

SIXTIETH ANNUAL REPORT

Agricultural Experiment Station
University of Minnesota

JULY 1, 1952 TO JUNE 30, 1953



UNIVERSITY OF MINNESOTA

ST. PAUL CAMPUS

LETTERS OF TRANSMITTAL

University of Minnesota, Minneapolis, Minn.

July 1, 1953

To His Excellency, C. Elmer Anderson,
Governor of Minnesota.

Sir: I have the honor to transmit to you herewith the report of the Agricultural Experiment Station of the University of Minnesota for the fiscal year ending June 30, 1953.

Respectfully transmitted,

JAMES L. MORRILL,
President of the Board of Regents
University of Minnesota, Minneapolis, Minn.

July 1, 1953

To the Honorable Board of Regents,
University of Minnesota.

Gentlemen: I have the honor to transmit herewith the report of the Director of the Agricultural Experiment Station of the University of Minnesota for the fiscal year ending June 30, 1953.

Respectfully transmitted,

JAMES L. MORRILL,
President of the University of Minnesota
University of Minnesota, St. Paul, Minn.

July 1, 1953

James L. Morrill,
President of the University of Minnesota.

Sir: I have the honor to submit herewith the report of the Agricultural Experiment Station for the fiscal year ending June 30, 1953.

Respectfully transmitted,

H. J. SLOAN, Director

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SIXTIETH ANNUAL REPORT

JULY 1, 1952 TO JUNE 30, 1953

H. J. Sloan, Director

FOREWORD

IN THE LAST few decades the agricultural picture has changed from one in which the majority of the population was engaged in agricultural production to one in which a rather minor portion of the population is thus employed. In the early days the principal concern of the agricultural producer was to provide for his own needs. This meant as wide a variety of crops as his conditions would permit; however, in many cases this also meant a limited variety of products for consumption and fiber for home fabricating. Today, an increasing number of crops are being provided by specialized producers.

These shifts are in general justified, partly because it permits larger units which usually result in greater efficiency of production. This in turn means lower cost to the consumer and better income to the producer. This change has been aided by the great improvement in distribution which permits the farmer to buy products produced to better advantage by other specialists.

The concomittant increase in food and fiber output per man has resulted from a wide variety of improvements. The more important among these are: increased use of improved fertilizer, development of faster growing livestock and higher yielding crops, improvements in disease and insect control, development of disease and insect resistant varieties, improved cultural practices, and farm mechanization. A point which is frequently not recognized is that these improvements have without exception come from the results of research.

In the general scheme of things it is argued that rural people should have the same opportunities, advantages, and comforts as people in other groups of society. It is well recognized that non-rural people have improved their status at least so far as material goods are concerned. These again have come entirely from research in the development and improvement of home conveniences, housing, communication, and transportation. It seems fair to reason that if the benefits to farmers from improved agricultural production and marketing are to keep pace with improvements in other groups of society, the expenditures for research that provide these improvements should be comparable. At the present time, however, it is estimated that agriculture spends only

about one-eighth as much for research on the basis of gross income as is spent by nonagricultural industry generally. As technology increases this disparity may grow unless greater support is given to agricultural research.

A fact also that should be kept in mind is that it appears at present that the opportunity for expanding the areas of agriculture geographically over the next twenty-five years will not be sufficient to provide for the increase in population that is anticipated. This means that our attention will be focused to a more intensive rather than more extensive type of agriculture. This imposes new problems and consequently new areas of research—a type of research which, we believe, will be more expensive. It will mean a greater expenditure for what is commonly known as basic or fundamental research because increasing production through more intensive farming requires answers of a more basic nature.

While it is recognized that industry is making important contributions to the solution of some of our agricultural problems, these of necessity involve, for the most part, the more applied types of experimentation leaving the major responsibility for fundamental research to the agricultural experiment stations. This is a responsibility that we must not ignore if the experiment stations are to make their fullest contribution to the future of agriculture.

Also it is now recognized that producers were originally not much concerned about problems of marketing or distribution because the products were either largely consumed at home or disposed of in nearby markets. Now even perishable goods are shipped long distances and, therefore, the farmer's market is frequently hundreds of miles away. Also, producers are becoming increasingly aware of consumers' interests in respect to kind, quality, and price of food. As a consequence, research in agricultural experiment stations is rapidly expanding to problems of marketing and distribution, preservation of quality, and even to problems of consumer acceptance. These are areas into which agricultural research has only recently entered and there is thus a responsibility for greatly increasing these areas of investigation.

While the agricultural experiment stations should be of every possible aid in trying to find answers to current problems, perhaps their greatest responsibility is to provide much of the leadership in anticipating the future direction of agriculture in particular and society in general so that they may plan research programs that will provide needed answers when changes occur. Only to the extent that we can keep our research program geared to future needs will agriculture be able to maintain a favorable position in relation to society as a whole.

CHANGES IN STAFF

Appointments

J. T. Bell, D.V.M., as instructor, Department of Veterinary Medicine, effective July 1, 1952.

R. L. Butler, M.S., as research associate, Department of Entomology and Economic Zoology, effective October 16, 1952.

R. M. Dennistoun, M.S., as assistant superintendent, Rosemount Agricultural Experiment Station, effective July 1, 1952.

J. D. Donker, Ph.D., as research fellow, Department of Dairy Husbandry, effective July 1, 1952.

Roy G. Francis, Ph.D., as assistant professor, Rural Sociology, effective September 16, 1952.

Charles Gale, D.V.M., as instructor, Department of Veterinary Medicine, effective July 1, 1952.

R. S. Grant, M.S., as assistant superintendent, Northeast Experiment Station, effective July 16, 1952.

Robert Hanson, B.S., as instructor, West Central Experiment Station, effective September 1, 1952.

