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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



APR 30 1980

Vol. 13, No.10 - April 1980

Experiment Station

***** SPRING ISSUE *****

FROM THE DIRECTOR'S DESK

Newsletter Format -- This issue of the Experiment Station Newsletter represents an effort to communicate additional information regarding Experiment Station programs. Dr. John Woodward, who is now serving as editor of the Newsletter, has developed the format represented in this issue. This format, which includes information about new projects, new staff and special concerns, will be used on a quarterly basis. Intervening issues will follow the briefer format.

Activities Update -- During the past month, I have visited the following units or groups to discuss research programs with faculty:

- Education & Family Resources
- Human Nutrition and Food Service Management
- Forestry, Fisheries & Wildlife
- Animal Science - Meat Research Program
- Animal Science - Poultry Research Program
- Agronomy
- Horticulture
- Panhandle Station
- North Platte Station
- Environmental Programs

When the first round of visits to units has been completed, I will develop a summary of high priority issues and some goals related thereto.

Meetings attended recently included North Central Experiment Station Directors meeting in Peoria, Illinois, Ag Consultants Workshop at Kearney, and Plant Sciences Hall dedication.

An outstanding symposium was held in conjunction with the Plant Sciences Hall dedication. Three excellent and diverse papers were presented, as follows:

- "Agronomy, A Look at the Past and Projections Into the Future" by Dr. Glen W. Burton, Geneticist, Forage and Turfgrasses, Georgia Coastal Plain Experiment Station, Tifton, Georgia.
- "Horticultural Progress and Change-dejavu" by Dr. Jules Janick, Professor of Genetics and Plant Breeding, Purdue University, LaFayette, Indiana.
- "Innovative Research in Agricultural Science", Dr. Arthur Kelman, Professor of Bacteriology and Disease Physiology, University of Wisconsin, Madison, Wisconsin.

Constraints to Creativity -- Dr. Kelman presented some interesting observations regarding "constraints to creativity" within experiment station and university research programs. Included in his list of constraints were the following:

1. Magnitude of research and new information
2. Research conducted by teams
3. Research directed by committees
4. Increasing specialization
5. Accountability demands
6. Societal constraints... environmental problems, cynicism about science
7. Funding patterns... lack of continuity, grantsmanship

I have requested a copy of his presentation, which will be useful as we contemplate the research environment within the Experiment Station, and search for ways to enhance that environment.

Roy G. Arnold, Dean & Director

GRANTS & CONTRACTS

Anderson, Frank, W. Trimmer & D. Yontz - Agr./Ag.Eng. - Lockwood Corp.	\$ 5,000
Bullerman, L. B. - Food Sci. & Tech. - General Mills Foundation	1,000
Burnside, O. C. - Agronomy - Miscellaneous Donors	2,000
Flowerday, A. D. - Agronomy - Olin Chemicals Corporation	5,000
Gast, R. G. - Agronomy - Miscellaneous Donors	12,650
Koch, R. M. - Animal Science - USDA/SEA	17,500
Riordan, T. P. - Horticulture - Nebraska Turf Grass Foundation	1,000
Moomaw, R. S. - Agronomy (NE Station) - Dow Chemical	1,000
Shahani, K. - Food Sci. & Tech. - Egyptian Cultural & Educ. Bureau	2,500
Steadman, J. R. - Plant Pathology - Merck & Co., Inc.	500
Sullivan, T. M. - Animal Science - VPO, Inc.	1,000
Waller, S. S. - Agronomy - Webster Co. Nat. Res. Conserv. Foundation	1,900
Watkins, J. E. - Plant Pathology - Merck & Company	500
Watkins, J. E. & B. Doupnick - Plant Pathology - DuPont	500
Wilson, R. G., Jr. - Agronomy (PH Station) - Dow Chemical Company	2,750
Witkowski, J. F. - Entomology (NE Station) - Dow Chemical Company	1,000
Wittmuss, H. D. - Ag Engineering - Fleischer Manufacturing Co.	11,000

