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Agricultural Experiment Station News May 1989

Agricultural Research Division News

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The Institute of Agriculture and Natural Resources University of Nebraska-Lincoln

May 1989 Volume 22, Number 4

Dr. Marion O'Leary

MARION O'LEARY HEADS BIOCHEMISTRY

Marion O'Leary was born in Quincy, Illinois in 1941. He spent his early years in Barry, Illinois, and graduated from Barry High School in 1959. After that, he enrolled at the University of Illinois where he received a B.S. degree in Chemistry in 1963. From 1963 to 1966 he attended the Massachusetts Institute of Technology, and received a Ph.D. degree in organic chemistry from that institution in 1966. During 1966 and 1967 he was an NIH fellow at Harvard University.

In 1967 Dr. O'Leary joined the faculty in the Department of Chemistry at the University of Wisconsin-Madison, where he became Assistant Professor of Chemistry. He rose through the ranks, becoming Professor of Chemistry in 1978 and Professor of Chemistry and Biochemistry in 1980. From 1986 to 1988 he served as Associate Chairman of the Department of Chemistry.

At the beginning of 1989, Dr. O'Leary joined the faculty at the University of Nebraska-Lincoln, where he is Head of the Department of Biochemistry and Director of the Center for Biological Chemistry. In addition to his affiliation with the Department of Biochemistry, he is associated with the Department of Chemistry and the School of Biological Sciences.

Dr. O'Leary was a Sloan Foundation Fellow in 1972-1974 and a Guggenheim Foundation Fellow in 1982-83. He has spent several periods as a Visiting Fellow at the Australian National University in Canberra and several periods as a Visiting Professor at various universities in Indonesia. He is a member of the American Chemical Society, the American Society for Biochemistry and Molecular Biology, the American Society of Plant Physiologists, and the American Association for the Advancement of Science. He is the author of two books and over 100 scientific papers.

Research activities in Dr. O'Leary's laboratory are in the areas of chemistry, biochemistry, and plant physiology. He has made extensive studies of isotope fractionation in chemical systems, in enzymatic reactions and has a variety of studies of enzymes and enzyme modes. His research is supported by the National Science Foundation, the National Institutes of Health, the U.S. Department of Agriculture, and the U.S. Department of Energy.

Dr. O'Leary is married and has three children. He is an avid pianist, with a particular interest in chamber music.

Dr. Glenn Hoffman

GLENN HOFFMAN LEADS AG ENGINEERING

Dr. Glenn Hoffman was born and raised in Delaware, Ohio. He completed his B.A.E. in Agricultural Engineering at The Ohio State University in 1963 and his M.S. degree the same year. In 1967, Dr. Hoffman earned a Ph.D. degree from North Carolina State in Biological and Agricultural Engineering.

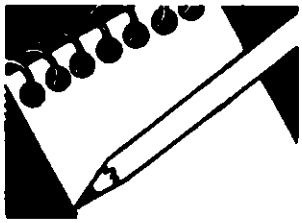
Dr. Hoffman comes to IANR from the USDA/ARS Water Management Research Laboratory in Fresno, California where he has been research leader and served

as Laboratory Director. In that position, he was also adjunct professor in the Department of Soil and Environment Sciences at the University of California-Riverside and an Agricultural Experiment Station associate at UC-Davis. Prior to assuming the Director's position at the Water Management Research Laboratory, Dr. Hoffman spent eighteen years as a Research Agricultural Engineer and Research Leader at the USDA/ARS Salinity Laboratory, Riverside, California.

Hoffman is recognized internationally as an authority on the management and reclamation of salt-affected soils, the drainage requirement to prevent salination of irrigated lands, the impact of irrigation systems and scheduling of irrigations on the magnitude and distribution of salinity in the soil profile, the influence of various environmental factors on crop salt tolerance and plant growth, and instrumentation for measuring plant response to salt and water stress.

As a consultant on the management of salt-affected agricultural soils, Hoffman has visited Israel, Iran, India, Pakistan, Australia, Brazil, Mexico, China, Algeria, and Egypt. He is the author of more than 125 scientific publications and 10 invited book chapters.

Dr. Hoffman is married and has three daughters.



NOTES FROM THE ARD ADVISORY COUNCIL

The agenda for the ARD Advisory Council meetings includes topics that directly affect the Agricultural Research Division. These topics originate as concerns of ARD faculty, or are items which ARD administrators would like further input from faculty. The following topics were discussed at recent Council meetings:

-Definition of "interdisciplinary". The Council proposed general definitions of the terms interdisciplinary and multidisciplinary as used within the ARD.

