3-1981

Agricultural Experiment Station News March 1981

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From the Director’s Desk:

In a recently published booklet, “Research and the Family Farm,” prepared for the Experiment Station Committee on Organization and Policy (ESCOP), data on allocation of research resources were reported. These data were obtained from a 10% sample of fiscal year 1979 funded projects in Agricultural Experiment Stations throughout the United States (both 1862 and 1890 institutions).

FY 1979 research effort in Agricultural Experiment Stations was classified as follows:

- Agricultural production: 74.3%
- Marketing and processing: 10.9%
- Family living: 7.3%
- Community: 6.0%
- Other: 1.5%

Further breakdown of the first two categories to indicate the primary users of results of research projects indicated:

<table>
<thead>
<tr>
<th>Category</th>
<th>Agricultural Production Research</th>
<th>Processing and Marketing Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic research (not classifiable to specific user groups)</td>
<td>28.1%</td>
<td>27.3%</td>
</tr>
<tr>
<td>Public bodies</td>
<td>3.3</td>
<td>9.6</td>
</tr>
<tr>
<td>Small farms</td>
<td>7.3</td>
<td>3.5</td>
</tr>
<tr>
<td>Moderate sized farms</td>
<td>4.9</td>
<td>6.4</td>
</tr>
<tr>
<td>Large farms</td>
<td>3.2</td>
<td>2.4</td>
</tr>
<tr>
<td>Size neutral</td>
<td>53.3</td>
<td>50.7</td>
</tr>
</tbody>
</table>

Breakdown of family living research projects according to principal users indicated 36.6% basic research, 39.2% directly related to family living, and 24.1% oriented to public bodies.

Among all Agricultural Experiment Station projects studied, 22.1% were classified as basic research, and 77.9% were classified as applied research.

Copies of this bulletin have been sent to all IANR unit administrators. I encourage your review of this document, and the recommendations contained therein.

Roy Arnold  
Dean and Director

Collaborative Research Support Programs

Title XII supported international collaborative research support projects (CRSPs) in which Nebraska scientists are participating are integral elements of the Agricultural Experiment Station program. This is consistent with the concept that international activities should be operated as a part of the teaching, research and extension functions of the IANR.

Through the initiatives of the International Programs Division and scientists involved, Nebraska is participating heavily in two of the three CRSPs which have been activated to date: Sorghum/Millet with nine contributing projects and Beans/Cowpeas headed by Michigan State. We are not involved in the Small Ruminant CRSP led by California-Davis. The management role of Nebraska as the lead institution for Sorghum/Millet on the other hand, is with the International Programs Division. Current annual grant support is approximately $450,000 for Sorghum projects and $100,000 for Bean projects in the AES and $200,000 for Sorghum/Millet CRSP management in IP.

Additional CRSPs are in various stages of planning and approval but their funding is somewhat in doubt. We would hope to be selected for involvement in those relating to maize wheat and large ruminants if and when they are activated. We plan to “pass” on those relating to fisheries, aquaculture, tropical soils, peanuts, and tropical crop protection. We tried but missed on human nutrition.

R. W. Kleis  
Dean, Int. Programs

CAMaC

The Center for Agricultural Meteorology and Climatology (CAMaC) was formed by action of the Board of Regents in February, 1979. The unit is composed of persons who had been assigned to other IANR units such as the Department of Agricultural Engineering (Agricultural Meteorology Section), Department of Horticulture, the Conservation and Survey Division and the Water Resources Center.

CAMaC’s current meteorology field research programs are aimed at achieving improvements in crop water use efficiency (photosynthetic production/unit of water consumed), studying the nature of atmospheric
deposition of pollutants and natural materials in our region, understanding turbulent transfer of heat and mass (water vapor, carbon dioxide) between plants and the atmosphere, predicting and modifying microclimatic influences on plant disease and detecting plant water stress by means of remote sensing of plant temperature conditions for purposes of irrigation scheduling.

In one major project supported by State and Hatch funds and by National Science Foundation and USDA/SEA grants, CAMaC and Agronomy Department scientists are studying ways in which architectural features of the soybean plant can influence that crop’s adaptability to heat, moisture and wind-induced stresses. Isogenic pairs of two important cultivars have been developed. Architectural changes should for example, affect the efficiency of light interception which in turn affects photosynthesis and should alter the energy balance in ways that influence how much water the plant will transpire.

