

# ANNUAL REPORT 1974

## FINANCIAL STATEMENT

North Dakota Agricultural Experiment Station

July 1, 1973 through June 30, 1974

	OPERATIONS			Main Station			Main Station					
	Balance 7-1-73	Receipts	Expenditures	Transfers	Balance 7-30-74	Salaries	Fees and Services	Supplies and Materials	Equipment			
State Appropriations	\$ 45,057.26	\$2,331,072.00	\$2,431,491.13	\$ -0-	\$ (55,361.87)	\$1,774,726.29	\$338,702.05	\$242,033.53	\$ 76,029.26			
Sales and Services	389,511.79	315,413.36	328,367.92	(29,230.32)	347,326.91	58,404.97	62,849.44	117,720.49	89,393.02			
Gifts and Grants	245,427.58	415,901.97	314,986.67	11,800.00	358,142.88	214,803.71	30,377.45	28,972.77	40,832.74			
Federal Appropriations												
CSRS, USDA	164.09	960,709.00	957,194.64	\$ -0-	3,678.45	923,204.47	14,111.79	2,994.50	16,883.88			
Other Federal	(85,945.56)	260,277.54	306,385.55	51,241.06	(80,812.51)	231,303.48	20,543.83	30,748.90	23,789.34			
TOTAL Main Station	\$ 594,215.16	\$4,263,373.87	\$4,338,425.91	\$33,810.74	\$ 572,973.86	\$3,202,442.92	\$466,584.56	\$422,470.19	\$246,928.24			
Branch Stations	428,005.00	1,050,066.62	819,384.28	\$ -0-	658,687.34	401,804.27	102,905.71	211,830.49	102,843.81			
TOTAL Operations	\$1,022,220.16	\$5,333,440.49	\$5,157,810.19	\$33,810.74	\$1,231,661.20	\$3,604,247.19	\$569,490.27	\$634,300.68	\$349,772.05			
<b>LAND AND STRUCTURES</b>												
<b>Main Station</b>												
State Appropriations	\$ -0-	\$ 228,400.00	\$ 54,598.45	\$ -0-	\$ 173,801.55							
Other	-0-	-0-	27,738.75	27,738.75	-0-							
TOTAL Main Station	\$ -0-	\$ 228,400.00	\$ 82,337.20	\$27,738.75	\$ 173,801.55							
<b>Branch Stations</b>												
State Appropriations	365.59	40,248.00	31,200.98	(365.59)*	9,047.02							
TOTAL Land & Structures	\$ 365.59	\$ 268,648.00	\$ 113,538.18	\$27,373.16	\$ 182,848.57							
Grand Total												
Operations, Land and Structures	\$1,022,585.75	\$5,602,088.49	\$5,271,348.37	\$61,183.90	\$1,414,509.77							

\* Unspent Special Appropriations Returned to State Treasurer General Fund.



**PROFESSIONAL STAFF**  
**AGRICULTURAL EXPERIMENT STATION**  
**NORTH DAKOTA STATE UNIVERSITY**  
**of AGRICULTURE and APPLIED SCIENCE**  
(as of January 1, 1975)

**STATE BOARD OF HIGHER EDUCATION:** Harold C. Reffling, President, Bottineau; Vincent J. Buck, Vice President, Jamestown; Mrs. E. G. (Geraldine) Clapp, Jr., Fargo; Mrs. James L. (Eleanor) Grahl, Bismarck; Rev. Peter C. Hinrichs, Dickinson; Richard H. McGee, Minot; Robert C. Painter, Grand Forks; Kenneth E. Raschke, Commissioner, Bismarck.

**CONSULTATION BOARD** for the Experiment Station and the Extension Service to the State Board of Higher Education: Arden Burbidge, Chairman, Park River; Arthur Christianson, Alamo; Clark Jenkins, Fargo; Lois Jones, Webster; Frank Kubik, Jr., Manning.

**ADMINISTRATION:** L. D. Loftsgard, Ph.D., President; Kenneth A. Gilles, Ph.D., Vice President for Agriculture<sup>35</sup>; H. Don Stockman, M.S., Vice President for Business and Finance<sup>35</sup>; Arlon G. Hazen, M.S., Director<sup>65</sup>; H. Roald Lund, Ph.D., Associate Director<sup>60</sup>; Peder A. Nystuen, M.S., Associate Director<sup>40</sup>; James B. Swank, ABA, Administrative Assistant to Director<sup>90</sup>.

**AGRICULTURAL ECONOMICS:** Frederick Taylor, Ph.D., Professor and Chairman<sup>50</sup>; Donald E. Anderson, Ph.D., Professor<sup>60</sup>; Gary M. Bedker, M.S., Research Associate<sup>55</sup>; David W. Cobia, Ph.D., Associate Professor<sup>50</sup>; Randal Coon, M.S., Research Associate<sup>100</sup>; Norman Dalsted, M.S., Research Associate<sup>100</sup>; Edward V. Dunn, M.S., Associate Professor<sup>55</sup>; Gordon Erlandson, Ph.D., Associate Professor<sup>40</sup>; Delmer L. Helgeson, Ph.D., Associate Professor<sup>70</sup>; Thor A. Hertsgaard, Ph.D., Professor<sup>40</sup>; Daniel Hofland, M.S., Research Associate<sup>100</sup>; Roger Jenson, M.S., Research Associate<sup>100</sup>; Jerome Johnson, Ph.D., Associate Professor<sup>50</sup>; Roger G. Johnson, Ph.D., Professor<sup>60</sup>; Arlen G. Leholm, M.S., Research Associate<sup>100</sup>; F. Larry Leistriz, Ph.D., Associate Professor<sup>55</sup>; William C. Nelson, Ph.D., Assistant Professor<sup>70</sup>; Thomas K. Ostenson, M.S., Associate Professor<sup>60</sup>; Timothy A. Petry, M.S., Assistant Professor<sup>70</sup>; LeRoy W. Schaffner, M.S., Associate Professor<sup>100</sup>; Donald F. Scott, Ph.D., Assistant Professor<sup>60</sup>; Donald E. Thomson, M.S., Assistant in Agricultural Economics<sup>100</sup>; Wallace McMartin, M.S., Agricultural Economist, USDA<sup>0</sup>; John R. Price, M.S., Agricultural Statistician, USDA<sup>0</sup>; Robert Tosterud, Ph.D., Director of Upper Great Plains Transportation Institute<sup>0</sup>; Stanley W. Voelker, M.S., Agricultural Economist, USDA<sup>0</sup>; Robert L. Vossen, M.S., Assistant Agricultural Statistician, USDA<sup>11</sup>.