-Health monitoring of University personnel who work with pesticides. Concerns about procedures were discussed and were forwarded to an active University committee currently developing guidelines for handling hazardous materials.

-Proprietary research and information. The Council reviewed several documents in the draft stage which define the University's policy on proprietary research and information. Comments and concerns relative to the ARD are being forwarded to the authors of these policy drafts.

-ARD administrators and faculty have raised general concerns about foreign graduate students who work on their research projects in a foreign country. These concerns were forwarded to International Programs.

-Desirability of graduate students to have training in extension, teaching, business, or international work, in addition to research. The Council questioned whether ARD graduate students should have additional training for career opportunities other than research (teaching, private industry, extension, etc.). Dr. Nelson has prepared a policy statement.

Topics on the agenda for upcoming meetings include:

-How do/will "Centers" impact the ARD and individual faculty?

-Mechanism to give credit to Departments sharing graduate students.

-Cost of doing field research.

-Participation in review of regional projects.

-Cooperative agreements with other institutions.

If you have comments or questions about these or any other topics in relation to the ARD, please contact a Council member or the ARD office.

John A. Smith, Chairman
ARD Advisory Council

ARD DEFINITION OF "INTERDISCIPLINARY" VS "MULTIDISCIPLINARY" RESEARCH

Sometimes, the distinction between "interdisciplinary" and "multidisciplinary" research is unclear. Therefore, we offer the following definitions which came from Richard Clark, West Central Research and Extension Center, in a paper he presented at the North Central Extension Workshop in May, 1988.

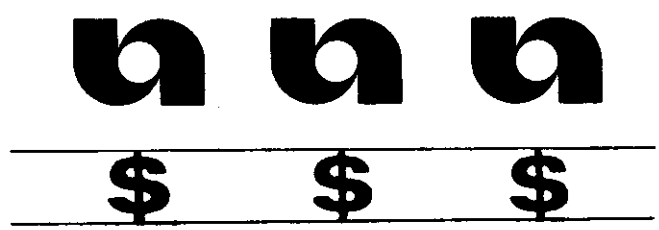
"Multidisciplinary work is when people from more than one discipline work individually on a common problem. But each discipline may cast the problem in its own terms and work on it more or less independently of the others. They may occasionally meet to discuss their findings, but direct interaction is not required."

"Interdisciplinary work involves several disciplines working together on a common problem. The distinction is a matter of intensity. Interdisciplinary efforts are more fully integrated and more intense in the interactive parts. In this case, problem definition and approaches to study and solution are done jointly. They meet together, agree on approaches, interact, and try to understand one another's contributions."

We would like to add that disciplinary lines do not equate to departmental lines. Due to the range of expertise in some departments it is possible for interdisciplinary efforts to be confined to a single department.

Worth Thinking About:

Hard work is the yeast that raises the dough.



INDIRECT COSTS-WHERE DO THEY GO?

In the previous issue of the ARD newsletter, an article was included discussing the rationale of indirect cost recovery on external grant and contract funds. As noted in that article, indirect costs are intended to support a number of areas including library costs, utility costs, physical plant Operations and Maintenance costs and general administrative costs for grants and contracts. However, this is primarily used as a basis of calculation and not necessarily as a form of redistribution.

In a survey of North Central Region State Agricultural Experiment Stations conducted in 1986, it was apparent that there was a wide variation among universities on how indirect costs are distributed and what proportion was received directly by the originating unit or investigator. In general terms, however, the most common arrangement was for a proportion (usually in the range of 10 to 25 percent) of the funds generated through activities of an academic unit being returned to that unit for discretionary use by the unit administrator. These are normally used for general unit operating costs, redistributed to faculty originating the proposals, or some combination of the above.

The remainder of the funds are retained at the Central Administration level, but are redistributed in support of research programs in a number of different ways. These will be illustrated by the distribution of funds within UNL as shown later in this article. Each of the University of Nebraska campuses has its own distribution policy, so the procedure shown in this article is correct only for UNL indirect cost distribution.