Gwen H. Haws, B.S., as agricultural bulletins editor, Information Service, effective April 1, 1953.

E. L. Johnson, Ph.D., as professor and head, Department of Poultry Husbandry, effective June 1, 1953.

L. M. LaMois, M.S., as instructor, North Central Experiment Station, effective July 1, 1952.

Wallace Mattson, D.V.M., as research fellow, Department of Veterinary Medicine, effective July 1, 1952.

K. P. Miller, M.S., as assistant professor, Southern Experiment Station, effective October 1, 1952.

W. M. Myers, Ph.D., as professor and head, Department of Agronomy and Plant Genetics, effective July 1, 1952.

R. R. Newberg, M.A., as instructor, Department of Agricultural Economics, effective January 1, 1953.

A. B. Salmela, M.S., as instructor, North Central Experiment Station, effective November 16, 1952.

J. M. Sieburth, M.S., as instructor, Department of Veterinary Medicine, effective October 1, 1952.

John Thompson, M.S., as instructor, Southern Experiment Station, effective January 1, 1952.

E. A. Usenick, D.V.M., as instructor, Department of Veterinary Medicine, effective September 16, 1952.

W. B. Wallin, M.S., as instructor, School of Forestry, effective September 16, 1952.

B. W. Warren, M.S., as research fellow, Department of Entomology and Economic Zoology, effective July 1, 1952.

Griselda F. Wolf, D.V.M., as research fellow, Department of Veterinary Medicine, effective July 1, 1952.

Promotions

L. K. Cutkomp, Ph.D., as associate professor, Department of Entomology and Economic Zoology, effective July 1, 1952.

A. A. Dowell, Ph.D., as assistant dean, Director of Resident Instruction, effective January 1, 1953.

T. H. Fenske, M.S., as assistant dean, Institute of Agriculture, effective January 1, 1953.

C. L. Larson, M.S., as assistant professor, Department of Agricultural Engineering, effective July 1, 1952.

H. Macy, Ph.D., as dean, Institute of Agriculture, effective January 1, 1953.

Travis W. Manning, M.S., as instructor, Department of Agricultural Economics, effective July 1, 1952.

H. A. Morris, Ph.D., as assistant professor, Department of Dairy Husbandry, effective July 1, 1952.

W. E. Rempel, Ph.D., as assistant professor, Department of Animal Husbandry, effective July 1, 1952.

Frank Sauer, D.V.M., as instructor, Department of Veterinary Medicine, effective October 16, 1952.

Dorothy F. Simmons, M.S., as professor, School of Home Economics, effective July 1, 1952.

H. J. Sloan, Ph.D., as director, Minnesota Agricultural Experiment Station, effective January 1, 1953.

Leaves of Absence

Roy G. Francis, Ph.D., assistant professor, Rural Sociology, on leave to accept Social Science Research Council Fellowship, September 16, 1952 to June 30, 1953.

W. F. Geddes, Ph.D., professor and head, Department of Agricultural Biochemistry, on leave to study in Europe, July 1, 1952 to July 16, 1952.

D. G. Low, D.V.M., instructor, Department of Veterinary Medicine, on leave for active duty in the Army Veterinary Corps, May 5, 1953 to June 30, 1953.

P. W. Manson, M.S., professor, Department of Agricultural Engineering, on leave to accept assignment with the Food and Agricultural Organization of the United Nations as technical assistant to the Hebrew Institute of Technology with headquarters in Haifa, Israel, October 1, 1952 to January 31, 1953.

Rex Montgomery, Ph.D., research associate, Department of Agricultural Biochemistry, on leave to attend International Union of

Pure and Applied Chemistry meeting in Oxford, England, August 17, 1952 to September 16, 1952.

E. H. Rinke, Ph.D., professor, Department of Agronomy and Plant Genetics, on leave to act as U.S. governmental adviser for Mutual Security Agency mission, July 1, 1952 to October 15, 1952.

A. J. Schwantes, M.S., professor and head, Department of Agricultural Engineering, on leave to accept assignment with the Office of Foreign Agricultural Relations, USDA, as engineering adviser, Point IV, with headquarters in Cairo, Egypt, September 1, 1952 to June 30, 1953.

E. C. Stakman, Ph.D., professor and head, Department of Plant Pathology and Botany, on leave to attend UNESCO General Conference, Paris, France, November 5, 1952 to December 10, 1952.

Resignations

D. E. Bartlett, D.V.M., Ph.D., instructor, Department of Veterinary Medicine, to accept a position with the American Breeders' Service, Chicago, Illinois, effective January 31, 1953.

H. C. Chiang, Ph.D., research fellow, Department of Entomology and Economic Zoology, to accept a position as instructor at the Northeast Experiment Station, effective March 15, 1953.

R. W. Gray, Ph.D., research fellow, Department of Agricultural Economics, to accept a position as assistant economist, Bank of America, San Francisco, California, effective May 2, 1953.

W. R. Hess, M.S., research fellow, Department of Veterinary Medicine, to accept a position as immunologist for the Plum Island Animal Disease Research Institute, New York, effective May 31, 1953.

V. H. Johnson, M.S., assistant professor, Department of Agricultural Engineering, to accept a position with the Caterpillar Tractor Company, Peoria, Illinois, effective May 6, 1953.

S. F. Krause, Ph.D., research fellow, Department of Agricultural Economics, to accept a position with the Bureau of Agricultural Economics at Washington, D. C., effective June 15, 1952.

L. L. Larson, D.V.M., instructor, Department of Veterinary Medicine, to enter private practice, effective June 15, 1953.

Wallace Mattson, D.V.M., research fellow, Department of Veterinary Medicine, to enter private practice, effective April 30, 1953.