**AGRICULTURAL ENGINEERING:** W. J. Promersberger, M.S., Professor and Chairman<sup>50</sup>; John E. Gilley, M.S., Research Associate<sup>100</sup>; Henry L. Kucera, M.S., Associate Professor<sup>30</sup>; Charles W. Moilanen, M.S., Associate Professor<sup>60</sup>; George L. Pratt, Ph.D., Professor<sup>50</sup>; Robert W. Schottman, M.S., Assistant Professor<sup>40</sup>; Ronald T. Schuler, Ph.D., Assistant Professor<sup>50</sup>; Elton G. Solseng, B.S., Assistant in Agricultural Engineering<sup>50</sup>; Earl C. Stegman, Ph.D., Professor<sup>70</sup>; Richard L. Witz, M.S., Professor<sup>60</sup>; Roget H. Cossette, M.A., Associate Professor (Cooperative Extension Service)<sup>0</sup>.

**AGRICULTURAL INFORMATION** (Cooperative Extension Service): Robert A. Jarnagin, Ph.D., Professor<sup>0</sup>; James A. Berg, M.S., Associate Professor<sup>0</sup>; John J. Feight, M.S., Associate Professor<sup>0</sup>; James R. Kenward, M.S., Associate Professor<sup>0</sup>; Mathias F. Lanz, B.A., Associate Professor<sup>0</sup>; Dorothea G. McCullough, M.A., Associate Professor<sup>0</sup>; Gary W. Moran, M.S., Assistant Professor<sup>0</sup>; Courtney R. Rotzien, Assistant Editor<sup>0</sup>.

**AGRONOMY:** Jack F. Carter, Ph.D., Professor and Chairman<sup>60</sup>; Melvern K. Anderson, Ph.D., Associate Professor<sup>75</sup>; Robert H. Busch, Ph.D., Associate Professor<sup>90</sup>; Harold Z. Cross, Ph.D., Assistant Professor<sup>100</sup>; Edward L. Deckard, Ph.D., Assistant Professor<sup>65</sup>; David

C. Ebeltoft, M.S., Associate Professor<sup>95</sup>; John R. Erickson, Ph.D., Associate Professor<sup>90</sup>; A. Earl Foster, Ph.D., Professor<sup>70</sup>; Richard C. Frohberg, Ph.D., Professor<sup>80</sup>; James J. Hammond, Ph.D., Associate Professor<sup>75</sup>; Karl A. Lucken, Ph.D., Professor<sup>100</sup>; S. S. Maan, Ph.D., Professor<sup>90</sup>; Calvin G. Messersmith, Ph.D., Assistant Professor<sup>50</sup>; Dwain W. Meyer, Ph.D., Assistant Professor<sup>60</sup>; Jerry F. Miller, M.S., Instructor<sup>100</sup>; Stephen D. Miller, Ph.D., Assistant in Agronomy<sup>100</sup>; John D. Nalewaja, Ph.D., Professor<sup>80</sup>; James S. Quick, Ph.D., Associate Professor<sup>100</sup>; Paul C. Sandal, Ph.D., Professor<sup>25</sup>; Albert Schneiter, Ph.D., Assistant Professor<sup>100</sup>; Arnold B. Schooler, Ph.D., Associate Professor<sup>70</sup>; Glenn S. Smith, Ph.D., Professor<sup>100</sup>; Dean A. Whited, Ph.D., Associate Professor<sup>30</sup>; Darrell F. Cole, Ph.D., Research Plant Physiologist, USDA<sup>0</sup>; Gerhard N. Fick, Ph.D., Adjunct Professor, USDA<sup>0</sup>; Richard H. Hodgson, Ph.D., Adjunct Professor, USDA<sup>0</sup>; Leonard R. Joppa, Ph.D., Adjunct Professor, USDA<sup>0</sup>; Richard H. Shimabukuro, Ph.D., Adjunct Professor, USDA<sup>0</sup>; Tommy Thompson, Ph.D., Research Geneticist, USDA<sup>0</sup>; Norman D. Williams, Ph.D., Adjunct Professor, USDA<sup>0</sup>.

**ANIMAL SCIENCE:** Marion L. Buchanan, M.S., Professor and Chairman<sup>60</sup>; Robert J. Amundson, B.S., Instructor<sup>70</sup>; Paul T. Berg, M.S., Assistant in Animal Science<sup>70</sup>; Russell B. Danielson, M.S., Assistant Professor<sup>70</sup>; William E. Dinusson, Ph.D., Professor<sup>70</sup>; Charles G. Edgerly, M.S., Associate Professor<sup>60</sup>; Duane O. Erickson, Ph.D., Associate Professor<sup>60</sup>; Robert L. Harrold, Ph.D., Associate Professor<sup>70</sup>; Clayton N. Hauge, M.S., Associate Professor<sup>60</sup>; John N. Johnson, M.S., Associate Professor<sup>90</sup>; Robert L. Johnson, M.S., Assistant Professor<sup>75</sup>; Verlin K. Johnson, Ph.D., Professor<sup>50</sup>; Merle R. Light, M.S., Professor<sup>70</sup>; Martin J. Marchello, Ph.D., Associate Professor<sup>50</sup>; Bert L. Moore, M.S., Instructor<sup>70</sup>; Jerry L. Sell, Ph.D., Professor<sup>80</sup>; James E. Tilton, Ph.D., Associate Professor<sup>60</sup>; Ronald E. Wollmuth, B.S., Instructor<sup>70</sup>; Ronald C. Zimprich, B.S., Instructor<sup>70</sup>; Peter W. Aschbacher, Ph.D., Adjunct Professor, USDA<sup>0</sup>; Kenneth L. Davison, Ph.D., Adjunct Professor, USDA<sup>0</sup>; Jerome C. Pekas, Ph.D., Adjunct Professor, USDA<sup>0</sup>; Edward J. Thacker, Ph.D., Adjunct Professor, USDA<sup>0</sup>.