In the realm of climatology research a new program has been started with NAES and Water Resources Center support to determine the specific impacts and vulnerabilities of Nebraska’s agriculture to normal and extreme weather conditions.

Other new efforts aimed at augmenting current capabilities in assembling, analyzing and interpreting climatic data, will soon be started. A recently signed cooperative agreement with the National Oceanic and Atmospheric Administration (NOAA) provides for a demonstration of the use of automated weather stations to support irrigation scheduling and other agricultural operations. A dedicated computer will interrogate stations to be located in Nebraska’s southwestern corner on a daily basis. Hourly information on wind speed and direction, solar radiation, precipitation, air and soil temperature and humidity will be processed and made available for use in the AGNET system. A large number of AGNET programs already make use of weather and climate data and it can be expected that many new applications will be found as the reliability and accessibility of the weather and climate data improve with introduction of this new technology.

N. J. Rosenberg CAMaC Director

Station Communications Activities

The Department of Agricultural Communications is engaged in a number of activities related to the Agricultural Experiment Station. Phil Holman handles Station publications as well as journal articles and graphs or charts for journal articles. Terry Meisenbach edits the Quarterly and the Station annual report. Bart Stewart handles visuals for slides, overhead transparencies and posters. DeLoris Clouse is the contact person for synchronized slide/tape presentations. Dan Lutz handles news releases and Jack Adams prepares science articles. If you have an item which might be used on radio, television or the IANR Update program, please contact Jim Randall.

These and other activities carried out by the Department of Agricultural Communications are summarized in a folder entitled “Communications Connections.” The folder was distributed through unit heads last month. If you have not received a copy, please call 2-2821.

Richard L. Fleming
Head
Agricultural Communications

Projects Approved

NEB 11-033 - The Dynamics and Energetics of the Soil-Plant-Atmosphere Continuum

This is a revised Hatch project that contributes to regional project NE-48. The investigators are W. E. Splinter (Ag Engineering), G. E. Meyer (Ag Engineering) and N. J. Rosenberg (Center for Ag Meteorology and Climatology). The project is approved for the period of October 1, 1980 through September 30, 1985. The objectives of this project are (1) understand and predict how the environment affects physiological factors controlling plant development, (2) adapt climatological technology and instrumentation to predict crop microclimate and (3) utilize the results of these studies to develop improved growth models of crops to predict impact of climate change.

NEB 11-061 - Development and Evaluation of Conservation Tillage Systems

This is a new Hatch project that contributes to regional project NC-156. The investigators are H. D. Wittmuss (Ag Engineering) and E. Dickey (Ag Engineering). The project is approved for the period of October 1, 1980 through September 30, 1985. The objectives of this project are (1) evaluate the effect of conservation tillage and machine operations on labor input and fuel requirements, (2) evaluate quantity, placement and decomposition rate of crop residues, organic matter changes, nutrient availability, soil pH, crop growth rates, and crop yields, (3) evaluate the effect of tillage on soil physical parameters, to include: (a) soil density, (b) soil surface roughness, (c) soil particle-size distribution, and (d) crop residue distribution, and (e) soil porosity. Physical parameters evaluated shall include: (a) soil moisture content; (b) soil temperature, (c) nutrient availability, (d) soil radiation, (e) wind velocity, (f)
evaporation, (g) infiltration, and (h) water-holding capacity, (4) evaluate concepts for machine design and performance criteria for fertilizing, planting and cultivating conservation-tilled crops.

**NEB 12-007 - Systems of Weed Control in Crop Production for Eastern Nebraska**

This is a revised Hatch project effective February 23, 1981 through February 22, 1986. The principal investigators is O. C. Burnside (Agronomy). The project reviewers were: R. Gold (Environmental Programs), E. Dickey (Ag Engineering), M. Boosalis (Plant Pathology), K. Frank (South Central Station) and W. Schutz (Biometrics Center). The objectives of this project are: (1) determine mechanism of seed and bud dormancy and methods of destroying their viability, (2) develop selection criteria for winter wheat competitiveness to weeds, (3) study factors influencing herbicide phytotoxicity and dissipation and (4) develop effective weed control methods for conservation tillage crop production systems.

