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THE AGRICULTURAL EXPERIMENT STATION
INSTITUTE OF AGRICULTURE
AND NATURAL RESOURCES
UNIVERSITY OF NEBRASKA-LINCOLN
ROY G. ARNOLD, DIRECTOR

Agricultural Experiment Station



Vol. 14, No. 5, Nov/Dec 1980



Season's Greetings from the Experiment Station Staff...

FROM THE DIRECTOR'S DESK

FUNDING

Information on funding of Ag Experiment Station research programs was requested in discussions at the recent NCEA meeting in North Platte. The following table summarizes sources of support for fiscal year 1979 (July 1, 1978-June 30, 1979):

GENERAL FUNDS	
State Appropriations	53.0%
Federal (Hatch)	8.8
RESTRICTED FUNDS	
Federal Agencies	15.4%
State Agencies	1.1
Industry	3.6
Foundations	0.4
REVOLVING	17.7
TOTAL:	<u>100.0%</u>

GENERAL FUNDS represent Federal formula funds and state appropriations to the Station without specific identification of programs to be supported.

RESTRICTED FUNDS represent grants, contracts, cooperative agreements or other earmarked funds to support specific research projects or programs. Federal agencies supporting grants and contracts to Ag Experiment Station scientists include USDA, Department of Energy, National Science Foundation, Environmental Protection Agency,

National Institutes of Health, and numerous other agencies. Please note that for Fiscal '79, 3.6% of total Experiment Station support came from industry. This is an important source of supplemental support for Station research projects, but certainly does not determine the direction of the Station's research programs as implied by some observers. It is important to keep in mind that grants, contracts and cooperative agreements, irrespective of source, are accepted in support of established Ag Experiment Station research projects developed and led by Station scientists.

REVOLVING FUNDS represent income from sale of products or services. This income is reinvested in the same program area for supplies, equipment, facilities or services as necessary to carry out research projects which require crops or livestock. This category of funding is subject to the greatest fluctuation from year to year due to prices of farm products, influence of weather on crop production, and production costs.

The Fiscal 1980 data will be reported to you in the newsletter as soon as the summary is available. I will be pleased to respond to any questions concerning this information.

FAREWELL AND BEST WISHES TO MRS. DELORES SORENSEN:

Delores Sorensen, Secretarial Specialist in the Ag Experiment Station office, is resigning her position effective December 15th. Delores and her husband, Bob, are moving to Holdrege, Nebraska.

Bob is working for Anderson Packing in Holdrege, and Delores recently accepted a position as Secretary to the Quality Control Manager of Becton-Dickinson, Inc.

Delores started in the Station office in March, 1967, and has played a major role in carrying out the functions of the Station office during her nearly 14 years in the office. I have found her to be an outstanding, effective and supportive employee. Her experience and knowledge have been most helpful to me during the past year. Obviously, she will be missed greatly. She leaves with our best wishes for continued success and satisfaction in her new job and their new home.

RECEPTION:

A reception to honor Delores Sorensen has been arranged for Friday, Dec. 12, 2:00-4:00 pm at the East Campus Union. Faculty and staff are invited to attend and honor Delores for her years of valuable service to the Nebraska Agricultural Experiment Station

Roy G. Arnold

Sahs Sez

A successful Organic Agriculture meeting was held at the East Campus Union, Friday, October 24, 1980. The purpose was to address the implications of the recent SEA report, "A Report and Recommendations on Organic Farming". Co-sponsors of the meeting were SEA and the Institute of Agriculture, with John Burbank and Warren W. Sahs as Co-chairmen of a local arrangements committee.

This meeting was the fourth and last to be held in the Nation, with the others having been held at Durham, New Hampshire; Sacramento, California; and Seattle, Washington.

Over 200 people from the Great Plains area listened to speakers from SEA, a researcher from Minnesota, extension specialists from Illinois, Missouri and Nebraska, and a teaching participant from Nebraska. John Vogelsberg, an Organic Farmer from Kansas cited his experiences. Dr. Anson Bertrand, Director, Science and Education Administration, was the luncheon speaker.

The IANR committee members for the event were: John Doran, Loyd Fischer, Robert Gast, Roger Gold, Russell Moomaw, James Power, and Howard Wittmuss.