Depending upon total grant funding, between two million and three million dollars of indirect costs recovery is generated by UNL annually. As directed by an action of the state legislature, each fiscal year, $700,000 of indirect cost money is placed into the general University support budget. This general budget support is one of the permanent allocations in the distribution procedure. In addition to this, there are other permanent allocations which specifically provide support for Research Council awards, Research and Graduate Studies office support, (including Sponsored Research Services and Contracts and Grants), Environmental Health and Safety support and Animal Care and Use activity. These latter allocations total over $200,000.

The remaining ICR funds are distributed according to the following formula:

Originating Unit or Department	35%
Deans Office	5%
Research Initiation Fund (Vice Chancellor for Research)	10%
Library Support	5%
Facility Renovation Support (Administered by Vice Chancellor for Research and Vice Chancellor, IANR)	25%
General Administration (Research and Research Support, e.g. Equipment matching, Computing, etc.)	20%

Using the previous formula, allocations of indirect cost monies are made once or twice per year by the Vice Chancellor for Business and Finance. All Unit Administrators receive a copy of this distribution document. After the permanent allocations are removed and the allocations for other purposes are removed, the percent of indirect costs generated by a specific unit which end up being returned to that unit under this distribution plan usually turns out to be about 17%. In addition to these, the unit and individual faculty receive additional returns through research grants and travel support from Research Council. Other allocations occur from the Dean's office, from the Vice Chancellor's office, through facilities renovation, through computing and operating support, and other ways. The return to each unit in these ways of course, is variable from year to year.

The above distribution policies are similar in most respects to those of the other North Central Region Universities with Agricultural Experiment Stations as reported in the previously mentioned survey. That survey also reinforced the points made in the earlier article relative to the fact that UNL ICR rates and policies for distribution and collection are fairly consistent with other peer institutions in the North Central Region.

STATEMENT OF ACCOMPLISHMENTS

Project NEB-27-004, Spectral Radiation Techniques to Estimate Productivity and Water Stress in Vegetation for period, April 1984-1989. Principal Investigator: Blaine Blad

There have been 19 journal articles published, 13 papers presented at scientific meetings, 3 Ph.D. dissertations, and 1 M.S. thesis completed with 3 Ph.D. dissertations currently being written. More than $800,000 in grant funds were received to support the project research.

Some of the most significant results include:

1. Development of techniques based upon the measurement of canopy temperatures with infrared thermometers for scheduling irrigation of corn, soybeans and wheat. The use of such techniques can result in significant savings of water.
2. Development of techniques for measuring surface temperatures to evaluate plant water status, to determine sensible heat transport from vegetated surfaces and to estimate emitted long-wave radiation from the surface.
3. Development of techniques for estimating the radiation components of the energy balance using multi-angle and multi-spectral data obtained with various types of radiometers. These techniques can be applied to satellite data to help

monitor energy and mass exchange processes and vegetative conditions on the earth's surface.

4. Evaluation of the influence of water stress and fertility levels on the productivity of wheat grown under a wide range of climatic conditions throughout the Great Plains and utilization of remote sensing methods for monitoring the effects of these factors or wheat productivity.

Project NEB-27-005, Climate Data Base and Model for Estimating Crop Yields. Principal Investigator: K.G. Hubbard.

Over the course of the project there have been 16 reports and papers which are directly related to the project. Four of these were theses and dissertations which resulted from graduate students working on objectives related to the project. These publications are the result of collaborative research on topics that have linkages to the crop yield as affected by weather and include: phenology, irrigation, drought, soil water, canopy temperature, evapotranspiration, and climate change.

A state-of-the-art climate data management system has been developed for use with the climate data base. This system has been developed around PC computers and has been made part of the Local Area Network at the Center for Agricultural Meteorology and Climatology. The system also includes a dial-up computer for use by outside users so that data can be provided to other researchers and decision makers in the state.

Another development related to the project is the formation of the High Plains Climate Center, one of six regional climate centers in the United States perform applied climate studies, develop new climate products and perform services for interested parties in the cooperating states. The HPCC has provided funding for graduate students, equipment, and operating expenses associated with field and computer studies. The HPCC has also provided a mechanism for working with other researchers in the surrounding states on problems of mutual interest and thereby extending the testing of modeling concepts to a wider arena of soils and weather conditions.

The monitoring of near-real time climate data in the High Plains region has been extended to seven states and includes more than 70 automated weather stations. Hourly and daily data from this network have been used in the activities related to this project.

Project NEB 26-003, Biology and Control of the Zimmerman Pine Moth and Other Insect Pests of Forests in Nebraska. Principal Investigator: Mark Harrell.