K. P. Miller, M.S., assistant professor, North Central Experiment Station, to accept a position at the Southern Experiment Station, effective September 30, 1953.

W. F. Millier, Ph.D., instructor, Department of Agricultural Engineering, to accept a position at Cornell University, Ithaca, New York, effective November 8, 1952.

K. F. Moist, D.V.M., instructor, Department of Veterinary Medicine, to enter private practice, Red Lion, Pennsylvania, effective October 15, 1952.

Margaret Nielsen, B.A., assistant to editor, Agricultural Bulletins, Department of Publications, to accept a position at the State College of Washington, Pullman, Washington, effective September 4, 1952.

R. E. Olson, M.S., research fellow, Department of Agricultural Economics, to accept a position with the Bureau of Agricultural Economics at Washington, D. C., effective June 30, 1952.

H. C. Rowsell, D.V.M., research fellow, Department of Veterinary Medicine, to reassume his appointment at the Ontario Veterinary College, Guelph, Ontario, effective April 30, 1953.

S. H. Spurr, Ph.D., associate professor, School of Forestry, to accept a position as professor of Natural Resources, University of Michigan, Ann Arbor, effective August 31, 1952.

H. L. Strandberg, B.S., instructor, Department of Veterinary Medicine, to devote full time work for the degree of Doctor of Veterinary Medicine, effective June 15, 1953.

B. E. Youngquist, B.A., assistant professor, West Central Experiment Station, to accept a position at the Southern Experiment Station, Waseca, Minnesota, effective July 1, 1952.

Retirements

W. H. Alderman, B.S.A., professor and head, Department of Horticulture, effective June 30, 1953.

C. H. Bailey, Ph.D., dean, Institute of Agriculture, effective December 31, 1952.

R. F. Crim, B.S., associate professor, Department of Agronomy and Plant Genetics, effective June 30, 1952.

E. C. Stakman, Ph.D., professor and head, Department of Plant Pathology and Botany, effective June 30, 1953.

M. J. Thompson, M.S., superintendent, Northeast Experiment Station, effective June 30, 1953.

Deaths

M. C. Hervey, Ph.D., associate professor, Department of Dairy Husbandry, January 25, 1953.

PUBLICATIONS

Agricultural Experiment Station

GENERAL BULLETIN SERIES

403. (Reprint) Sex determination of geese. Thomas H. Canfield, Poultry Husbandry, 6 pages, 2,000.
416. Changes in the dairy farming picture. W. E. McDaniel and G. A. Pond, Agricultural Economics, 20 pages, 10,000.
417. Competition between butter and margarine. Rex W. Cox, Agricultural Economics, 16 pages, 8,500.
418. The export market for pork and lard. Austin A. Dowell, Robert E. Olson, and Oscar B. Jesness, Agricultural Economics, 36 pages, 6,000.
419. Facts about Newcastle disease. B. S. Pomeroy and C. A. Brandly, Veterinary Medicine, and University of Wisconsin, 24 pages, 36,000.
420. Minnesota dairy cooperatives. T. W. Manning, E. Fred Koller, and O. B. Jesness, Agricultural Economics, 44 pages, 8,500.
421. Minnesota farm supply associations. T. W. Manning and E. Fred Koller, Agricultural Economics, 40 pages, 7,000.

TECHNICAL BULLETIN SERIES

151. (Reprint) Prenatal development of the bovine. L. M. Winters, W. W. Green, and R. E. Comstock, Animal Husbandry, 48 pages, 2,000.
205. Inheritance of reaction to leaf rust, *Puccinia rubigo-vera tritici* (Erikss.) Carleton, and of certain other characters in a wheat cross. Lorenzo M. Martinez, E. R. Ausemus, and C. R. Burnham, Agronomy and Plant Genetics, 36 pages, 3,000.
206. The black point disease of wheat in the United States. E. W. Hanson and J. J. Christensen, Plant Pathology and Botany, 32 pages, 3,000.
207. Development and performance of inbred lines of chickens. R. N. Shoffner, H. J. Sloan, L. M. Winters, T. H. Canfield, and A. M. Pilkey, Poultry Husbandry and Animal Husbandry, 36 pages, 3,000.
208. Relative accuracy of pricing butcher hogs on foot and by carcass weight and grade. Gerald Engelman, Austin A. Dowell, and Robert E. Olson, Agricultural Economics, 52 pages, 12,000.
209. Seed treatment of small seeded legumes. M. F. Kernkamp, Botany and Plant Pathology, 12 pages, 3,000.
210. The relation of defoliation and nitrogen supply to yield and quality in the muskmelon. Robert E. Nylund, 28 pages, 3,000.

MINNESOTA FARM AND HOME SCIENCE

- Volume X, Number 1, 20 pages, 16,500.
- Volume X, Number 2, 20 pages, 16,500.
- Volume X, Number 3, 20 pages, 16,500.

REPORT SERIES

- Fifty-ninth annual report of the Minnesota Agricultural Experiment Station, July 1, 1951 to June 30, 1952, 44 pages, 2,500.
- Miscellaneous Report No. 16. Meteor cherry. W. H. Alderman, W. G. Brierley, T. S. Weir, A. N. Wilcox, R. C. Blake, K. W. Hanson, and L. C. Snyder, Horticulture, 4 pages, 2,000.
- Miscellaneous Report No. 17. (Original and reprint) Maturity ratings of corn hybrids in Minnesota, 1952-53. E. H. Rinke, Gertrud Joachim, and N. C. Olmeim, Agronomy and Plant Genetics, 12 pages, 8,000.
- Miscellaneous Report No. 18. Varietal trials of farm crops. W. M. Myers, E. R. Ausemus, J. O. Culbertson, E. H. Rinke, J. W. Lambert, H. L. Thomas, E. L. Pinnell, L. J. Elling, R. G. Robinson, K. S. Koo, K. J. Hsu, and D. W. Sunderman, Agronomy and Plant Genetics, 36 pages, 12,500.
- (Reprint) Facts about Minnesota agriculture. 16 pages, 7,500.
- (Reprint) Welcome to St. Paul Campus. 8 pages, 7,500.