**BACTERIOLOGY:** Kenneth J. McMahon, Ph.D., Professor and Chairman<sup>50</sup>; Beverley A. Baldwin, B.S., Instructor<sup>30</sup>; David L. Berryhill, Ph.D., Assistant Professor<sup>90</sup>; Mary C. Bromel, Ph.D., Professor<sup>40</sup>; John A. Doubly, M.S., Assistant Professor<sup>70</sup>; Berdell R. Funke, Ph.D., Associate Professor<sup>40</sup>; Bayard P. Sleeper, Ph.D., Professor<sup>50</sup>; Edward R. Renner, M.D., Adjunct Professor (Fargo Clinic)<sup>0</sup>; Phletus P. Williams, Ph.D., Adjunct Professor, USDA<sup>0</sup>.

**BIOCHEMISTRY:** Harold J. Klosterman, Ph.D., Professor and Chairman<sup>60</sup>; Douglas W. Bristol, Ph.D., Assistant Professor<sup>95</sup>; Allan G. Fischer, Ph.D., Associate Professor<sup>60</sup>; James R. Fleeker, Ph.D., Associate Professor<sup>60</sup>; George Graf, Ph.D., Professor<sup>60</sup>; Arland E. Oleson, Ph.D., Assistant Professor<sup>60</sup>; Don C. Zimmerman, Ph.D., Adjunct Professor, USDA<sup>0</sup>.

**BOTANY:** Warren C. Whitman, Ph.D., Professor and Chairman<sup>75</sup>; Murray E. Duysen, Ph.D., Associate Professor<sup>50</sup>; Donald S. Galitz, Ph.D., Associate Professor<sup>50</sup>; Harold Goetz, Ph.D., Associate Professor<sup>15</sup>.

**CEREAL CHEMISTRY AND TECHNOLOGY:** Orville J. Banasik, M.S., Professor and Chairman<sup>80</sup>; Charles W. Baker, Ph.D., Assistant Professor<sup>90</sup>; Merlin D. Breen, Ph.D., Assistant Professor<sup>100</sup>; Bert L. D'Appolonia, Ph.D., Associate Professor<sup>90</sup>; Clarence E. McDonald, Ph.D., Associate Professor<sup>90</sup>; Leonard D. Sibbitt, Associate Professor<sup>100</sup>; A. A. Seyam, Ph.D., Assistant Professor<sup>100</sup>; Joel W. Dick, M.S., Food Technologist, USDA<sup>0</sup>; William C. Shuey, Ph.D., Adjunct Professor, USDA<sup>0</sup>.

**ENTOMOLOGY:** John T. Schulz, Ph.D., Professor and Chairman<sup>70</sup>; Albin W. Anderson, Ph.D., Assistant Professor<sup>90</sup>; Robert B. Carlson, Ph.D., Associate Professor<sup>75</sup>; Richard D. Frye, Ph.D.,



Associate Professor<sup>85</sup>; Hendrik J. Meyer, Ph.D., Assistant Professor<sup>90</sup>; Gregory B. Mulkern, Ph.D., Professor<sup>50</sup>; Christian Y. Oseto, Ph.D., Assistant Professor<sup>70</sup>; Richard L. Post, Ph.D., Professor<sup>50</sup>; Terrance S. Adams, Ph.D., Adjunct Professor, USDA<sup>0</sup>; Robert A. Bell, Ph.D., Adjunct Professor, USDA<sup>0</sup>; Leo E. LaChance, Ph.D., Adjunct Professor, USDA<sup>0</sup>; Edwin P. Marks, Ph.D., Adjunct Professor, USDA<sup>0</sup>; David T. North, M.S., Adjunct Professor, USDA<sup>0</sup>; John G. Riemann, Ph.D., Adjunct Professor, USDA<sup>0</sup>; Dale E. Wagoner, Ph.D., Adjunct Professor, USDA<sup>0</sup>.

**HORTICULTURE AND FORESTRY:** Edward P. Lana, Ph.D., Professor and Chairman<sup>70</sup>; Dale E. Herman, Ph.D., Associate Professor<sup>50</sup>; Neal S. Holland, M.S., Professor<sup>70</sup>; Robert H. Johansen, Ph.D., Professor<sup>100</sup>; Donald C. Nelson, Ph.D., Professor<sup>70</sup>; Earl W. Scholz, Ph.D., Associate Professor<sup>70</sup>; Robert H. Heintz, Associate Professor, (Cooperative Extension Service)<sup>0</sup>.

**PLANT PATHOLOGY:** Richard L. Kiesling, Ph.D., Professor and Chairman<sup>70</sup>; Robert M. Hosford, Jr., Ph.D., Associate Professor<sup>90</sup>; Joseph E. Huguelet, Ph.D., Professor<sup>80</sup>; Larry J. Littlefield, Ph.D., Associate Professor<sup>90</sup>; Vernyl D. Pederson, Ph.D., Professor<sup>90</sup>; Glen D. Statler, Ph.D., Associate Professor<sup>90</sup>; William M. Bugbee, Ph.D., Adjunct Professor, USDA<sup>0</sup>; James D. Miller, Ph.D., Adjunct Professor, USDA<sup>0</sup>; Roland G. Timian, Ph.D., Adjunct Professor, USDA<sup>0</sup>; David E. Zimmer, Ph.D., Adjunct Professor, USDA<sup>0</sup>.

**SOILS:** Enoch B. Norum, Ph.D., Professor and Chairman<sup>70</sup>; James W. Bauder, Ph.D., Assistant Professor<sup>80</sup>; Armand Bauer, Ph.D., Professor<sup>100</sup>; Lynn J. Brun, Ph.D., Assistant Professor<sup>80</sup>; William C. Dahnke, Ph.D., Associate Professor<sup>100</sup>; Glendon W. Gee, Ph.D., Research Associate<sup>100</sup>; Terrance H. Krueger, B.S., Assistant in Soils<sup>100</sup>; John T. Moraghan, Ph.D., Professor<sup>80</sup>; Hollis W. Omodt, M.S., Professor<sup>100</sup>; Donald D. Patterson, M.S., Associate Professor<sup>100</sup>; Juanito M. Ramirez, Ph.D., Associate Professor<sup>70</sup>; Fred W. Schroer, M.S., Associate Professor<sup>100</sup>; Michael D. Sweeny, M.S., Assistant Professor<sup>100</sup>; Larry J. Swenson, B.S., Assistant in Soils<sup>100</sup>; Bruce K. Worcester, Ph.D., Assistant Professor<sup>70</sup>; Joseph C. Zubrisky, Ph.D., Professor<sup>50</sup>; James F. Power, Ph.D., Adjunct Professor, USDA (Mandan)<sup>0</sup>; Wayne O. Willis, Ph.D., Adjunct Professor, USDA (Mandan)<sup>0</sup>.