The group of insects in Nebraska commonly called Zimmerman pine moths are serious borer pests of pines in windbreaks, plantations, and landscape plantings. This group was once believed to be the single species, *Dioryctria zimmermani* (Grote), the true Zimmerman pine moth. However, a study of these insects in central and western Nebraska determined that two species were actually present, *Dioryctria ponderosae* Dyar and *D. tumicolella* Mutuura, may be present in the Omaha area. None of these is the true Zimmerman pine moth, and this species is apparently not present in the state.

Early studies of *D. ponderosae* and *D. tumicolella* found that *D. tumicolella* has a life history similar to that of *D. zimmermani.* The life cycle is one year in length, adults fly in August, and the insect overwinters as first-instar larvae on the bark surface beneath bark scales. *D. ponderosae* was found to have a much different life history, with a life cycle varying in length from 14 months to two years, adults flying in June and August, and most larvae overwintering in the tunnels they have already formed beneath the bark.

This group of insects is difficult to control with pesticides, but when properly timed and applied, insecticide trunk drenches were found to provide a reasonable effective method for control. A potential long term approach for the management of these insects is to select and plant tree species that are resistant to their attack and damage. In a study of host resistance, jack pine was found to be the least infested and damaged of the four pine species common in Nebraska. Austrian and Scotch pines were intermediate, and ponderosa pine was the most heavily infested and damaged pine species.

Studies are continuing to identify additional methods of control, including the testing of safer and more effective insecticide treatments and identifying additional host, site, and environmental factors that predispose the trees to greater damage.

Project 20-036, Genetics, Breeding and Cultural Interactions of Beans. Principal Investigator: Dermot P. Coyne.

Great Northern (GN) and Pinto dry edible beans are an important cash crop on irrigated lands in western Nebraska (value □ $100 million, □ 200,000 acres, in 1988). There is a need to develop high yielding, multiple disease resistant cultivars, with improved yield and seed quality, and a plant archetype suitable for direct combining in order to remain competitive with other bean areas.

Germplasm screening: The common blight bacterial disease of beans, caused by *Xanthomonas campestris* pv *phaseoli* (Xcp) is seed transmitted. Resistance to seed infection by Xcp was detected in line BAC-6 (Brazil) and will be used in breeding. A differential reaction of leaves of tepary beans to strains of Xcp was detected. This has implications in breeding for resistance to Xcp in common beans. Co-inoculation experiments of bean lines with pathogens showed that rust interacted with Xcp

and BCMV, and so rust should be tested on separate leaves if Xcp is involved, and on separate plants if plants susceptible to BCMV are inoculated. Effective screening for resistance to leaf iron induced chlorosis is important. Leaf chlorosis was more severe under low rather than high temperature and a cultivar X temperature interaction was found.

Inheritance: Major genes were found to determine specific resistance to strains of the rust pathogen in several dry bean crosses. No genetic association was detected between genes controlling the reaction to rust and Xcp. The reaction to Xcp was inherited quantitatively in several crosses and narrow sense heritability was low, indicating that selection for resistance should be performed on a family basis in replicated trials. Bean leaf pubescence appears to be associated with non-specific (and durable) resistance to rust. The dense pubescence of the abaxial leaf surfaces of the rust resistant "Pompadour" cultilvar was found to be determined by one or two major genes.

Breeding:

(a) *Nebraska:* A small white dry bean cv "Monument," resistant to BCMV and with avoidance to white mold was released. GN and Pinto dry bean breeding lines have been developed with multiple disease resistance to several or all of the pathogens causing white mold, seed quality and yield, suitable maturity, and improved plant habit. Two GN lines appear promising for release in 1989. GN Belneb-1 and -2 advanced breeding lines were released jointly by the USDA (Dr. R. Stavely) and Nebraska. These lines combine specific rust resistance to all US rust races, Xcp and BCMV. The leaf pubescence trait is being transferred to glabrous Gn and Pinto lines.

(b) *Dominican Republic (DR):* Two red-mottled (PC-50 and "Quisquea"), one black ("CIBAO") and one white ("Arroyo Loro #") cultivars were released in cooperation with the DR and the University of Puerto Rico for use in the DR.