PROJECTS APPROVED FROM JANUARY THROUGH MAY 1980

- NEB 11-057 -- Energy Requirements of Agricultural Field Operations -- This is a Hatch project that became effective January 24, 1980. The principal investigators are J. D. Summers and K. L. von Barga, Ag Engineering. Reviewers were: R. Mumm, Biometrics & Information, W. Sahs and D. Swartzendruber, Agronomy. The objective of this project is to evaluate and demonstrate potential energy savings through proper selection, utilization and management of agricultural tractors and tillage, planting and cultivation implements.
- NEB 12-111 -- Morphology and Physiology of Selected Perennial Grasses -- This is a Hatch project that became effective January 1, 1980. The principal investigators are L. E. Moser, Agronomy and K. P. Vogel, AR/USDA. Reviewers were: W. Schutz, Biometrics & Information, H. Gorz, AR/USDA, T. Klopfenstein, Animal Science and F. Haskins, Agronomy. The objectives of this study are to develop and evaluate physiological and morphological screening techniques that can be used in breeding of improved cool and warm-season grasses; investigate the influence of environmental and physiological factors on perennial grass growth and development; and, investigate the effects of certain management practices such as defoliation, fertilization and irrigation on forage crop physiology.
- NEB 12-114 -- Genetics, Biochemistry, and Breeding of Forage Sorghum and Sudangrass -- This is a Hatch project that became effective January 31, 1980. The principal investigators are F. A. Haskins, Agronomy and H. J. Gorz, AR/USDA. Reviewers were: L. Moser, Agronomy, K. Vogel, AR/USDA, R. Borchers, Biochemistry and R. Mumm, Biometrics and Information. The purpose of this project is to improve existing knowledge of the genetics and biochemistry of forage sorghum and sudangrass and to apply this knowledge in the development of superior lines, populations and cultivars of these crops.
- NEB 15-028 -- Biochemistry of Plant Disease -- This is a Hatch project that became effective January 1, 1980. The principal investigator is J. M. Daly, Biochemistry. The reviewers were: W. Schutz, Biometrics and Information, A. Vidaver, Plant Pathology, R. Klucas, Biochemistry and M. Brakke, Plant Pathology. The objectives of this project are to develop quantitative chemical measurements of host resistance or susceptibility and of pathogen virulence or avirulence; examine biochemical changes in resistant or susceptible hosts at early stages of disease development when genes for disease reactions are becoming operative;

NEB 15-028 -- continued -- establish criteria for sorting chemical changes essential to specific disease reaction from those which are nonspecific wound or stress responses to infection; and, identify chemical factors for pathogen virulence, such as toxins, and determine mode of action as prelude to understanding resistance.

NEB 27-001 -- Climate Variability, Drought and Agricultural Productivity in Nebraska -- This is a Hatch project that became effective February 21, 1980. The principal investigators are D. A. Wilhite, Climatology & Meteorology and R. E. Neild, Horticulture. Reviewers of the project were: D. G. Hanway, Agronomy, J. T. Nichols, Agronomy - North Platte Station, J. M. Norman, Agronomy, R. J. Supalla, Ag Economics and N. J. Rosenberg, Climatology and Meteorology. The objectives of this project are to evaluate, and modify as appropriate, available drought indices as measures of agricultural drought frequency, intensity and impact in Nebraska; determine geographical sensitivities of principal crop and forage yields to weather variability; evaluate the effectiveness of governmental response to drought in Nebraska; assess the effects of changing cropping patterns (land use) on the sensitivity of Nebraska's agricultural system to drought; develop an early warning system for current season drought assessment in Nebraska; and determine the feasibility of using remotely derived thermal data to identify and delineate rangeland areas under varying degrees of moisture stress.

For further information on these projects please contact the principal investigators.

PERSONNEL ACTION FROM JANUARY THROUGH MARCH 1980



Dr. Roy G. Arnold

Dr. Roy G. Arnold has a B.S. degree from the University of Nebraska, College of Agriculture, and an M.S. and a Ph.D. degrees in Food Science from Oregon State University. He joined the IANR staff in 1967 as Assistant Professor in the Department of Food Science & Technology. In 1974 he became Head of the Department and, on January 1, 1980, Dean and Director of the Agricultural Experiment Station.

During his career he has had major responsibilities in extension, teaching and research. He received the Outstanding Professor Award from the Agricultural Executive Board of UNL in 1970; the Teaching Award of Merit, Nebraska Chapter, Gamma Sigma Delta in 1975; and a Distinguished Undergraduate Teaching Award from UNL in 1977. He has been project leader for studies dealing with food flavor and food analysis since 1968. He served as Coordinator of the Food Protein Research Group, a multidisciplinary research group consisting of 8 scientists from six departments. Dr. Arnold is author or co-author of 30 published papers in scientific journals, plus several abstracts of papers presented in meetings and other publications. He is a co-inventor on a patent dealing with prediction of tenderness of meat.