**VETERINARY SCIENCE:** Myron F. Andrews, D.V.M., Professor and Chairman<sup>50</sup>; Arnold D. Alstad, D.V.M., Associate Professor<sup>100</sup>; Ivan E. Berg, D.V.M., Associate Professor<sup>100</sup>; Howard H. Casper, Ph.D., Assistant Professor<sup>100</sup>; Ithel A. Schipper, D.V.M., Professor<sup>60</sup>; George E. Staples, D.V.M., Associate Professor<sup>90</sup>; Raul Weiss, D.V.M., Assistant Professor<sup>100</sup>.

## BRANCH STATIONS

**AGRONOMY SEED FARM:** LeRoy A. Spilde, M.S., Superintendent<sup>100</sup>.

**CARRINGTON:** Howard M. Olson, M.S., Superintendent and Agricultural Engineer<sup>100</sup>; Robert S. Hoffman, B.S., Assistant Agricultural Engineer<sup>100</sup>; David W. Rodgers, M.S., Assistant Animal Husbandman<sup>100</sup>.

**DICKINSON:** Thomas J. Conlon, M.S., Superintendent<sup>100</sup>; Douglas G. Landbloom, M.S., Assistant Animal Husbandman<sup>100</sup>; James Lee Nelson, B.S., Animal Husbandman<sup>100</sup>.

**HETTINGER:** Timothy C. Faller, B.S., Superintendent<sup>100</sup>.

**LANGDON:** Robert E. Nowatzki, B.S., Superintendent<sup>100</sup>.

**NORTH CENTRAL:** Ben K. Hoag, M.S., Superintendent<sup>100</sup>; Philip W. Stahlman, M.S. Agronomist<sup>100</sup>.

**WILLISTON:** Ernest W. French, M.S., Superintendent<sup>100</sup>; Neil Riveland, M.S., Assistant Agronomist<sup>100</sup>.

## PROFESSIONAL STAFF CHANGES

(to January 1, 1975)

### ADDITIONS TO STAFF

Merlin D. Breen, Ph.D.  
Assistant Professor ..... January 21, 1974

James W. Bauder, Ph.D.  
Assistant Professor ..... June 1, 1974

Robert S. Hoffman, B.S.  
Assistant Agricultural Engineer ..... June 1, 1974

Melvorn K. Anderson, Ph.D.  
Associate Professor ..... June 15, 1974

Albert Schneiter, Ph.D.  
Assistant Professor ..... July 1, 1974

Christian Y. Oseto, Ph.D.  
Assistant Professor ..... July 15, 1974

John E. Gilley, M.S.  
Research Associate ..... August 1, 1974

Elton G. Solseng, B.S.  
Asst. in Agricultural Engineering ..... August 1, 1974

Douglas G. Landbloom, M.S.  
Assistant Animal Husbandman ..... August 15, 1974

Glendon W. Gee, Ph.D.  
Research Associate ..... August 19, 1974

Hendrik J. Meyer, Ph.D.  
Assistant Professor ..... September 1, 1974

Donald F. Scott, Ph.D.  
Assistant Professor ..... September 1, 1974

A. A. Seyam, Ph.D.  
Assistant Professor ..... October 7, 1974

Randal Coon, M.S.  
Research Associate ..... November 1, 1974

Timothy A. Petry, M.S.  
Assistant Professor ..... November 1, 1974

### DELETIONS

(to January 1, 1975)

Donald K. Cassel, Ph.D.  
Associate Professor ..... February 28, 1974

Glenn A. Peterson, Ph.D.  
Professor ..... March 26, 1974

Ronald G. Fraase, M.S.  
Assistant Professor ..... March 31, 1974

M. S. Quraishi, Ph.D.  
Professor ..... May 31, 1974

John A. Callenbach, Ph.D.  
Professor ..... June 30, 1974

Raymond J. Douglas, M.S.  
Animal Husbandman ..... June 30, 1974

Cornelius Heidt, B.S.  
Assistant in Soils Survey ..... June 30, 1974

Francis Sobolik, M.S.  
Assistant Agronomist ..... June 30, 1974

Clarence Swallers, M.S.  
Assistant Professor ..... June 30, 1974

Ansel Hakanson, B.S.  
Asst. in Agricultural Engineering ..... August 16, 1974

David E. Walsh, Ph.D.  
Associate Professor ..... October 11, 1974



## GIFTS AND GRANTS

Numerous grants of money and gifts of equipment, supplies and other services are provided the North Dakota Agricultural Experiment Station each year in support of its research programs. The station expresses its sincere thanks to the following for the support provided during the fiscal year 1973-74.

Acme Electric Motors, Incorporated  
Aerovent Fan and Equipment, Incorporated  
Agricultural Research Service, USDA  
American Cyanamid Company  
American Hoechst Corporation  
BASF Wyandotte Corporation  
Beet Sugar Development Foundation  
Bureau of Reclamation, U.S. Department of the Interior  
Cargill, Incorporated  
Celanese Chemical Company  
Central Exchange Foundation  
Chevron Chemical Company  
Ciba Geigy  
Colorado State University  
Diamond Shamrock Chemical Company  
Diamond Shamrock Corporation  
Dow Chemical Company  
E. I. du Pont de Nemours and Company  
Economic Development Administration,  
U.S. Department of Commerce  
Economic Research Service, USDA  
Eli Lilly Company  
Environmental Protection Agency  
FMC Corporation, Niagra Chemical Division  
Fargo Ford Tractor, Incorporated  
Fargo Tire Company  
Fats and Protein Research Foundation  
Fisons Corporation  
Forest Service, USDA  
Fort Dodge Laboratories  
Frito Lay, Incorporated  
Garrison Diversion Conservancy District  
Geigy Agricultural Chemicals  
General Mills  
Goodrich Tire Company  
Green Giant Company  
Gulf Oil Foundation  
Hercules, Incorporated  
International Multi-foods