Rank Comparison of the Nebraska Agricultural Experiment Station to Other NC Region Stations*

Element	*NE*	*KS*	*IA*	*IL*	*MN*	*WI*
State Agriculture Receipts**	2	5	1	3	4	6
State Appropriations	7	6	8	10	1	3
Total Station Funds	6	7	8	9	2	1
Appropriated $/capita	2	5	7	12	3	6
Appropriated $/$100 sales	10	8	12	9	4	6
Station $ as % of higher education $	3	4	7	12	5	6

* There are 12 AESs in the North Central Region. Rankings for only 6 AESs are presented based on FY87 expenditures.

**Includes sales of agricultural commodities and government payments.

ARDC-MEAD ENVIRONMENTAL SITUATION

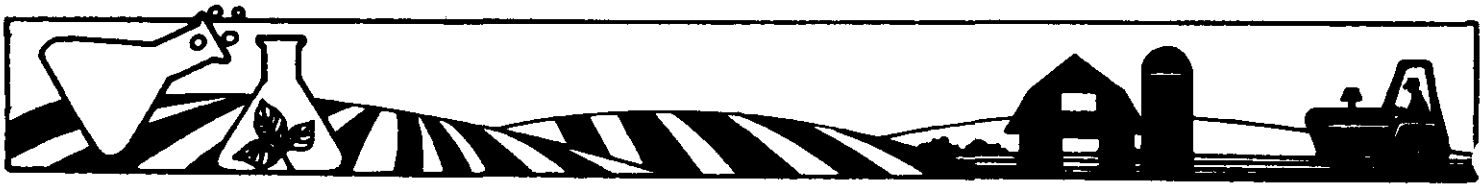
Numerous news articles have recently referred to the ongoing investigation by the U.S. Army Corps of Engineers (COE) to assess environmental hazards associated with the former ordnance plant activity on the land now operated as the Agricultural Research Development Center (ARDC). The primary concern has centered around groundwater contamination possibly resulting from leaching of explosives and solvents.

While a great deal of information has "leaked" to the press and appeared in the news articles, and while some information has been provided to the University on an informal basis, at this point the University has not received the actual CEO reports. The initial phase of the study consisted of an inventory phase which was conducted primarily in 1987. This was followed by a confirmation study phase conducted during 1987, 1988, and 1989 which is essentially finished at this point with a report nearly finalized, but not yet made public. The major thrust of that report is that the groundwater sampling activities have identified the presence of explosives and a solvent at trace levels in a few ARDC-operated wells on the ARDC, and COE-monitored wells on ARDC, and also a few domestic wells outside the boundaries of ARDC.

Initially, the well at the Agronomy headquarters was found to have solvent (TCE) concentrations at a low, but detectable level which exceeded the current drinking water standard. Use of that well for drinking water purposes has since been discontinued. More recently, a second well near Loadline 4 which was not in current operation, but in past years has been used as a portion of the general ARDC water supply was also found to have TCE in excess of the current standard. This is an old, small capacity well and will be immediately deactivated so it will not be used the future. Informal communication has also indicated that a low level of RDX was detected in an irrigation well in a field research area. This well is not used human consumptive use and since external exposure is not considered hazardous, the well will remain in operation.

While use of the TCE-containing well water for human consumption has been discontinued as a precautionary measure, it should again be noted that the levels of TCE found were extremely low and communication from health authorities indicates that there is no real risk to employees that have consumed this water in the past.

The inventory study and the confirmation study also deal to a lesser degree with PCB and asbestos on the property. However, the problem associated with the presence of these is not considered to be health threatening and the reports give little attention to these according to our advanced information.



There are tentative plans for the COE to conduct a public meeting in the Mead area in mid-May to release the confirmation study report and to discuss the results. We will have much better factual information provided to us at that time.

The next phase of this process is for the COE to conduct a very detailed study of the extent and types of contamination existing in the area, then to use this information to develop recommended remedial measures. This will be an expensive study probably costing in the millions of dollars and lasting nearly two years. This next phase has been recommended by the confirmation study and the COE is in the process of obtaining funding through the Department of Defense to continue with this project. The status of that will likely also be communicated at the public meeting in May.

UNL and IANR are cooperating as much as possible with COE, EPA, and other federal and state agencies during this period. However, documented feedback to us has been almost non-existent and we have been unable to communicate to interested persons internally as well as we would like. As information becomes available, we will continue to communicate as effectively as possible and take any measures that may be necessary to guard the health and safety of UNL employees.