GRANTS AND CONTRACTS

Campbell, J. B. - North Platte Station - ICI Americas Inc.	1,000
Compton, W. A. - Agronomy - Fontanelle Hybrid Seed Company	200
Johnson, B. B. - Ag Economics - North Central Regional Pesticide Impact Assessment Program	5,700
Larson, L. L. - Animal Science - Mid-America Dairymen, Inc.	3,148
Mandigo, R. W. - Animal Science - Nebraska Beef Industry Foundation	200
Manglitz, G. - Entomology - NOR-AM Agricultural Products, Inc.	500
Moomaw, R. S. - Northeast Station - Mobay Chemical Corporation	550
Moomaw, R. S. - Northeast Station - Union Carbide Corporation	500
Nielsen, M. K. - Animal Science - Wolf Bros & Reich, Inc.	500
Omtvedt, I. T. - Animal Science - ELANCO	3,500
Riordan, T. P. - Horticulture - North American Plant Breeders	250
Rosenberg, N. J. - Center for Agricultural Meteorology and Climatology USD Commerce-NOAA-National Climate Program Office	175,000
Satterlee, L. - Food Science & Technology and Kendrick, J. G. - Ag. Economics - National Science Foundation	79,566
Shahani, K. M. - Food Science & Technology - The VIT-E-MEN Co., Inc.	90
Underdahl, N. R. - Veterinary Science - Philips Roxane Laboratories, Inc.	8,000
Vidaver, A. K. - Plant Pathology - Agrico Chemical Company	2,000
Witkowski, J. - Northeast Station - FMC Corporation	900
Witkowski, J. - Northeast Station - ICI Americas Inc.	750
Witkowski, J. - Northeast Station - Union Carbide	1,000

-- PROJECTS APPROVED --

NEB 11-044 - Improvement of Thermal Processes for Foods

This is a revised Hatch project contributing to regional project NC-136. This project was approved for the period October 1, 1980 through September 30, 1985. The project leader is Milford Hanna (Ag Engineering). The broad objective of the proposed research is to develop tools that can be used to improve the efficiency of processes for handling, storage, processing and distribution of high-quality foods. Specific emphasis will be given to energy input for these processes in an effort to reduce the dependency of food processing on non-renewable energy sources. Two objectives in which Nebraska is involved are (1) to develop methods for the evaluation and measurement of rheological properties as related to food-product texture, and (2) to quantify the reaction dynamics of quality changes in food during thermal processes.

NEB 12-078 - Fate of Nutrients in the Environment as Affected by Soil and Crop Management

This is a revised Hatch project effective October 1, 1980 to September 30, 1985 contributing to regional project NC-98. The principal investigators are R. A. Olson

(Agronomy), M. P. Russelle (Agronomy), K. D. Frank (South Central Station), G. W. Rehm (Northeast Station) and D. H. Sander (Agronomy). Warren W. Sahs is the Administrative Advisor. The objectives of this study are (1) measure and quantify the movement of N and P in the environment as influenced by crop production practices; (2) develop BMPs that will maximize N and P fertilizer use efficiency by the crop and minimize the amount moving into surface and ground waters; and (3) determine the efficiency with which nutrients are utilized by crops when located at different depths in the soil rooting profile.

NEB 12-118 - Increasing the Efficiency of Phosphorus Fertilizers in Winter Wheat and Corn

This is a new Hatch project effective July 1, 1980 to July 31, 1985. The investigators are D. H. Sander (Agronomy), G. A. Peterson (Agronomy), E. J. Penas (Agronomy), K. D. Frank (South Central Station) and F. N. Anderson (Panhandle Station). The reviewers of this project were R. A. Olson (Agronomy), G. W. Rehm (Northeast Station), R. F. Mumm (Biometrics and Information Systems Center) and D. G. Watts (Ag Engineering). The objectives of this project are: (1) to determine the relative efficiency of row vs broadcast P for corn and wheat on a range of soil conditions on both a short and long term basis; (2) provide new calibration data relating soil test P to P needs of corn and wheat; (3) to study soil profile P content as it relates to fertilizer P needs and maintenance concepts of P fertilization; (4) to determine the effectiveness of anhydrous ammonia as a N fertilizer for wheat; and (5) to improve the soil test N calibration on wheat.

NEB 12-121 - Plant Breeding for Physiological Traits

This is a new Hatch project that contributes to regional project NC-155. James E. Specht (Agronomy) is the principal investigator. The project is approved for the period beginning October 1, 1980 through September 30, 1985. The objectives are: (1) to improve plant populations for photosynthetic potential, (2) to improve plants for key enzyme systems, (3) to relate N-metabolism to yield improvement, (4) to determine the physiological mechanisms of environmental stress responses and the genetic variability in plants for these mechanisms, and (5) to evaluate morphological and developmental traits believed to be important in determining grain yield.