Interstate Seed and Grain Company  
Malting Barley Improvement Association  
McAvoy, Joe Memorial  
Merck and Company, Incorporated  
MINN-DAK Growers Association  
Mobil Chemical Company  
Monsanto Chemical Company  
NABISCO  
Nalley's Fine Foods  
National Macaroni Manufacturers Association  
Natural Gas Pipeline Company of America  
Nor-Am Agricultural Products, Incorporated  
North Dakota Beef Cattle Improvement Association  
North Dakota Beef Commission  
North Dakota Business and Industrial Development  
Department  
North Dakota Grazing Association  
North Dakota Mutual Aid Corporation  
North Dakota Power Use Council  
North Dakota State Highway Department  
North Dakota State Seed Department  
North Dakota State Water Commission  
North Dakota State Wheat Commission  
North Dakota Water Resources Research Institute  
Northern Great Plains Research Laboratory  
Old West Regional Commission  
Olin, Agricultural Division  
PPG Industries, Incorporated  
Peavey Company  
Pennwalt Corporation  
Peter Schweitzer Division of Kimberly-Clark Corp.  
Pillsbury Company  
Processors of Sunflower Seed  
Quaker Oats Company  
Red River Valley Sugarbeet Growers Association  
Research Corporation  
Rohm and Haas Company  
Schaefer, Harold Grant  
Schuler Grain Company  
Shell Chemical Company  
Shell Development Company  
Sheyenne Valley Grazing Association  
Stauffer Chemical Company  
Turkey Federation  
Union Carbide  
UNIROYAL Chemical Company  
U.S. Borax Research  
Valley Chemical Laboratory, Incorporated  
Velsicol Chemical Corporation



# Active Projects

NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION  
North Dakota State University

January 1, 1975

Project	Title	Investigator(s)
<b>BIOCHEMISTRY</b>		
1212	Comparative Study of Plant Carbonic Anhydrase.	George Graf
1213	Peptide Hydrolases in Pesticide Metabolism by Plants.	George Graf
1214	Role of Hydroxylation in 2,4-D Inactivation.	J. R. Fleeker
1215	Enzymic Biosynthesis of Gramine in <i>Hordeum vulgare</i> .	A. G. Fischer
1217	Environmental Implications of Pesticide Usage.	H. J. Klosterman
(NC-96)		D. W. Bristol
1218	Uric Acid and Hydrogen Peroxide Formation in Bovine Thyroid.	A. G. Fischer
1219	Extracellular Nuclease from Cell Suspension Culture of Higher Plants.	A. E. Oleson
1747	Interrelationships of Mercury Concentration in Beef, Milk, Soils, Plants, and Water.	D. W. Bristol
2535	Implications of the Atmospheric Environment on Coal Development in Western North Dakota (Seam: Phase I).	D. W. Bristol
3201	Cooperative Investigations in Agricultural Biochemistry	H. J. Klosterman D. W. Bristol
<b>Agricultural Economics</b>		
1331	State and Local Taxes and Their Effects on Agriculture	T. K. Ostenson
1335	Economics of Farm and Ranch Growth.	J. E. Johnson
(GP-12)		
1336	Credit Problems of North Dakota Agriculture.	F. R. Taylor
1337	Dairy Market Efficiency.	G. W. Erlandson
1344	Economics of Crop Production Technology.	R. G. Johnson
1345	Effects of the 1967 Wholesome Meat Law Upon North Dakota's Meat Industry.	E. V. Dunn
1346	Market Structure Analysis of Farm Input Retailing Industries.	G. W. Erlandson D. E. Anderson D. W. Cobia
1347	North Dakota Agribusiness Marketing Information.	D. W. Cobia
1348	The Relations of Population to Social Change in The North Central Region, 1960-70.	T. K. Ostenson
(NC-97)		
1350	Livestock and Produce Marketing.	E. V. Dunn
1351	Economics of Farm Size.	R. G. Johnson
1352	Economics of Livestock Production Technology.	F. L. Leistriz L. W. Schaffner
1353	The Economics of Institutional Arrangements for Viable Rural Communities in the Great Plains.	D. L. Helgeson T. K. Ostenson W. C. Nelson
(NC-102)		D. E. Anderson
1354	Systems Analysis of the Economics of Grain Marketing.	
(NC-104)		
1355	Costs, Quality, and Demand for Selected Community Services: The Effect of Organizational Form, Size, and Other Factors.	D. L. Helgeson
(NC-123)		
1429	Evaluation of North Dakota's First Rural Water System	W. C. Nelson
3303	Collection and Dissemination of Agricultural Data.	F. R. Taylor
3306	Service Activities and Pilot Studies.	F. R. Taylor
3314	Market Development for Hard Red Spring and Durum Wheat.	D. E. Anderson
3319	Service Activities Relating to Ownership, Markets, and Use of Farmland.	J. E. Johnson
3328	Economic and Social Impact of Recreational Development of Lake Metigoshe.	D. L. Helgeson
3330	Marketing of Irrigation Production.	D. E. Anderson R. G. Johnson
3331	Water Quality and Land Use in the Sheyenne River Basin	W. C. Nelson
3332	Impacts of Coal Development Alternatives.	F. L. Leistriz
3333	Growth and Decline of Small Cities in North Dakota.	D. L. Helgeson
3334	Alternative Uses of Wetlands.	T. A. Hertsgaard
3335	Labor Supply in North Dakota.	T. A. Hertsgaard
3336	Resource Inventory and Monitoring System in North Dakota.	J. E. Johnson