Dr. Arnold has many professional affiliations and has been involved in several University and professional committees.

He and his wife, Jane, have two daughters, Jana (13) and Julie (almost 11). The Arnolds enjoy camping and, as time may permit, Dr. Arnold enjoys outdoor photography and trout fishing.

Agricultural Mechanization - Who Wins? Who Loses?

W. E. Splinter, Head
Agricultural Engineering Department

December, 1979, Fresno, CA, Mr. Bob Bergland, Secretary of Agriculture... "I do not think that federal funding of labor saving devices is a proper use of federal money...". The central issue that lies behind Sec. Bergland's statement is the role of mechanization. Who benefits from mechanization? Does mechanization create social problems through forced displacement of earnest workers? Secretary Bergland does, in fact, represent a growing element of the U.S. population who see mechanization as a negative social force.

First, who benefits from mechanization? The first tasks amenable to mechanization are those which are repetitive. The plow replaced the spade. The planter replaced the dibble stick. The reaper - thresher - combine replaced the scythe, and the flail. Therefore, the first benefit of mechanization has been to relieve man from drudgery and amplify his productivity to the extent that today's American farmer enjoys basically the same standard of living as his urban cousin.

The second major thrust of mechanization is to develop stability in the food production system. Major excursions in labor supply and demand are common in the hand agriculture production systems throughout the world. Crops must be planted and harvested within narrow time slots - commonly one or two weeks. Planting and harvesting are very labor intensive and all available manpower must be thrown into the task.

Those who are forced to earn a livelihood following the harvest lead a precarious existence economically - impacting urban areas with shortages and gluts of labor. The stabilizing influence of mechanization is to redistribute the work pattern. That harvesting machine had to be manufactured. Steel had to be produced. Coal had to be mined. Coal can be mined all year - steel can be smelted all year - and harvesters can be assembled all year. The result is that people are now employed indirectly in the food system as well as directly, and employment is yearly rather than seasonal. More importantly, the net result of specialized labor input is to greatly increase the production of food not only per farmer but per worker in the whole system servicing agriculture. Thus we have our highly productive industrial economy, based first and foremost on a stable and low cost food supply.

Examining history of the U.S., what fate has befallen those workers replaced by the planter, the combine, the milking machine, the cotton picker and the peanut digger? With a population of 221 million people and 2.8 million farmers, do we have 218 million people on relief? Not quite. Government statistics indicate that about 5 percent of the labor force (3.7 million) is unemployed. How many doctors, lawyers, engineers, scientists - and College of Agriculture faculty come from the farm?

Who benefits? Everyone. Without our highly productive food machine our standard of living would collapse. Americans pay the smallest proportion of their salary or wages for food than any nation - even with the social burden of massive food stamp and food aid programs. That "everyone" includes the Russians, Japanese, Indians, Europeans and the Chinese.