Agricultural Extension Service

BULLETIN SERIES

141. (Revised) Sheep on Minnesota farms. W. E. Morris and P. A. Anderson, Agricultural Extension and Animal Husbandry, 24 pages, 7,500.
196. (Reprinted) Planting the farmstead shelter belt. Parker Anderson, Agricultural Extension, 16 pages, 10,000.
232. (Reprinted) Know your cooperative. W. H. Dankers, Agricultural Extension, 16 pages, 7,500.
249. (Revised) Kitchen cupboards. Original by Mary May Miller revised by Lucile Holaday, Agricultural Extension, 8 pages, 20,000.
258. (Reprinted) Evergreens. L. C. Snyder, Raymond J. Wood, Clyde M. Christensen, and A. C. Hodson, Horticulture, Plant Pathology and Botany, Entomology and Economic Zoology, 28 pages, 7,500.
263. (Revised) Insecticides for the garden, home, and field. L. K. Cutkomp, Entomology and Economic Zoology, 28 pages, 10,000.

267. (Reprinted) Woody plants for Minnesota. Leon C. Snyder and Marvin E. Smith, Agricultural Extension, 24 pages, 7,500.
268. (Revised) Lampshades you can make. Charlotte Kirchner, Agricultural Extension, 12 pages, 20,000.
272. Building better farm fences. John R. Neetzel, Forestry, 12 pages, 55,000.
273. Grafting fruit trees. T. S. Weir, Horticulture, 16 pages, 7,500.
274. Care of house plants. Richard E. Widmer and Leon C. Snyder, Horticulture and Agricultural Extension, 32 pages, 15,000.

PAMPHLET SERIES

184. (Revised) Fruit spray schedule. L. C. Snyder, T. H. King, and L. K. Cutkomp, Agricultural Extension, Plant Pathology and Botany, and Entomology and Economic Zoology, 8 pages, 10,000.
186. Livestock outlook for 1953. S. B. Cleland, Agricultural Extension, 8 pages, 7,500.
187. (Original and reprint) Chemical weed control in Minnesota. R. S. Dunham, R. E. Nylund, R. F. Crim, and H. L. Hansen, Agronomy and Plant Genetics, Horticulture, Agricultural Extension, and Forestry, 16 pages, 30,000.
188. Understanding the teen age. John E. Anderson, Institute of Child Welfare, 4 pages, 35,000.

FOLDER SERIES

22. (Revised) Improved varieties of farm crops. Minnesota Agricultural Experiment Station, 28 pages, 10,000.
70. (Reprinted) Livestock weights from measurements. W. E. Morris and H. G. Zavoral, Agricultural Extension, 6 pages, 5,000.
85. (Revised) Tips on tree planting. Parker Anderson, Agricultural Extension, 6 pages, 10,000.
100. (Revised) Home canning fruits and vegetables. Agricultural Extension, 10 pages, 30,000.
107. (Reprinted) Grassed waterways. Agricultural Extension, 4 pages, 10,000.
108. (Reprinted) Contour strip cropping. M. A. Thorfinnson, Agricultural Extension, 6 pages, 10,000.
119. (Reprinted) Faster milking. W. E. Petersen, Dairy Husbandry, 6 pages, 15,000.
130. (Revised) Pollen substitutes. M. H. Haydak, Entomology and Economic Zoology, 6 pages, 5,000.
142. (Reprinted) Centralized hog plan. H. G. Zavoral, Agricultural Extension, 6 pages, 7,500.

148. (Reprinted) Use built-up litter in your poultry house. Agricultural Extension, 4 pages, 10,000.
150. (Revised) Community nest. Agricultural Extension, 4 pages, 10,000.
154. (Revised) Vegetable varieties for Minnesota. Orrin C. Turnquist, Agricultural Extension, 8 pages, 12,500.
156. (Revised) Freezing fruits and vegetables. Grace D. Brill, Agricultural Extension, 8 pages, 20,000.
157. (Reprinted) Hay crop silage. M. L. Armour, J. B. Fitch, and H. R. Searles, Agricultural Extension and Dairy Husbandry, 4 pages, 7,500.
160. (Reprinted) Your dairy calf. Thor W. Gullickson, Dairy Husbandry, 4 pages, 10,000.
162. (Reprinted) Strawberries for Minnesota. L. C. Snyder, Agricultural Extension, 8 pages, 10,000.
163. (Reprinted) Raspberries for Minnesota. L. C. Snyder, Agricultural Extension, 8 pages, 10,000.
164. (Revised) Getting started with your vegetable garden. Orrin C. Turnquist, Agricultural Extension, 10 pages, 10,000.
165. (Revised) The home lawn. Leon C. Snyder, Agricultural Extension, 10 pages, 10,000.
167. (Reprinted) Summer care of vegetable gardens. Orrin C. Turnquist, Agricultural Extension, 10 pages, 7,500.
170. (Revised) How to control wireworms. A. A. Granovsky, Entomology and Economic Zoology, 8 pages, 5,000.
171. (Revised) How to control cutworms. A. A. Granovsky, Entomology and Economic Zoology, 8 pages, 5,000.
173. (Original and reprint) It pays to protect stored grain. Harold C. Pederson, Clyde M. Christensen, H. L. Parten, D. M. Ryan, Agricultural Extension, Plant Pathology and Botany, and Entomology and Economic Zoology, 8 pages, 65,000.
174. (Original and reprint) Know the eggs you buy. Eleanor Y. Loomis, William H. Dankers, and Cora E. Cooke, Agricultural Extension, 6 pages, 20,000.
175. Don't gamble with mastitis. I. A. Schipper, Dairy Husbandry, 8 pages, 20,000.
176. Know the milk you buy. Eleanor Loomis, Agricultural Extension, 8 pages, 10,000.
177. Know your Minnesota apples. Eleanor Loomis, Agricultural Extension, 8 pages, 10,000.