NEB 22-021 - Function, Nutritive Composition, Quality, Stability and Efficient Production of Poultry Products

This is a revised Hatch project effective October 1, 1980 to September 30, 1985 that contributes to NC-133. G. W. Froning (Animal Science) and R. Dam (Ag Biochemistry) are the project leaders. The objectives of this project are as follows: (1) to continue developing improved processing and further processing procedures to conserve energy, water and other natural resources, (2) to expand the USDA nutritional composition data bank for poultry and egg products, (3) to further measure and evaluate the influence of production, processing and distribution variables, including physical and environmental stresses and packaging, on yield, composition, safety and stability of each product, and (4) to determine the composition, function, stability, compatibility, utilization and efficiency of foods produced from poultry and egg products or when combined with other ingredients, including other protein sources.

NEB 93-015 - Independent Living Rehabilitation/Habitation for Persons with Severe Disabilities

This is a new Hatch project effective July 22, 1980 to June 30, 1985. L. O. Schwat (Human Development and the Family) is the principal investigator. This project was reviewed by Barbara Chesser (Human Development and the Family), Charles Gardner (Agronomy), Audrey Newton (Textiles, Clothing and Design) and Walter Stroup (Biometrics

and Information Systems). The objectives of this project are (1) continued development of the assessments, training and devising procedures for independent living rehabilitation/habilitation of persons with severe disabilities and evaluating procedures by consumers and professionals; and (2) determination of physiological and psychological levels of stress of persons with disabilities at various stages of rehabilitation program and psychological stress levels of family members and significant others.

CURRENT RESEARCH INFORMATION SYSTEM

In response to a recent urgent request for information on current SEA-AR and SEA-CR projects on a specific topic, information was obtained from the Current Research Information System (CRIS) retrieval system by use of the Lockheed computer search system at C. Y. Thompson Library. Wayne Collings was most helpful in entering the request. The information was received within five days (request submitted on Friday, and copies of printout received in the mail the following Tuesday).

The projects in the CRIS System (approximately 29,000) are defined by Activity, Commodity, Field of Science, Research Problem Area and Subcommodity. The Manual of Classification of Agricultural and Forestry Research is the source of codes for identifying the various areas of research. A Keyword index is also available.

Use of this access method should enable project leaders to obtain information on research being conducted by other Experiment Station scientists and SEA-AR scientists before preparation of new or revised Station projects.

If you have any questions, please contact Dr. Roy Arnold or Diane Mohrhoff in the Experiment Station office.

-- FEATURE ARTICLES --

Animal Science Departmental Review

The Animal Science Department had a successful Comprehensive Departmental Review the week of October 6, 1980. The 10-person team (six from outside the University of Nebraska system) received an overview of the departmental programs and evaluated the teaching programs the first day. On the second day, representatives of the team visited the outstate locations with Animal Science programs, met with other IANR departments that have cooperative programs with Animal Science, toured campus research facilities and met with a cross-section of undergraduate students. The outstate staff then came to Lincoln for the remainder of the week and all the departmental faculty were present for all portions of the review. The third day was devoted to reviewing the extension programs and visiting the University Field Laboratory at Mead. The remainder of the research program was reviewed on the fourth day along with the team meeting with the graduate students. Friday consisted of finalizing their report and reporting back to the staff and administration.

The efforts expended by the Department during the past year through a series of faculty study groups, a departmental retreat and the preparation of an extensive self-study report provided sufficient background for establishing goals, outlining concerns and establishing high-priority recommendations for each program area that served as the foundation for the review. The fact that most of the specific recommendations stemming from the previous departmental review in 1975 have been implemented is encouraging to the faculty as they begin evaluating the recommendations made during the 1980 review. The team was on a tight schedule for the entire week, but they

felt all aspects of the program received sufficient attention to prepare a meaningful evaluation report. The scheduled visits to the outstate locations were particularly helpful to them in getting a proper perspective of the overall program.

Irv Omtvedt, Head
Animal Science

Energy Farm

The Department of Agricultural Engineering, with the cooperation of the Departments of Agricultural Biochemistry, Agricultural Economics, Agronomy, Animal Science and Horticulture -- all of the Institute of Agriculture and Natural Resources; with the College of Engineering and Technology; and with other units of the University of Nebraska, is cooperating with the U. S. Department of Energy in a demonstration of how fossil-fuel usage on modern farms can be minimized and, in the long run, how it may be eliminated. The general concept of this demonstration involves the use of "state-of-the-art" technology in an attempt to achieve zero flow of direct and indirect petroleum input into the farming operation. Specific objectives of the project include:

demonstration of energy-saving irrigation practices, including irrigation scheduling, low-pressure center-pivot and gated-pipe irrigation systems;

use of ethanol produced from sweet sorghum as a replacement for fuel in farm engines;

reduced tillage and fertilizer for energy, soil and water conservation;

demonstration of solar energy and methane gas usage in an integrated fashion for electricity production and for hot-water heating and space heating in a swine-production facility;

use of mini- and micro-computer technology for on-farm energy conservation and management;

recovery of waste heat and carbon dioxide from alcohol fermentation and swine production for greenhouse production of vegetables; and

demonstration of energy conservation practices in all aspects of farming operations.