**NEB 12-046 - Market Quality in Wheat**

This is a revised Hatch project that contributes to regional project NC-132. P. J. Mattern (Agronomy), V. A. Johnson (Agronomy) and J. W. Schmidt (Agronomy) are the principal investigators. The project is approved for the period of October 1, 1980 through September 30, 1985. The objectives of this project are (1) to improve the quality and marketability of wheat in domestic and foreign markets, (2) to identify the major quality specifications for noodle flour and determine the role of existing wheat types and to examine the potential for modifying processing parameters, (3) to differentiate between genetic and environmental factors for trace mineral content of wheat and identify cultivars which could be used for modifying trace mineral content in a wheat breeding program.

**NEB 12-076 - Evaluation of Grain Crop Variety Performance in Nebraska**

This is a revised State project effective December 1, 1980 through December 1, 1985. The principal investigator is A. F. Dreier (Agronomy). The co-principal investigators are L. Nelson (Panhandle Station), P. Grabouski (North Platte Station), and R. Moomaw (Northeast Station). The reviewers of this project were J. Specht (Agronomy), P. T. Nordquist (North Platte Station), W. Schutz (Biometrics Center) and M. G. Boosalis (Plant Pathology). The general objective of this project is to provide farmers with adequate information for selecting varieties and hybrids. This requires a statewide approach to be more effective. The specific objectives are: (1) to evaluate yield performance and other important agronomic traits of selected crop varieties and hybrids by using test sites at various locations in Nebraska, and (2) to study the interaction of varieties with soil, climatic and cultural variables.

**NEB 12-091 - Soybean Physiology in Varietal Improvement**

This is a revised Hatch project with an effective date of October 20, 1980 through June 30, 1985. James E. Specht (Agronomy) is the principal investigator. The reviewers are W. Schutz (Biometrics Center), C. Gardner (Agronomy), B. Blad (Center for Ag Meteorology and Climatology), C. Sullivan (Agronomy) and R. Moomaw (Northeast Station). The objectives of this project are (1) investigate and identify the key physiological mechanisms involved in soybean response to drought and temperature stress, (2) evaluate the response of soybeans to irrigation considering the ontogenetic and morphological parameters required to maximize yield with a minimum of supplemental water, (3) assess the potential of known genes inducing significant alterations in soybean plant architecture, morphology, and physiology with respect to agronomic significance or utility in various production environments, (4) construct a random-mating soybean population upon which recurrent selection for the various physiological and morphological traits can be accomplished.

**NEB 12-092 - Canada Thistle Physiology and Biochemistry and Herbicide Action in Plants**

This is a revised Hatch project effective January 15, 1981 through January 14, 1986. L. C. Haderlie (Agronomy) is the principal investigator. G. A. Wicks (North Platte Station) and R. F. Mumm (Biometrics and Information Systems Center) were the project reviewers. The objectives of the project are (1) investigate Canada thistle biology, physiology and biochemistry, (2) measure root growth and extent of root buds and dormancy, (3) assay biochemicals of buds through development, dormancy, and sprouting, (4) measure photosynthetic capabilities, and assimilate translocation as affected by temperature and photoperiod, (5) measure herbicide absorption, translocation, metabolism and mechanism of action in plants (a) when postemergence herbicides are combined with growth regulators, adjuvants, or clay carriers of fertilizers or herbicides, (b) when plants are water stressed or under various temperatures, nutritive supplies, or light intensities.

**NEB 16-034 - Heat Stable Enzymes from Thermophilic Microorganisms**

This is a new Hatch project effective November 12, 1980 through September 30, 1985. J. H. Rupnow (Food Science and Technology) is the principal investigator. The reviewers were A. M. Parkhurst (Biometrics and
Information Systems Center), K. M Shahani (Food Science and Technology), P. Mattern (Agronomy), R. Dam (Ag Biochemistry) and M. Hanna (Ag Engineering). The objectives of the project are (1) evaluate thermophilic microorganisms for their abilities to produce enzymes of potential technical utility to the food industry and to determine the physical and nutritional conditions that promote growth and enzyme production, (2) determine conditions that affect catalytic activities of selected heat stable enzymes, and (3) develop methods for immobilizing heat stable enzymes and to evaluate the effects of immobilization on catalytic efficiencies and thermal stabilities.