4-H CLUB BULLETIN SERIES

22. (Revised) Raising chicks the 4-H way. Cora Cooke, Agricultural Extension, 8 pages, 20,000.
26. (Revised) Forestry in 4-H. Marvin E. Smith, Agricultural Extension, 8 pages, 7,000.

36. (Revised) 4-H Homemaking Assistance. Evelyn D. Harne, Agricultural Extension, 24 pages, 20,000.

NEWSLETTERS

Name of publication	Issues	Pages	Circulation
Ask University Farm	52	52	8,060
Bob Hodgson's Talk	26	65	3,250
Club Leader Letter	1	4	4,910
Dairy Herd Improvement Association			
Summary	1	56	3,900
Farm Business Notes	8	32	25,175
Garden Fact Sheet	7	21	1,400
Home Garden Tips	29	29	6,728
Minnesota Feed Service	4	16	6,800
Minnesota State Florists' Letter	6	48	2,400
Our Land	52	52	21,476
Poultry News Letter	3	6	939
Radio Shorts	52	156	4,576
Reaching Rural People	12	48	2,400
Turkey Letter	6	12	12,084
University Farm Shorts	12	24	8,060
Visual Aids Tip Sheet	12	24	4,428
	283	645	116,586

Scientific Journal Series Papers

AGRICULTURAL BIOCHEMISTRY

2298. The action of oxygen on glucose in the presence of potassium hydroxide. Benjamin Warshowsky and W. M. Sandstrom. *Archives of Biochemistry and Biophysics* 37:46-55. 1952.

2678. Kinetic analysis of enzyme reactions. I. Further considerations of enzyme inhibition and analysis of enzyme activation. H. L. Segal, J. F. Kachmar, and P. D. Boyer. *Enzymologia* 15:187-198. 1952.

2683. Electrophoretic analysis of protein interaction. II. Explanation of a boundary anomaly in the system bovine serum albumin-methyl orange. J. Ross Colvin and D. R. Briggs. *Journal of Physical Chemistry* 56:717-722. 1952.

2699. Combinations of modified serum τ -globulin with other proteins. E. W. Turner and P. D. Boyer. *Archives of Biochemistry and Biophysics* 37:353-365. 1952.

2700. Simple fractionating device for chromatographic analysis. L. A. Boggs, L. S. Cuendet, Michel Dubois, and Fred Smith. *Analytical Chemistry* 24:1148-1151. 1952.

2740. Interaction of protein antigens and antibodies. I. Inhibition studies with the egg albumin-anti-egg albumin system. W. J. Kleinschmidt and P. D. Boyer. *The Journal of Immunology* 69:247-255. 1952.

2741. Interaction of protein antigens and antibodies. II. Dissociation studies with egg albumin-anti-egg albumin precipitates. W. J. Kleinschmidt and P. D. Boyer. *The Journal of Immunology* 69:257-264. 1952.

2777. Interaction of protein antigens and antibodies. III. Dissociation studies with diphtheria toxoid-antitoxin precipitates. E. W. Turner and P. D. Boyer. *The Journal of Immunology* 69:265-271. 1952.

2778. Characterization of the sulfhydryl groups and the kinetics of the heat denaturation of crystalline β -lactoglobulin. Bruce L. Larson and Robert Jenness. *Journal of the American Chemical Society* 74:3090-3093. 1952.

2785. Threitan and erythritan and their reaction with periodate. H. Klosterman and F. Smith. *Journal of the American Chemical Society* 74:5336-5339. 1952.

2792. Purification of a toxic substance from defatted soybean flour. Irvin E. Liener and Michael J. Pallansch. *The Journal of Biological Chemistry* 197:29-36. 1952.

2809. Synthesis of ascorbic acids by the osone-cyanide method. J. Kelvin Hamilton and F. Smith. *Journal of the American Chemical Society* 74:5162-5163. 1952.

2810. The effect of various milk serum proteins and their sulfhydryl groups on bread quality. Bruce L. Larson, Robert Jenness, and W. F. Geddes. *Cereal Chemistry* 29:440-447. 1952.

2825. Kinetic analysis of enzyme reactions. II. The potassium activation and calcium inhibition of pyruvic phosphoferase. J. F. Kachmar and P. D. Boyer. *The Journal of Biological Chemistry* 200:669-682. 1953.

2833. The reaction mechanism of soybean lipoxidase. A. L. Tappel, P. D. Boyer, and W. O. Lundberg. *The Journal of Biological Chemistry* 199:267-281. 1952.

2834. A simple and accurate device for measuring the volume of layer cakes. L. S. Cuendet and W. W. Luchsinger. *Transactions, American Association of Cereal Chemists* 10:173-175. 1952.

2835. The heat resistance of the thermophilic spores present in wheat and wheat products. W. L. Jones, J. J. Jezeski, and W. F. Geddes. *Cereal Chemistry* 30:12-21. 1953.

2839. The constitution of mesquite gum. Part IV. Determination of the structure of the amide of 6- β -(4-methyl-D-glucopyru-

ronosyl) a-methyl-D-galactopyranoside. M. Abdel Akher, F. Smith, and D. Spriestersbach. *Journal of the Chemical Society*, pp. 3637-3640. 1952.