The demonstration farm encompasses 63.6 hectares (157 acres) at the University of Nebraska Field Laboratory near Mead, Nebraska. A crop rotation of corn, soybeans and sweet sorghum is planned as part of the energy and soil conservation system for the farm. Approximately 2 hectares (5.0 acres) of the farm is reserved for farmstead operations. These include: A 10-sow, farrow-to-finish swine facility; a 760-litre (200 gal) per batch alcohol fermentation/distillation unit; a methane-gas production unit; and crop drying and processing facilities. Energy-saving, low-pressure center-pivot and gated-pipe irrigation will be important features of this demonstration project. Power for pumping water to these systems will be provided by alcohol-fired LP gas engines.

The respective amounts of corn, soybean and sweet sorghum selected for this project were dictated by the amount of corn and soybean supplement needed by the swine and by the relative quantities of alcohol required for irrigation plus the field and farmstead operations. Integrated use of various renewable energy sources on this farm makes it theoretically possible to market 104 metric tons (114 ton) of

pork per year with almost zero direct and little indirect petroleum input. To do this, approximately 33.2, 19.4 and 8.1 hectares (82, 48 and 20 acres) of irrigated corn and soybeans and dryland sweet sorghum, respectively, are required.

The energy savings of this form of integrated energy management are substantial. Present estimates of the amount of direct and indirect energy (including that for corn and soybean production) required per metric ton of pork marketed are equivalent to nearly 230 litres (60.6 gallons) of diesel fuel. Nebraska, which ranks fifth nationally in pork production, produces one-half million metric ton (1.1 billions lbs) of pork per year. If only 10 percent of the savings projected by this project were achieved by the year 1985, and if the magnitude of pork production does not increase -- which it almost certainly will -- Nebraska swine producers alone would conserve the equivalent of 1.12 million litres (296,000 gallons) of diesel fuel per year. Presumably, this fuel would be available for grain production for the export market. A similar 10-percent acceptance of fossil-fuel savings demonstrated in this project, if applied to the remaining 1979 corn and soybean crop, would conserve an additional 189 million litres (50 million gallons) of diesel fuel per year in Nebraska alone.

Dennis Schulte, Assist. Prof.
Agricultural Engineering



MARK HARRELL, Assistant Professor/Assistant Forester, Forestry Fisheries and Wildlife

A native of Springfield, VA, he received his B.S. degree in Biology, College of William and Mary, Williamsburg, VA. His M.S. and Ph.D. is in Entomology, University of Wisconsin, Madison, WI. Research for his Ph.D. dissertation was in the area of Forest Entomology. Dr. Harrell will be involved with Forest Pest Control programs. He started on October 15th.



DENNIS McCALLISTER, Assistant Professor, Agronomy Department

Dr. McCallister was educated in Leipsic, Ohio. He attended the University of Notre Dame for his undergraduate work where he received a B.S. degree in chemistry and completed his training for a secondary school teaching certificate. He obtained his Masters degree in Agronomy from Ohio State University. In 1977 he moved to College Station, Texas to work on a Ph.D. degree in soil chemistry, with research into the chemistry of soils. He joined the staff on August 1st.



JAMES PETERSEN, USDA Scientist, Courtesy Appointment as Professor of Entomology

Dr. Petersen is a graduate of the University of Utah, where he completed his Ph.D. work in 1966. He worked for 14 years with the USDA, Gulf Coast Mosquito Research Laboratory, Lake Charles, Louisiana. His research efforts were concentrated on biological control for mosquitoes with emphasis on Mermithid nematodes. His new job assignment is with the USDA, Livestock Insects Research Unit. He started in this capacity on Sept. 15.



GURMEL SIDHU, Assistant Professor, Plant Pathology Department

Dr. Sidhu received his M.Sc. (1962) from Punjab University, India and Ph.D. (1972) from the University of British Columbia, Canada in plant and fungal genetics. He was awarded a post-doctoral fellowship to study the genetics of nematode-fungal interactions on a common host and has continued this research as a research scientist. His main research interest is in the field of genetics of host-parasite interactions. He joined the staff on September 1st.



C. DEAN YONTS, Research Assistant/Irrigation Engineering Technician, University of Nebraska - Panhandle Station

Mr. Yonts received his B.S. in Agricultural Engineering from the University of Wyoming in 1974. He was employed by the Ag. Technology Company as a consultant in Alliance, NE. He took a leave of absence to return to the University of Wyoming where he received his Master's degree in Ag. Engineering in 1978. On Sept. 1st, he started to work for the University of NE, Panhandle Station, as an Irrigation Engineering Tech.