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

5839. Registration of Nebsoy Soybeans. J. H. Williams, J. E. Specht, A. F. Dreier, R. S. Moomaw and L. S. Svec. Crop Science.
5840. The Design of an Automated System to Measure Evapotranspiration in Real Time. A. Weiss, D. L. Lukens and L. A. Akers. Joint Special Issue on Microprocessors and Microcomputers for IEEE Journal of Solid-State Circuits & IEEE Transactions on Computers.
5841. Comparison of Two Soil P Testing Methods and Correlation of Their Results with Crop Response on Two Soils in the Same Association. G. E. Varvel, F. N. Anderson and G. A. Peterson. Soil Science Society of America Journal.
5842. Food Patterns and Physical Characteristics of Moroccan and American Adolescents. Constance Kies and Marian M. Cast. Journal of the American Dietetic Association.
5843. Public Health Significance of Molds and Mycotoxins in Fermented Dairy Products. L. B. Bullerman. Journal of Dairy Science.
5844. Effect of Growth Stage and Water Stress on Barnyardgrass Control and on Glyphosate Absorption and Translocation. M. S. Ahmadi, L. C. Haderlie and G. A. Wicks. Weed Science Journal.
5845. Simulating the Quality and Quantity of Short-Wave Radiation Within and Above Vegetative Canopies. Raoul Lemeur and Norman J. Rosenberg. Presented at Workshop on Energy Exchange Simulation Models, Uppsala, Sweden, September 24-30, 1978.
5846. Ultrastructural Variations and Phagocytosis of Spermatozoa in the Epithelium of the Monkey Vas Deferens. Angel S. Ramos, Jr. and Martin Dym. Journal of Ultrastructural Research.
5847. A Comparison of Purified Host-Specific Toxin from *Helminthosporium maydis*, Race T. and its Acetate Derivative on Oxidation by Mitochondria from Susceptible and Resistant Plants. Gary Payne, Y. Kono and J. M. Daly. Plant Physiology.
5848. The Semiconservative Synthesis of Single-stranded RNA by Bacteriophage $\phi 6$ RNA Polymerase. James L. Van Etten, Dwight E. Burbank, Diane A. Cuppels, Leslie Lane and Anne K. Vidaver. Journal of Virology.
5849. Photolysis of Trifluralin: Characterization of Azobenzene and Azoxybenzene Photodegeneration Products. Randall G. Sullivan, Herman W. Knoche and James C. Markle. Journal of Agriculture and Food Chemistry.
5850. Soybean Cultivar Development for High Temperature, Semi-Arid, Irrigation Culture. James E. Specht and Cecil D. Nickell. Irrigated Soybean Conference in Cairo, Egypt.
5851. Ration Analysis: A Tolerance Evaluation Procedure for Two Component Turfgrass Mixtures. T. P. Riordan. Journal of Seed Technology.
5852. Biological Control of *Rhizoctonia solani* With a Soil-inhabiting Basidiomycete. G. N. Odvody, M. G. Boosalis and E. D. Kerr. Phytopathology.

(over)

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

- 80-1317. Natural Revegetation of Rangeland Following the Control of *Geomys Bursarius*. Kathie J. Kjar and J. Stubbendieck.
- 80-1318. The Effect of Copper and Fiber Supplementation on Copper Utilization in Humans. Anne Plant and Constance Kies. Research Abstract American Home Economics Association.
- 80-1319. Ascorbic Acid, Meat, and Non-Meat Iron Intakes and the Iron Nutritional Status of Adolescents. Danette M. Bylund and Constance Kies. Research Abstract American Home Economics Association.
- 80-1320. Effect of Sweet Acidophilus Milk vs. Regular Milk on the Pantothenic Acid Nutritional Status of Older Adult Humans. Janet A. Mathison and Constance Kies. Research Abstract American Home Economics Association.
- 80-1321. Vitamin B₆ Nutritional Status of Several Strains of Mice and Rats as Affected by Pantothenic Acid Deficiency. Ming-Tai Huang and Constance Kies. Research Abstracts American Home Economics Association.
- 80-1322. Recipe and Food Samples Compared as Nutrition Education Methods in Stimulating Food Purchases. Peggy A. McElvain and Hazel Fox. Research Abstract American Home Economics Association.
- 80-1323. Nutrition Knowledge, Attitudes and Infant Feeding Practices of Rural Nebraska Mothers. Eileen I. Douglass and Hazel Fox. American Home Economics Association.
- 80-1324. Nutrition Orientations of Working Women in the North Central Region. Jaime Swanson and Hazel Fox. Research Abstract American Home Economics Association.
- 80-1325. Pantothenic Acid Content of Human Milk. Linda J. Schroeder and Hazel Fox. Research Abstract American Home Economics Association.
- 80-1326. The Influence of Diet and Exercise on Changes in Body Composition in Adult Males. Dolores Floor and Hazel Fox. Research Abstract American Home Economics Association.
- 80-1327. Food Shopping Behavior and Food Item Frequency of Working Mothers. Erin Caudill and Hazel Fox. Research Abstract American Home Economics Association.
- 80-1328. Pantothenic Acid/Linoleic Acid Interrelationships on Serum Lipid Levels of Women. Kathryn Anderson and Constance Kies. Research Abstract American Home Economics Association.
- 80-1329. The Effect of Wheat, Corn or Rice Bran on Dietary Fat Utilization in Humans. Sharon Buckles Balters and Constance Kies. Research Abstract American Home Economics Association.

BULLETINS PRINTED

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