2844. Studies on the chemistry of the living bark of the black locust in relation to its frost hardiness. III. The validity of plasmolysis and desiccation tests for determining the frost hardiness of bark tissue. D. Siminovitch and D. R. Briggs. *Plant Physiology* 28:15-34. 1953.

2851. The number of catalytically active sites present on the chymotrypsin molecule. Mary Walz Loewus and D. R. Briggs. *The Journal of Biological Chemistry* 199:857-864. 1952.

2868. The carbohydrates of *Gramineae*. The constitution of the water-soluble polysaccharides of the grain of barley (*Hordeum vulgare*). K. A. Gilles, W. O. S. Meredith, and F. Smith. *Cereal Chemistry* 29:314-316. 1952.

2873. A new procedure for correlating the structure of glycosides. M. Abdel Akher, J. E. Cadotte, R. Montgomery, F. Smith, J. W. Van Cleve, and Bertha Lewis. *Nature* 171:474-476. 1953.

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799. Grassland farming in Minnesota. W. M. Myers. *The Conservation Volunteer* 16(91):11-15. January-February, 1953.

ENTOMOLOGY AND ECONOMIC ZOOLOGY

711. Values of insect collections. Clarence E. Mickel. *Insects—The Year Book of Agriculture*, pp. 60-64. 1952.

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810. Feeding pollen substitutes to bees in the spring. M. H. Haydak. *The Minnesota Beekeeper* 6(2):7-10. April, 1953.

FORESTRY

786. Power driving of wood fence posts. J. R. Neetzel. *Minnesota Forestry Notes* No. 4, pp. 1-2. July 15, 1952.
791. Forest fire history of Itasca State Park. S. H. Spurr. *Minnesota Forestry Notes* No. 18, pp. 1-2. June 15, 1953.
813. Poplar, elm, and Colorado spruce investigations at the University of Minnesota. D. P. Duncan. *Proceedings of Lake States Forest Genetics Conference*, pp. 18-20. 1953.

HORTICULTURE

784. How to freeze meats for storage in the home freezer. J. D. Winter. *Meat Merchandizing* 28(9):25-28. 1952.
792. 1952 Lily leaf scorch experiments. R. E. Widmer. *Minnesota State Florists' Bulletin*, pp. 2-5. December, 1952.
797. Hormones help black walnut root grafts. W. G. Brierley. *Minnesota Horticulturist* 81:44. 1953. *The Nutshell* 5(3):19-20. 1953.
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PLANT PATHOLOGY

672. The control of plant diseases. E. C. Stakman. *Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources* 6:319-324. 1951.
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795. A soils program for increased crop production. C. O. Rost. *Minnesota Vocational Agriculture Instructors Association Newsletter, Winter Edition*, pp. 23-24. December, 1952.
808. Can we feed our growing population? C. O. Rost. *Progress Thru Research* 7(3):6-9. 1953.
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814. Anhydrous ammonia comes to Minnesota. A. C. Caldwell and H. E. Jones. *Agricultural Ammonia News* 2(4):14. April, 1953.

Summary of Publications

JULY 1952—JUNE 1953

Kind of publication	No. issued	No. of pages	No. of copies in edition
General series bulletins	7	186	78,000
Technical series bulletins	7	244	29,000
<i>Minnesota Farm and Home Science</i>	3	60	49,500
Report series	6	120	40,000
Extension Service			
Bulletins	11	216	167,500
Pamphlets	4	36	82,500
Folders	27	210	355,000
4-H bulletins	3	72	47,000
Newsletters	283	645	116,586
	351	1,789	965,086

Summary of Journal Series Papers

Department	Scientific Journal Series		Miscellaneous Journal Series	
	Number issued	Number of pages	Number issued	Number of pages
Agricultural Biochemistry	31	278	0	0
Agricultural Economics	1	6	4	54
Agricultural Engineering	1	2	1	134
Agronomy and Plant Genetics	13	48	6	13
Animal Husbandry	3	31	0	0
Dairy Husbandry	4	42	0	0
Entomology and Economic				
Zoology	12	181	5	39
Forestry	26	76	3	7
Home Economics	3	17	0	0
Horticulture	10	46	4	12
Plant Pathology and Botany	35	117	2	8
Poultry Husbandry	4	10	0	0
Rural Sociology	1	7	0	0
Soils	2	27	5	20
Veterinary Medicine	21	121	0	0
	167	1,009	30	287
Total publications	197			

NEW EXPERIMENT STATION PROJECTS

Agricultural Biochemistry

2226-116. Trichlorethylene-extracted soybean oil meal in rations for livestock.

Agricultural Economics

NC-15-Minn. 1. How young families get established in farming.

NCM-9. Methods and costs in the retail distribution of meat and meat products.

Minn. NCM-10. Economics of grain storage.

148. A study of market structures in agriculture.

Agricultural Engineering

147. Drying of farm crops.

Animal Husbandry

442. The digestibility of a flax by-product.

443. Nutrient requirements for reproduction in swine.

444. The effect of antibiotic implants on survival and weaning weights of suckling pigs.

Dairy Husbandry

222. The effect of feeding antibiotics on the ingesta and intestinal microflora of farm animals.

Entomology and Economic Zoology

172. Host specificity of lice of the genus *Enderleinellus* on *Citellus (Citellus) richardsoni*, *Citellus (Ictidomys) tridecemlineatus*, and *Citellus (Poliocitellus) franklinii*.

173. The interrelationships of toxicity of DDT, temperature, and lipids in insects.

174. Insect and rodent contamination of grain.

FH 2217-4. The effect of nutrient levels on attractiveness to pollinating insects and seed production of alfalfa.