**NEB 26-002 - Interfacing of Wildlife Resources and Agriculture**

This is a new Hatch project effective September 1, 1980 through August 31, 1985. R. M. Case (Forestry, Fisheries and Wildlife) is the principal investigator. The reviewers were R. Gold (Environmental Programs), B. Johnson (Ag Economics), R. Mumm (Biometrics and Information Systems Center), E. Peo (Animal Science), J. Stubbendieck (Agronomy). The objectives of this project are (1) evaluate methods for immobilizing heat stable enzymes and to activities of selected heat stable enzymes, and (3) develop methods for immobilizing heat stable enzymes and to evaluate the effects of immobilization on catalytic efficiencies and thermal stabilities.

**NEB 44-025 - Biology and Control of Nematodal and Fungal Plant Diseases in the Nebraska Panhandle**

This is a new Hatch project with an effective date of January 1, 1981 through December 31, 1985. E. D. Kerr (Panhandle Station) is the principal investigator. The reviewers were M. G. Boosalis (Plant Pathology), A. M. Parkhurst (Biometrics and Information Systems Center), R. Staples (Entomology), B. Doupek (South Central Station) and J. Steadman (Plant Pathology). The objectives of this project are (1) determine the best time to apply nematicides in a corn-bean-sugar beet rotation, (2) determine if nematodes are causing yield losses of corn in the Nebraska Panhandle, (3) determine the relationship between dry bean yields and lesion nematode populations, (4) determine the effects of late season powdery mildew on yield of sugar beet, (5) investigate the effects of stunted nematodes on sorghum and proso in western Nebraska and (6) determine the importance of head smut of proso in the Nebraska Panhandle.

**NEB 91-020 - Nutrient Bioavailability: A Key to Human Nutrition**

This is a revised Hatch project that contributes to regional research project W-143. The project is approved for the period of October 1, 1980 through September 30, 1985. C. Kies and H. M. Fox of the Human Nutrition and Food Service Management are the principal investigators. The objectives of this project are (1) to determine the biological availability in human subjects of water soluble vitamins and trace minerals and (2) to assess the factors affecting the availability of these nutrients.

**Grants and Contracts**

<table>
<thead>
<tr>
<th>Project</th>
<th>Principal Investigator</th>
<th>Grant Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anderson, Bruce (Agronomy) - Arrow Seed Company, Inc.</td>
<td>1,200</td>
<td></td>
</tr>
<tr>
<td>Dickerson, Gordon E. (Animal Science) - University of Arkansas</td>
<td>500</td>
<td></td>
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<tr>
<td>Farlin, Stanley D. (Animal Science) - Eli Lilly and Company</td>
<td>12,000</td>
<td></td>
</tr>
<tr>
<td>Frey, Merwin L. (Veterinary Science) - Schering Corporation</td>
<td>650</td>
<td></td>
</tr>
<tr>
<td>Haderlie, Lloyd C. (Agronomy) - CIBA-GEIGY</td>
<td>2,000</td>
<td></td>
</tr>
<tr>
<td>Hergert, Gary W. (North Platte Station) - Eagle-Picher Foundation</td>
<td>1,000</td>
<td></td>
</tr>
<tr>
<td>Hergert, Gary W. (North Platte Station) - National Fertilizers Solution Association</td>
<td>2,000</td>
<td></td>
</tr>
<tr>
<td>Hergert, Gary W. (North Platte Station) - U. S. Department of Interior Office of Water Research and Technology</td>
<td>9,150</td>
<td></td>
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<tr>
<td>Mandigo, Roger W. (Animal Science) - Prime Meat Processors</td>
<td>12,750</td>
<td></td>
</tr>
<tr>
<td>Mandigo, Roger W. (Animal Science) - Nebraska Pork Producers Ass'n</td>
<td>2,000</td>
<td></td>
</tr>
<tr>
<td>Moser, Bobby D., Zimmerman, Dwane R. Peo, Ernest R., (Animal Science) - Nebraska Pork Producers Association</td>
<td>2,500</td>
<td></td>
</tr>
<tr>
<td>Rahn, George (Northeast Station) - National Fertilizer Solutions Ass'n</td>
<td>2,000</td>
<td></td>
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<tr>
<td>Rosenberg, N. J. (Center for Agricultural Research and Technology) - National Science Foundation</td>
<td>98,900</td>
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<tr>
<td>Rush, Ivan G. (Panhandle Station) - Eli Lilly and Company</td>
<td>4,800</td>
<td></td>
</tr>
<tr>
<td>Sullivan, Thomas W. (Animal Science) - American Cyanamid Company - Donation/Gift</td>
<td>3,000</td>
<td></td>
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<tr>
<td>Turner, Mike (Ag Economics) - Omaha Bank for Cooperatives</td>
<td>7,500</td>
<td></td>
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<tr>
<td>Weiss, Albert (Panhandle Station) - U. S. Department of the Interior Office of Water Research and Technology</td>
<td>3,670</td>
<td></td>
</tr>
</tbody>
</table>

