared to plants growing without it."

The 254 abandoned pivot sites were on 32,807 acres of land. During 1985 about 20 percent of that land, or 6,560 acres, was eroding at twice the rate acceptable to the SCS.

In addition, this research would aid owners of abandoned marginal land if reseeding such land should become law. Even though LB1132 did not get out of the Agriculture Committee of the Nebraska State Legislature during the 1986 session, the bill would have allowed natural resources districts to require owners to reseed fragile land that has been plowed and then abandoned. Similar bills have been introduced in previous sessions.

The mycorrhizal research could be essential in developing comprehensive reclamation procedures for eroded and disturbed center-pivot sites. These procedures should be successful in restoring the former irrigation site to a nearly natural plant community, Boosalis concluded.

New Research Projects Funded

The Nebraska Water Resources Center's 1986 research program, funded under Section 104 of P.L. 98-242, has been approved by the U.S. Geological Survey. The following six University of Nebraska research projects will be funded beginning June 1, 1986 (unless otherwise mentioned, researchers are from the University of Nebraska-Lincoln):

- Soil Type, Tillage and Precipitation Pattern as Factors Influencing Groundwater Recharge and Surface Water Supplies: Alice Jones, agronomy, Elbert Dickey, agricultural engineering, and Kenneth Hubbard, Center for Agricultural Meteorology and Climatology.
- Chemical Removal of Nitrates from Drinking Water Using Waste Pickle Liquor: Gary B. Keefer, civil engineering, University of Nebraska-Omaha.

- Assessing Agricultural Drought Impact: The Development of a Crop-Specific Index for Winter Wheat: Donald A. Wilhite, Center for Agricultural Meteorology and Climatology.
- Conservation of Soil and Water Utilizing Interrow Cultivation Techniques: William L. Kranz, agricultural engineering, Northeast Extension and Research Center.
- Assessment of the *Bacteroides fragilis* Group and Their Bacteriophages as Indicators of Human Fecal Pollution of Surface Waters: S. James Booth, N. U. Medical Center.
- Identification of a Management Strategy for a Conjunctive Surface-Groundwater System: Michael E. Nicklin, civil engineering.



NEBRASKA WATER RESOURCES CENTER

Amendment to HR 3906 Would Alter States' Matching Funds

A bill, HR 3906, has been introduced into the U.S. House of Representatives to provide for the assessment of the quality of the nation's groundwater and surface-water resources by the U.S. Geological Survey. The National Groundwater Contamination Research Act would enhance and accelerate the collection, analysis and dissemination of information regarding the current and future quality of the nation's groundwater and surface-water resources.

An amendment has been added to HR 3906 that would

affect the Water Resources Research Act of 1984. Section 7 of the bill would revise the amount of state matching funds for the State Water Institute Programs (Section 104 of P.L. 98-242) from 1.5 non-federal dollars per federal dollar to 1 non-federal dollar per federal dollar during fiscal years 1986 through 1989.

The bill is currently being reviewed by the House Committee on Interior and Insular Affairs.

Water Policy Committee to Examine a New Quality Issue

The Water Policy Committee of the University of Nebraska Institute of Agriculture and Natural Resources has formed a new water-quality task force to examine contamination by and legislation concerning synthetic organic compounds. Synthetic organics include such compounds as herbicides, insecticides, gasoline and degreasers. Pat Shea of the agronomy department will chair the new task force.

A group of department heads and unit administrators chaired by Dr. Bill Powers, director of the Water Resources Center, the committee analyzes water-policy issues and makes recommendations to IANR administrators on existing and needed programs in research, teaching and extension. Special interdisciplinary task forces composed of university faculty and members of other water agencies are asked to study specific topics.

One of the areas of special interest is groundwater quality. Various task forces have been formed to develop recommendations on programs to address groundwater-quality protection. They are named after the contaminant of concern

or practice that has a potential for contaminating groundwater. These are the Nitrate, Chemigation and Synthetic Organics task forces.

The Nitrate Task Force is the oldest of the three and was responsible for the extension publication entitled "Living With Nitrates." The Chemigation Task Force sponsored the "Chemigation Workshop" in 1985 and has published the proceedings of that workshop. The newly-formed Synthetic Organics Task Force is assembling a bibliography on water-quality problems in the state related to these contaminants.

The Water Policy Committee and the task forces are expected to help the IANR assess the impact of legislation and constitutional amendments on groundwater quality and develop ways to assist the state's residents in dealing with this legislation as it begins to surface. Some of the measures passed during the 1986 session are expected to have substantial impact on needed agriculture and natural resources research, teaching and extension programs in Nebraska.

Research Review

Project: Thermal-Infrared Remote Sensing of Near Surface Moisture in Deep Sandy Soils

Principal Investigator: Donald Rundquist, associate professor of geography, Conservation & Survey Division; Lloyd P. Queen and Merlin P. Lawson, geography department

This project made use of remote sensing and Geographic Information System (GIS) approaches in an analysis of the relationships between surface-temperature patterns and groundwater levels.

Two diurnal thermal-infrared (TIR) overflights during the summer of 1984 documented the feasibility of using TIR data to identify thermal variations for land and lake surfaces. Ground-based observations of water levels in a series of monitoring wells located adjacent to a Sand Hills lake study site were also used to characterize the distribution of hydraulic head as a possible source of temperature variation. The integration of this ground-based information with the remotely sensed data allowed for a reasonable interpretation of surface-temperature patterns at the study site.

Proceedings Available for Symposium on Dryland Agriculture

Informal proceedings of the Great Plains Agricultural Council symposium, "Causes and Consequences of the Transition to Dryland Agriculture," are available from the Nebraska Water Resources Center, 113 Nebraska Hall, University of Nebraska, Lincoln, NE 68588-0517.

The symposium was held October 29-31, 1985, at the Airport Hilton, Denver, Colo., and was sponsored by the Water Resources Committee of the GPAC and the WRC, Institute of Agriculture and Natural Resources, UNL.

The GPAC Board will meet June 3-5, 1986, at Bozeman, Mont. For more information, contact Dr. Norman Landgren, GPAC, Room 109, Agricultural Hall, UNL, Lincoln, NE 68583-0704.

Chemigation Proceedings Available

Proceedings are now available from the Chemigation Safety Conference held April 17-18, 1985 at the University of Nebraska-Lincoln. The conference was part of a project funded by the Cooperative Extension Service and the U.S. Department of Agriculture to develop educational materials on applying pesticides through irrigation systems. The materials will be part of the pesticide-applicator training program.

The purpose of the Chemigation Safety Conference was to address the safety and environmental hazards associated with chemigation. The proceedings and discussion from the conference will serve as a conceptual base for developing the educational materials.

Dr. Bill Powers, Director of the Water Resources Center, also serves as coordinator of water programs in the Cooperative Extension Service at UNL.