Rural Sociology

115. A study of intra-family relations in farm, village, and small city areas of Minnesota.

Veterinary Medicine

117. Fascioloidiasis of cattle, sheep, and deer in Minnesota.

SUMMARY OF PROJECTS

Department	Total	Active	Inactive	Closed	New
Agricultural Biochemistry	15	15	0	4	1
Agricultural Economics	26	26	0	4	4
Agricultural Engineering	12	12	0	2	1
Agronomy and Plant Genetics	22	22	0	0	0
Animal Husbandry	14	14	0	6	3
Dairy Husbandry	16	16	0	1	1
Entomology and Economic Zoology	23	23	0	1	4
Forestry	10	10	0	0	0
Home Economics	12	12	0	2	0
Horticulture	21	21	0	0	0
Plant Pathology and Botany	22	22	0	0	0
Poultry Husbandry	11	11	0	0	0
Rural Sociology	5	4	1	0	1
Soils	13	13	0	0	0
Veterinary Medicine	10	10	0	1	1
North Central Experiment Station	3	3	0	1	0
Northeast Experiment Station	6	6	0	0	0
Northwest Experiment Station	6	6	0	0	0
Southern Experiment Station	2	2	0	0	0
West Central Experiment Station	6	6	0	0	0
Total	255	254	1	22	16

FINANCIAL STATEMENT

Income 1952-53

Source of revenue	St. Paul Campus	Branch stations					Total
		Crookston	Morris	Grand Rapids	Duluth	Waseca	
Federal appropriations:							
Hatch fund	\$ 15,000.00						\$ 15,000.00
Adams fund	15,000.00						15,000.00
Purnell fund	60,000.00						60,000.00
Bankhead-Jones section 5 ..	68,128.03						68,128.03
Bankhead-Jones 9b1-2	90,783.35						90,783.35
Bankhead-Jones 9b3	39,790.00						39,790.00
State appropriations:							
General University support	854,147.58	71,146.00	59,087.75	42,369.06	46,389.89	46,447.77	1,119,588.05
Special appropriations	366,000.00						366,000.00
Endowments, fellowships, and other similar grants							
	205,071.33						205,071.33
Fees, sales, and miscellaneous							
	317,030.93	34,252.81	38,548.50	15,569.58	20,807.78	54,968.88	481,178.48
Total	\$2,030,951.22	\$105,398.81	\$97,636.25	\$57,938.64	\$67,197.67	\$101,416.65	\$2,460,539.24

Expenditures 1952-53

Classification	St. Paul Campus	Branch stations					Total
		Crookston	Morris	Grand Rapids	Duluth	Waseca	
Services and labor	\$1,380,499.10	\$69,640.80	\$70,453.84	\$34,968.74	\$44,025.15	\$63,495.54	\$1,663,083.17
Travel expenses	37,929.64	653.22	929.24	400.31	560.51	348.65	40,821.57
Transportation of things	8,639.05	776.07	331.83	298.82	69.85	361.55	10,477.17
Communication service	12,213.44	620.46	492.01	298.18	414.10	284.36	14,322.55
Rents and utility service	22,013.23	1,702.77	1,474.47	1,238.81	1,125.85	1,410.75	28,965.88
Printing and binding	19,704.73		4.67				19,709.40
Other contractual services	155,649.77	4,866.36	2,680.72	3,265.96	5,097.14	7,316.73	178,876.68
Supplies and materials	286,854.72	19,484.27	15,946.85	11,539.87	9,739.94	22,847.92	366,413.57
Equipment	95,304.70	7,597.65	5,322.62	4,406.39	5,622.19	5,368.21	123,621.76
Lands and structures (con- tractual)	10,391.99	57.21		1,521.56	542.94	17.06 cr	12,496.64
Annuities	1,750.85						1,750.85
Total	\$2,030,951.22	\$105,398.81	\$97,636.25	\$57,938.64	\$67,197.67	\$101,416.65	\$2,460,539.24

EXPERIMENT STATION STAFF

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THE HON. DANIEL C. GAINNEY, Owatonna	-	-	-	-	-	1955
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THE HON. MARJORIE J. HOWARD (MRS.), Excelsior	-	-	-	-	-	1959
THE HON. GEORGE W. LAWSON, St. Paul	-	-	-	-	-	1957
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 D. R. BRIGGS, Ph.D., Agricultural Biochemist
 FRED SMITH, Ph.D., D.Sc., Agricultural Biochemist
²REX MONTGOMERY, Ph.D., Research Associate

Section of Cereal Technology

³C. H. BAILEY, Ph.D., Agricultural Biochemist
 W. F. GEDDES, Ph.D., Agricultural Biochemist
 L. S. CUENDET, Ph.D., Assistant Agricultural Biochemist

Section of Nutrition, Dairy Chemistry, and Analytical Service

M. O. SCHULTZE, Ph.D., Agricultural Biochemist
 P. D. BOYER, Ph.D., Associate Agricultural Biochemist
 ROBERT JENNESS, Ph.D., Associate Agricultural Biochemist
 I. E. LIENER, Ph.D., Assistant Agricultural Biochemist

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 E. F. KOLLER, Ph.D., Agricultural Economist
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 TRAVIS W. MANNING, M.S., Assistant in Agricultural Economics
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⁵R. W. GRAY, Ph.D., Research Fellow
 V. L. SORENSON, Ph.D., Research Fellow
⁶S. F. KRAUSE, Ph.D., Research Fellow
⁷R. R. NEWBERG, M.A., Assistant in Agricultural Economics