3337	Research and Extension Assist Communities Through Title V (React).	E. V. Dunn D. L. Helgeson G. M. Bedker
3338	Feasibility and Potential Impact of Sunflower Seed Processing Firms.	D. L. Helgeson D. W. Cobia L. W. Schaffner
<b>Agricultural Engineering</b>		
1419	Evaluation of Extensive Irrigation.	E. C. Stegman
1421	Effect of Air Flow and Temperature in Mechanical Dryers on Wheat Quality.	C. W. Moilanen W. J. Promersberger G. L. Pratt
1422 (NC-93)	Animal Waste Management with Pollution Control.	
1423	Irrigation Scheduling of Mechanized Sprinkler Systems	E. C. Stegman H. M. Olson
1424	Treatment Methods for Removing Organic Coloring and Minerals from Rural Water Supplies.	R. L. Witz Coila Janecek R. T. Schuler
1425	Physical Properties of Sunflower Seeds.	R. W. Schottman
1426	Feedyard Runoff.	R. T. Schuler
1427	Grain Harvesting Losses.	H. L. Kucera
1428	Ventilation for Confined Cattle.	R. L. Witz
1429	Evaluation of North Dakota's First Rural Water System.	R. L. Witz Coila Janecek G. L. Pratt
1430 (NC-118)	Utilization and Disposal of Municipal, Industrial, and Agricultural Processing Wastes on land.	
1431	Energy for Tillage.	H. L. Kucera
3411	Ditch Linings and Underground Pipe for Irrigation Systems.	E. C. Stegman H. M. Olson
<b>Entomology</b>		
1518	Factors Influencing Aphid and Leafhopper Transmission of Plant Diseases to Cereal Grain.	J. T. Schulz
1519	Biology, Ecology and Control of Sunflower Insects.	J. T. Schulz C. Y. Oseto A. W. Anderson R. D. Frye H. J. Meyer
1521	Biology and Control of Sugarbeet Root Maggot.	
1522	Insect Control Through Interference with Normal Processes of Physiology, Reproduction and Behavior.	
1523	Management of Grasshopper Populations.	G. B. Mulkern
1524	Microbial Agents for Control of Agricultural Pests.	R. D. Frye G. B. Mulkern
1806	Effects of Selected Insecticides on Agriculturally Important Microbiological Activities.	J. T. Schulz
3502	North Dakota Insect Survey and Insect Collection.	R. L. Post
3503	Management of Insects Infesting Corn.	D. K. McBride R. D. Frye R. B. Carlson
6201	Shelter Belts in North Dakota.	
<b>Agronomy</b>		
1601	Hard Red Spring Wheat Improvement.	R. C. Frohberg R. H. Busch H. Z. Cross M. K. Anderson A. E. Foster P. C. Sandal R. H. Busch R. C. Frohberg J. J. Hammond J. S. Quick J. D. Nalewaja D. W. Meyer K. A. Lucken S. S. Maan A. B. Schooler J. F. Carter D. W. Meyer
1606	Corn Improvement.	
1608	Breeding and Genetics of Spring Barley.	
1610	Sudan Grass for North Dakota.	
1611	Genetics and Associations of Inherited Characters in Wheat.	
1613	Breeding and Genetics of Flax.	
1614	Durum Improvement.	
1617	Weed Control Practices and Related Basic Problems.	
1619	Drought Injury and Resistance in Plants.	
1620	Male Sterility, Fertility Restoration and Hybrid Vigor in Hard Red Spring and Durum Wheat.	
1621	Intergeneric and Interspecific Crosses of Barley and Rye.	
1623	Grasses and Legumes for North Dakota.	



1624	Soybean Improvement.	D. A. Whited
1625	Hard Red Winter Wheat Improvement.	J. R. Erickson
1626	Biochemical Criteria for Plant Breeding.	E. L. Deckard
1627	Transfer of Cytoplasmic Variability and Disease Resistance to Wheat from Related Species.	S. S. Maan
1628	Integrating Crop Culture, Chemicals and Life Cycles to Control Persistent Weeds.	C. G. Messersmith
(NC-121)		J. D. Nalewaja
1752	Forage Production and Utilization Systems as a Base for Livestock Production.	D. W. Meyer
(NC-114)		
1910	Physiology of Soybean Seeds.	D. A. Whited
2533	Effect of Irrigation and Fertilizer Nitrogen on Soybeans on Well-Drained Loamy Soils.	D. A. Whited
3330	Marketing of Irrigation Production.	L. A. Jensen
3601	Testing New and Standard Open Pedigree Corn Hybrids.	H. Z. Cross
3602	Breeding Improved Varieties of Oats for North Dakota.	G. S. Smith
		D. C. Ebeltoft
3605	Hybrid Corn Performance Trials in North Dakota.	H. Z. Cross
3606	Increase and Distribution of Improved Inbreds of Corn.	H. Z. Cross
3610	Miscellaneous and New Crops for North Dakota.	A. A. Schneiter
3611	Cereal Crops Variety Testing.	A. A. Schneiter
		J. F. Carter
3613	Production and Supervised Distribution of Breeders and Foundation Seed.	D. C. Ebeltoft
3617	Commercial Production of Male Sterile and Hybrid Wheat Seed.	K. A. Lucken
		J. F. Miller
3618	Simulated Hail Damage on Barley.	E. L. Deckard
3619	Weed Control in Sugarbeets and Related Basic Problems.	A. G. Dexter
3620	Sawfly Resistant Wheats.	G. S. Smith
		L. R. Joppa
		R. C. Frohberg
3802	Serologic Aspects on the Nature of Rust Resistance in Wheat.	N. D. Williams.
<b>Animal Science</b>		
1422	Animal Waste Management with Pollution Control.	M. L. Buchanan
(NC-93)		
1428	Ventilation for Confined Cattle.	M. L. Buchanan
1729	Factors Affecting Volatile Fatty Acid Production in the Rumen.	D. O. Erickson
1736	Nutrient Requirements for Confined Ewes.	M. R. Light
		J. E. Tilton
1737	Rations for Ruminants.	W. E. Dinusson
		D. O. Erickson
1740	Improvement of Beef Cattle Through Breeding Methods.	M. L. Buchanan
(NC-1 Rev.)		R. B. Danielson
1741	Cattle Types and Methods of Marketing.	V. K. Johnson
		M. L. Buchanan
1743	Amino Acid Composition of Muscles from Nutritionally-Limited Swine.	R. L. Harrold
		M. J. Marchello
		C. N. Haugse
1745	Embryonic Mortality in Swine.	J. E. Tilton
		J. N. Johnson
		M. L. Buchanan
1747	Interrelationship of Mercury Concentration in Beef, Milk, Soils, Plants, and Water.	J. L. Sell
1748	Area Centers for Beef Development and Producer Education.	P. T. Berg
		M. L. Buchanan
		M. A. Kirkeide
1749	Growth Rate and Market Characteristics in Turkeys as Related to Early Nutrition.	R. L. Johnson
		J. L. Sell
1750	Adrenal Cortical Levels in Rats and Sheep.	J. E. Tilton
		M. R. Light
		M. L. Buchanan
1751	Ergot in Livestock and Poultry Rations.	W. E. Dinusson
		J. L. Sell
		D. O. Erickson
1752	Forage Production and Utilization Systems as a Base for Livestock Production.	D. O. Erickson
(NC-114)		C. N. Haugse
1753	Feed Value and Composition of North Dakota Feed Grains.	R. L. Harrold
		D. O. Erickson
		C. N. Haugse
1754	Progressive Pneumonia in Farm Sheep Flocks.	M. R. Light
		J. E. Tilton
		R. J. Amundson