**Competitive Grants**

There were twelve Competitive Grants submitted through the Ag Experiment Station for submission to the USDA/SEA. The breakdown of the areas were as follows:

1. Biological Stress on Plants
2. Human Nutrient Requirements
3. Biological Nitrogen Fixation
4. Genetic Mechanisms for Crop Improvement

A special thank you to the Departments for their preparation of grants and cooperation with the Experiment Station on submission of the grants.


Journal Abstracts - Submitted for Publication (contact authors for more information)


80-1466. Picloram, Dicamba and 2,4-D in Combination with Growth Regulators for Control of Leafy Spurge. Timothy C. Lambert and Alex R. Martin. North Central Weed Control Conference.


BULLETINS PRINTED


Edd Clemens, Associate Professor, Veterinary Science Department

Dr. Clemens is a native of Illinois. He received his Ph.D. in Nutrition from the (University of Nebraska-Lincoln), gastroenterology (Cornell, Veterinary College). He formerly was on the Veterinary faculty at Cornell, Nairobi, Kenya and New England. His University of Nebraska faculty appointment was on November 1, 1980. He does research efforts in gastro-enterology and clinical nutrition.

Thomas W. Dorn, Extension Irrigation and Conservation Specialist, University of Nebraska - Northeast Station

A native of Tekamah, NE, Mr. Dorn earned a B.S. & M.S. in Mechanical Agriculture from UNL. He spent four years with a private agricultural consulting firm in heading the Engineering division. Before assuming his position with the Northeast Station, he spent six months with PUMP program traveling over much of Nebraska demonstrating the value of testing irrigation pumping plants for efficiency. His research and extension effort will continue to include a strong emphasis in efficiency, but will include such areas as irrigation scheduling, reduced nitrate leaching and improved irrigation management.

Roy Frederick, Professor, Agricultural Economics and Extension Public Policy Economist

Dr. Frederick is a native of Kearney, Nebraska. He earned a B.S. in 1966 and a M.S. in 1968 from the University of Nebraska in agricultural economics. He completed his Ph.D. work in 1971 at Purdue University in agricultural economics. From 1971-75 he was an extension grain marketing specialist at Kansas State University. Also at KSU he was an agricultural policy specialist from 1977-80. In 1976 he served as a staff economist for the Committee on Agriculture and Forestry of the US Senate. He started his new position in January, 1981.

Jeffrey A. Meyer, Research Associate, Department of Entomology

Dr. Meyer was educated in Aurora, Indiana. He did his undergraduate work at Purdue University in Animal Science, receiving a B.S. in 1975. He received a M.S. in Entomology from the University of Kentucky in 1978. Later that year, he moved to Fayetteville, AK to work on a Ph.D. degree in Entomology, studying control methods for the lone star tick. He joined the Livestock Insects Research Unit in the Department of Entomology in February, where he will be working on management of the stable fly in feedlots.

Ellen T. Paparozzi, Assistant Professor of Urban Horticulture, Department of Horticulture

Dr. Paparozzi is a native of Passaic, New Jersey. She earned a B.S. degree in 1976 from Rutgers University in plant science. She received a M.S. degree in 1978 and a Ph.D. in 1981 from Cornell University. She majored in floriculture and ornamental horticulture with minors in plant anatomy and plant physiology. She started in her new position in January, 1981. Her research will emphasize outdoor woody ornamental plants and floriculture. She will teach floriculture, floral design and nursery crop management and production.

Lavon J. Sumption, District Director, University of Nebraska - North Platte Station and Extension District II

Dr. Sumption is a native of South Dakota. He earned a B.S. in 1951 and Ph.D. in 1957 from the University of Minnesota in Animal Science. From 1975-80 he was a project director for the Great Falls, Montana Livestock Cooperative as an animal geneticist. From 1957-66 he was a genetics researcher and teacher in the Animal Science department here at UNL. He was a consulting geneticist with private Canadian livestock breeders designing breeding, marketing plans, and selection of European cattle. He was a geneticist for two years with Ankony Angus Corp. Dr. Sumption started in his new position on January 5th.