NEW AND REVISED PROJECTS

The following station projects were approved recently by the USDA Cooperative State Research Service:

12-080 Chemical Aspects of Nutrient Movement and Availability in Sandy Soils.
Investigator: R. C. Sorensen, Agronomy
Status: Revised Hatch project effective January 1, 1989.

12-100 Nitrate Metabolism and Chemical Growth Regulation of Plants
Investigator: L. A. Klepper, Agronomy
Status: Revised Hatch project effective January 1, 1989.

12-042 Characterization and Genetics of Bacterial Plant Pathogens and Endophytic Bacteria
Investigator: A. K. Vidaver, Plant Pathology
Status: New Hatch project effective March 1, 1989.

43-037 Characteristics and Feed Value of Barley and Western Protein Supplements for Swine
Investigator: D. M. Danielson, West Central Research and Extension Center
Status: Revised Hatch project contributing to regional research project W-166 effective October 1, 1988.

RESEARCH GRANTS AND CONTRACTS RECEIVED FEBRUARY & MARCH 1989

AGRICULTURAL ECONOMICS	
Aiken, D. & Johnson, B. - Nebr. Banker's Association	$10,000
AGRICULTURAL ENGINEERING	
Schulte, D., DeShazer, J., Grisso, R., Hanna, M., Martin, D., Meyer, G., Thompson, T., & VonBargen, K., - National Science Foundation	40,000
Miscellaneous Grants Under $5,000 each	3,847
AGRONOMY	
Jones, A. - U.N. Foundation	20,000
Miscellaneous Grants Under $5,000 each	8,240
ANIMAL SCIENCE	
Calkins, C. - National Live Stock & Meat Board	35,694
Lewis, A. - Ajinomoto Company	10,000
Lewis, A. - Agri-Bio Corporation	20,000
Miscellaneous Grants Under $5,000 each	36,239
BIOCHEMISTRY	
Wagner, F. - Nebr. Dept. of Economic Development	70,000
CENTER FOR AGRICULTURAL METEOROLOGY & CLIMATOLOGY	
Miscellaneous Grants Under $5,000 each	9,221
ENTOMOLOGY	
Miscellaneous Grants Under $5,000 each	18,500
FOOD SCIENCE & TECHNOLOGY	
Taylor, S., & Hutkins, R. - Uni. of Wisconsin	53,419
FORESTRY, FISHERIES & WILDLIFE	
Miscellaneous Grants Under $5,000 each	1,500
HORTICULTURE	
Read, P. - UN Foundation	10,000
Riordan, T. - U.S. Golf Association	35,000
Miscellaneous Grants Under $5,000 each	12,203
NORTHEAST RESEARCH & EXTENSION CENTER	
Miscellaneous Grants Under $5,000 each	4,330
PANHANDLE RESEARCH & EXTENSION CENTER	
Hein, G. - Anna H. Elliott Fund	16,180
Reece, P. - Anna H. Elliott Fund	25,150
Smith, J. - Anna H. Elliott Fund	17,500
Wilson, R. - Anna H. Elliott Fund	24,850
Wilson, R. - Nebr. Dept. of Agriculture	14,835
Yonts, C. - Anna H. Elliott Fund	10,000
Miscellaneous Grants Under $5,000 each	36,590
PLANT PATHOLOGY	
Powers, T. - Layman Fund	9,100
SOUTH CENTRAL RESEARCH & EXTENSION CENTER	
Miscellaneous Grants Under $5,000 each	1,523
VETERINARY SCIENCE	
Miscellaneous Grants Under $5,000 each	28,145
WEST CENTRAL RESEARCH & EXTENSION CENTER	
Dearborn, D. - USDA	94,800
Klocke, N. - Layman Fund	8,000
Nichols, J. - Anna H. Elliott Fund	12,497
Miscellaneous Grants Under $5,000 each	3,820
TOTAL	**691,183**

FEDERAL GRANTS

The competitive grants, special grants, IPM grants and groundwater quality grants of the USDA are major sources of Federal funding for agricultural research nationwide. It is our goal for this source of funding to help us effectively address high priority research problems and we are pleased with the number of proposals submitted recently to the USDA by our faculty.

Although it is anticipated that not all proposals will be funded, the research program for each faculty member who took the time to develop an innovative and sound proposal should benefit from this experience even if the proposal is not funded.