1755	Influence of DDT on Hepatic Microsomal Enzyme Activities and on Urinary Excretion of Ascorbic Acid.	J. L. Sell R. L. Puyear K. L. Davison
1756 (NC-111)	Increased Efficiency of Lamb Production Through Improved Breeding, Nutrition and Management Systems.	M. R. Light D. O. Erickson J. E. Tilton
1757	Nutrition of Pigs.	R. L. Harrold J. N. Johnson W. E. Dinusson
1758	Sow Nutrition and Management.	J. N. Johnson R. C. Zimprich R. L. Harrold C. N. Haugse
1759	Effect of Dietary Fats on Egg Production and on Quantity of Manure Produced.	J. L. Sell R. L. Johnson J. L. Sell
1809	The Etiology of Necroses in Poultry.	M. L. Buchanan
1810	Bacterial Viruses in Farm Animal Waste Lagoons.	C. N. Haugse
3330	Marketing of Irrigation Production.	C. N. Haugse
3336	Resource Inventory and Monitoring System in North Dakota.	M. L. Buchanan
3703	General Service.	M. R. Light
3707	Productivity of Selected Breeds of Sheep.	T. C. Faller M. L. Buchanan
3710	Preliminary Investigations (Dairy).	C. G. M. Edgerly J. E. Tilton
3714	Improving Reproduction in Beef Cattle.	M. L. Buchanan M. R. Light
3715	Growth in Suffolk Sheep.	T. C. Faller C. G. M. Edgerly
3717	Livestock Waste Characterization and Production Rates.	C. N. Haugse W. E. Dinusson
3718	Whey in Rations.	R. B. Danielson T. C. Faller
3719	Aversive Agent in Reducing Sheep Losses to Coyotes.	M. R. Light C. N. Haugse
<b>Bacteriology</b>		
1422 (NC-93)	Animal Waste Management with Pollution Control.	M. C. Bromel
1430 (NC-118)	Utilization and Disposal of Municipal, Industrial, and Agricultural Processing Wastes on Land.	B. R. Funke
1524	Microbial Agents for Control of Agricultural Pests.	K. J. McMahon
1806	Effects of Selected Insecticides on Agriculturally Important Microbiological Activities.	B. R. Funke
1807	Effects of L-Amino-D-Proline on Some Enzyme Systems.	B. P. Sleeper
1809	The Etiology of Necroses in Poultry.	M. C. Bromel
1810	Bacterial Viruses in Farm Animal Waste Lagoons.	D. L. Berryhill
3328	Economic and Social Impact of Recreational Development of Lake Metigoshe.	M. C. Bromel
3331	Waste Quality and Land Use in the Sheyenne River Basin.	M. C. Bromel
3332	Impacts of Coal Development Alternatives.	M. C. Bromel
3801	Starch and Cellulose Breakdown by Soil Actinomycetes.	B. P. Sleeper
3802	Serologic Aspects on the Nature of Rust Resistance in Wheat.	J. A. Doubly
3804	General Service and Preliminary Investigations.	K. L. McMahon
3805	Japanese Beetle Control with <i>Bacillus popilliae</i> .	K. L. McMahon
<b>Botany</b>		
1906	Pasture Management for Spring Grazing in Western North Dakota.	W. C. Whitman
1908 (GP-9)	Rangeland Improvement in North Dakota.	Harold Goetz W. C. Whitman
1909	Range Forage Production in Relation to the Environment.	W. C. Whitman Harold Goetz
1910	Physiology of Soybean Seeds.	D. S. Galitz
1911	Photosynthesis and Nitrogen Metabolism as Related to Internal Water Balance of Wheat and Other Selected Plants.	M. E. Duysen D. S. Galitz
1913	Impact of Coal Development on Plant Ecosystems in Western North Dakota (Seam; Phase I).	D. S. Galitz W. T. Barker W. C. Whitman
1914	Photosynthesis in Wheat Subjected to Water Deficit Stress.	M. E. Duysen T. P. Freeman



3331	Water Quality and Land Use in the Sheyenne River Basin.	W. T. Barker
3902	Preliminary Investigations (Pasture and Ranges).	W. C. Whitman
3903	Floristic Composition of Wet Lowland Prairie Sites.	W. T. Barker Harold Goetz
4519	Coal Overburden Characterization and Revegetation Studies.	W. C. Whitman
5901	Growth and Production of Deer Browse Species in the Badlands of Western North Dakota.	Harold Goetz W. C. Whitman
<b>Cereal Chemistry and Technology</b>		
1601	Hard Red Spring Wheat Improvement.	L. D. Sibbitt
2001	Wheat Protein Fractions and Baking Quality.	C. E. McDonald
2002	Quality Investigations of Hard Red Spring Wheat Varieties.	L. D. Sibbitt
2004	Durum Wheat Quality Evaluation for Consumer Acceptance.	O. J. Banasik
2005	Testing and Improvement of North Dakota Barley Varieties for Industrial Acceptance.	C. W. Baker
2006	The Role of Lipids on Durum Wheat Quality.	C. E. McDonald
2007	Barley and Malt Quality as Influenced by Biochemical Constituents.	C. W. Baker
2008	Cereal Polysaccharides. Effect on Chemical Composition and Structure on Milling, Baking and Processing.	B. L. D'Appolonia
2009	Market Quality in Wheat.	B. L. D'Appolonia
(NCM-41)		
2526	Fertilizer Nitrogen Rate — Spring Wheat Variety Interaction in Relation to Soil Environment.	O. J. Banasik
4001	Quality Testing of Wheat Varieties.	L. D. Sibbitt
<b>Horticulture and Forestry</b>		
2201	Breeding Potatoes.	R. H. Johansen
2213	Effect of Production Practices on the Quality of Potatoes.	D. C. Nelson
2216	Vegetable Breeding and Genetics.	N. S. Holland
2218	Factors Affecting Post-Harvest Marketing Quality of Processed Potatoes.	E. P. Lana
(NCM-45)		R. L. Shaw
2219	Influence of Stocks on Growth and Fruiting of Apple Trees.	D. C. Nelson
2220	Vegetable Production Under Irrigation in North Dakota.	N. S. Holland
2221	Selection, Evaluation and Culture of Hardy Ornamentals for the Northern Plains.	E. W. Scholz
2530	Soil Test Values and Potato Response to Fertilizer.	D. E. Herman
3330	Marketing of Irrigation Production.	D. C. Nelson
4203	Fruits Breeding Culture and Varieties.	E. W. Scholz
4204	General Service and Preliminary Investigations.	N. S. Holland
4206	Mulches and Row Covers for Vegetable Crops.	E. P. Lana
6201	Shelter Belts in North Dakota.	E. W. Scholz E. P. Lana
<b>Plant Pathology</b>		
2304	Etiology and Control of Seed, Seedling and Root Diseases of Barley.	V. D. Pederson
2305	Biology and Control of Bacterial and Fungal Diseases of Potato.	J. E. Huguelet
2307	Virus Diseases of Potato.	J. E. Huguelet
2308	Biology and Control of Foliar Diseases in Wheat.	R. M. Hosford, Jr.
2309	The Genetics of Wheat and Wheat Leaf Rust Interactions.	G. D. Statler
2310	Biology and Control of Ergot in Cereals and Grasses.	L. J. Littlefield
2311	Morphology of Tolerance and Slow Rusting in Wheat.	L. J. Littlefield.
2312	Genetics of Flax and Flax Rust Interactions.	G. D. Statler
3802	Serologic Aspects on the Nature of Rust Resistance in Wheat.	G. D. Statler
4308	Plant Disease Survey of North Dakota Crops.	R. L. Kiesling
4309	Importance of Barley Foliar Diseases in North Dakota.	V. D. Pederson
4315	Disease Resistance in Confectionary Sunflowers.	D. E. Zimmer G. N. Fick
6201	Shelter Belts in North Dakota.	R. L. Kiesling
<b>Soils</b>		
1430	Utilization and Disposal of Municipal, Industrial and Agricultural Processing Wastes on Land.	E. B. Norum
(NC-118)		
1752	Forage Production and Utilization Systems as a Base for Livestock Production.	W. C. Dahnke
(NC-114)		
1909	Range Forage Production in Relation to the Environment.	H. W. Omodt
2514	Biological Availability of Nitrogen in Soil Organic Matter.	J. T. Moraghan
2517	Soil Physiochemical Properties as Affected by Tillage.	Armand Bauer

2519	Effects of Nitrogen and Phosphorus Fertilizer on Performance of Corn.	J. T. Moraghan
2520	The Climatic Resources of the North Central Region.	J. M. Ramirez
(NC-94)		
2522	Effect of Management on Sugarbeet Production.	J. T. Moraghan
		P. J. Tiedeman
2525	Nutrient Enrichment of Waters by Soils and Sediments.	J. W. Bauder
(NC-98)		E. B. Norum
2526	Fertilizer Nitrogen Rate — Spring Wheat Variety Interaction in Relation to Soil Environment.	Armand Bauer
2527	Top Soil Depth on Wheat Response to Phosphate Fertilizer.	J. C. Zubrisky
		W. C. Dahnke
2528	Detailed Soil Surveys for Potentially Irrigable Land.	H. W. Omodt
		M. D. Sweeney
2530	Soil Test Values and Potato Response to Fertilizer.	W. C. Dahnke
		L. J. Swenson
2531	Effects of Fertilizer and Plant Populations Upon Yield and Quality of Sunflowers.	J. C. Zubrisky
		W. C. Dahnke
2532	Soil Landscape Characteristics Affecting Land Use Planning and Rural Development.	H. W. Omodt
(NC-109)		D. D. Patterson
2533	Effect of Irrigation and Fertilizer Nitrogen on Soybeans on Well-Drained Loamy Soils.	Armand Bauer
2534	Soil, Landscape and Ground-Water Relationships in a Prairie Pothole.	B. K. Worcester
		L. J. Brun
2535	Implications of the Atmospheric Environment on Coal Development in Western North Dakota (SEAM: Phase I).	J. M. Ramirez
		L. J. Brun
3330	Marketing of Irrigation Production.	D. D. Patterson
4505	Soil Correlation.	H. W. Omodt
4507	Soil Survey and Interpretation.	H. W. Omodt
		D. D. Patterson
		F. W. Schroer
4508	Fertilizer Soil Testing.	W. C. Dahnke
		R. A. Torkelson
		L. J. Swenson
4513	Application of Phosphorus for Small Grains in North Dakota Soils.	W. C. Dahnke
		E. B. Norum
		L. J. Swenson
4518	Soil, Cropping System and Climate on Control of Saline Seeps.	L. J. Brun
		B. K. Worcester
4519	Coal Overburden Characterization and Revegetation Studies.	F. W. Schroer
4521	Soil Test Values and Alfalfa Response to Fertilizer.	W. C. Dahnke
		L. J. Swenson
4522	Water Regime of Salt-Affected Soils in Northwestern North Dakota.	B. K. Worcester
		L. J. Brun
		F. J. Sobolik
4523	Chemical and Physical Characteristics of Shaped Mined Lands and Their Effect on Establishment of Plants	Armand Bauer
		Glendon Gee
		John Gilley
4524	Surface and Root Zone Hydrology of Shaped Surface-Mined Spoil Banks and Rehabilitated Lands.	Armand Bauer
		Glendon Gee
		John Gilley
4525	Plant Establishment and Culture on Surface-Mined Lands	Armand Bauer
		Glendon Gee
		John Gilley
<b>Veterinary Science</b>		
2610	Bovine Respiratory Diseases.	I. A. Schipper
(NC-107)		C. L. Kelling
		B. R. Hanson
4602	Preliminary Investigations.	M. F. Andrews
		G. E. Staples
		H. H. Casper
4604	Veterinary Diagnostic Service.	I. E. Berg
		M. F. Andrews
		A. D. Alstad
		Raul Weiss
		H. H. Casper
4605	State Animal Health Service.	G. E. Staples
4606	Diseases of Neonatal Calves.	G. E. Staples
4609	Infectious Bovine Rhinotracheitis (IBR) in the Pregnant Bovine.	I. A. Schipper
		C. L. Kelling