The Agricultural Research Division personally commends the following faculty for submitting proposals:

COMPETITIVE GRANT PROPOSALS SUBMITTED FOR FY 89

F. G. Wagner	Biochemistry	proteolytic Mechanisms in Soybean Root Nodules
J. E. Kinder	Animal Science	Regulation of Ovarian Function by Circulating Progesterone in the Bovine
S. Srikumaran R. Krueger	Veterinary Science Biochemistry	Molecular Characterization of Virus-Host Cell Receptor Interactions
L. A. Klepper	Agronomy	Photochemical Non-Enzymatic Formation of Nitrogen Oxides in Green Plants
J. R. Settimi J. W. Maranville	Agronomy	Mechanisms Controlling Leaf Area Reduction Under Nitrogen Stress
R. V. Klucas	Biochemisetry	Hemoglobins from Monocotyledonous Plants
D. L. Rock	Veterinary Science	BHV-1 Latency-Related Gene: Function in Viral Latency and Reactivation
J. P. Markwell	Biochemistry	Biosynthesis of Chlorophyll *b*
C. V. Keis	Human Nutrition &	Fatty Acid/Fiber Interactions: Effects on Lipid Utilization
R. J. Spreitzer	Biochemistry	Chloroplast Heteroplasmic Suppression
M. G. Zeece	Food Science & Technology	Role of Cystatins in Myogenesis
S. G. Ernst G. D. Coleman	Forestry, Fisheries, & Wildlife	Competence State of *Populus Deltoides* Explants and its Effect on Targeting Cells for *Agrobacterium*-Mediated Transformation
T. O. Powers L. J. Sandall	Plant Pathology	Genetic Population Structure of the Soybean Cyst Nematode

SPECIAL GRANT PROPOSALS SUBMITTED FOR FY 89

L. D. Clements	Chemical Engineering	Conventional Polymers from Corn
J. L. Stubbendieck R. A. Masters T. B. Bragg	Agronomy Biology	Interactions of Eastern Redcedar and Rangeland Vegetation
F. A. Osorio A. Hogg	Veterinary Science	An Accurate Determination of the Pseudorabies Infection Status of Swine Herds with Single Reactors
D. L. Rock M. K. Hayes	Veterinary Science	Molecular Characterization of Bovine Herpesvirus Type 1 Immediate-Early Genes
D. L. Rock	Veterinary Science	Function of the BHV-1 Latency-Related Gene in Viral Latency and Reactivation
C. L. Kelling R. Obserst M. B. Rhodes S. Srikumaran	Veterinary Science	Molecular Changes in BVD Virus/Pathogenesis of Early Reproductive Disease
J. E. Kinder M. K. Nielsen	Animal Science	Evaluation of Management Practices and Traits that Influence Reproductive Efficiency in Beef Cattle
L. A. Nelson A. K. Vidaver K. Von Bargen P. Crews	Agronomy Plant Pathology Ag Engineering Textiles, Clothing & Design	Investigating Milkweed as an Alternative Source of Fiber
D. D. Dearborn D. C. Clanton R. T. Clark J. T. Nichols P. E. Reece	West Central R&E Panhandle R&E	Beef/Range Systems—Integrating Management Practices to Improve Efficiency

NORTH CENTRAL REGIONAL IPM GRANT SUBMITTED FOR FY 89

R. J. Wright L. J. Meinke G. L. Hein	Entomology Panhandle R&E	Impact of the Soil Environment on Survival of Immature Western Corn Rootworms

GROUNDWATER QUALITY RESEARCH GRANTS SUBMITTED FOR FY 89

W. L. Powers P. J. Shea R. F. Spalding	Agronomy Conservation & Survey	Offsetting Spatial Variability of Agrichemical Leaching by Coring Technique
P. J. Shea R. A. Masters D. A. Mortensen D. T. Walters A. M. Parkhurst	Agronomy Biometrics	Implications of Fire, Atrazine, and Nitrogen Use for Forage Management in Subirrigated Meadows
D. L. Martin W. L. Kranz L. E. Stetson	Ag Engineering Northeast R&E	Potential Leaching Under Low Pressure Center Pivots
W. L. Kranz C. A. Shapiro R. D. Grisso	Northeast R&E Ag Engineering	In-Field Calibration of Anydrous Ammonia Applicators
D. Eisenhauer	South Central R&E	Movement and Distribution of Agricultural Chemicals Beneath Surface Irrigated Land
A. Weiss	CAMaC	Modeling the Yield Response of Corn to Defoliation at Different Stages and Weather Conditions