¹ On leave July 1, 1952, to July 16, 1952

² On leave August 17, 1952, to September 16, 1952

³ Retired December 31, 1952

⁴ Resigned June 30, 1952

⁵ Resigned May 2, 1953

⁶ Resigned June 15, 1952

⁷ Appointed January 1, 1953

DEPARTMENT OF AGRICULTURAL ENGINEERING

⁸A. J. SCHWANTES, M.S., Agricultural Engineer, Head

Farm Power and Machinery

A. J. SCHWANTES, M.S., Agricultural Engineer
 JOHN STRAIT, M.S., Associate Agricultural Engineer
⁹V. H. JOHNSON, M.S., Assistant Agricultural Engineer
 J. G. DENT, Assistant in Agricultural Engineering
 R. V. KEPPEL, M.S., Assistant in Agricultural Engineering

Farm Structures

C. K. OTIS, M.S., Agricultural Engineer
 C. H. CHRISTOPHERSON, M.A., Associate Agricultural Engineer
¹⁰W. F. MILLER, Ph.D., Assistant in Agricultural Engineering
 J. H. POMROY, M.S., Assistant in Agricultural Engineering

Agricultural Physics and Rural Electrification

ANDREW HUSTRULID, Ph.D., Agricultural Engineer
 A. M. FLIKKE, M.S., Assistant Agricultural Engineer
 H. A. CLOUD, M.S., Assistant in Agricultural Engineering

Soil and Water Conservation

¹¹P. W. MANSON, M.S., Agricultural Engineer
 E. R. ALLRED, M.S., Associate Agricultural Engineer
 C. L. LARSON, M.S., Assistant Agricultural Engineer

Land Clearing

M. J. THOMPSON, M.S., Land Clearing Specialist

DEPARTMENT OF AGRONOMY AND PLANT GENETICS

¹²W. M. MYERS, Ph.D., Agronomist and Plant Geneticist, Head
 C. R. BURNHAM, Ph.D., Agronomist and Plant Geneticist
 R. S. DUNHAM, M.S., Agronomist and Plant Geneticist
¹³E. H. RINKE, Ph.D., Agronomist and Plant Geneticist
 CARL BORGESON, M.S., Associate Agronomist and Associate Plant Geneticist
¹⁴R. F. CRIM, B.S., Associate Agronomist and Associate Plant Geneticist
 J. W. LAMBERT, Ph.D., Associate Agronomist and Associate Plant Geneticist
 A. R. SCHMID, Ph.D., Associate Agronomist and Associate Plant Geneticist

⁸ On leave September 1, 1952, to June 30, 1953

⁹ Resigned May 6, 1953

¹⁰ Resigned November 8, 1952

¹¹ On leave October 1, 1952, to January 31, 1953

¹² Appointed July 1, 1952

¹³ On leave July 1, 1952, to October 15, 1952

¹⁴ Retired June 30, 1953

H. L. THOMAS, Ph.D., Associate Agronomist and Associate Plant Geneticist
 E. L. PINNELL, Ph.D., Assistant Agronomist and Assistant Plant Geneticist
 R. G. ROBINSON, Ph.D., Assistant Agronomist and Assistant Plant Geneticist

Detailed by the United States Department of Agriculture,
 Bureau of Plant Industry, Soils and Agricultural Engineering,
 Division of Cereal Crops and Diseases, for Cooperative Work

E. R. AUSEMUS, Ph.D., Agronomist
 J. O. CULBERTSON, Ph.D., Agronomist
 J. H. MILLER, M.S., Assistant Agronomist
 L. J. ELLING, Ph.D., Research Associate
 KEH-SHING KOO, Ph.D., Research Fellow
 KUAN-JEN HSU, Ph.D., Research Fellow

DEPARTMENT OF ANIMAL HUSBANDRY

E. F. FERRIN, M.Agr., Animal Husbandry, Head
 A. L. HARVEY, Ph.D., Animal Husbandman
 P. A. ANDERSON, B.S., Associate Animal Husbandman
 R. M. ANDERSON, Ph.D., Assistant Animal Husbandman
 W. J. AUNAN, Ph.D., Assistant Animal Husbandman

Section of Animal Feeding

L. E. HANSON, Ph.D., Animal Husbandman

Section of Animal Breeding

L. M. WINTERS, Ph.D., Animal Husbandman
 J. N. CUMMINGS, Ph.D., Associate Animal Husbandman
 W. E. REMPEL, Ph.D., Assistant Animal Husbandman

DEPARTMENT OF DAIRY HUSBANDRY

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Section of Dairy Production

J. B. FITCH, M.S., Dairy Husbandman
 T. W. GULLICKMAN, Ph.D., Dairy Husbandman
 W. E. PETERSEN, Ph.D., Dairy Husbandman
¹⁵M. C. HERVEY, Ph.D., Associate Dairy Husbandman
 H. W. THOELE, M.S., Assistant in Dairy Husbandry
¹⁶J. D. DONKER, Ph.D., Research Fellow
 G. B. MARION, Ph.D., Research Fellow

¹⁵ Deceased January 25, 1953

¹⁶ Appointed July 1, 1952

Section of Dairy Products

W. B. COMBS, M.A., Dairy Husbandman
 S. T. COULTER, Ph.D., Dairy Husbandman
 H. A. HARLAND, Ph.D., Research Associate
 E. L. THOMAS, Ph.D., Assistant Dairy Husbandman
 H. A. MORRIS, Ph.D., Assistant Dairy Husbandman
 A. W. RUDNICK, JR., M.S., Assistant in Dairy Husbandry
 ALAN THOMAS, M.S., Assistant in Dairy Husbandry

Section of Dairy Bacteriology

H. MACY, Ph.D., Dairy Bacteriologist
 J. J. JEZESKI, Ph.D., Associate Dairy Bacteriologist
 J. C. OLSON, JR., Ph.D., Associate Dairy Bacteriologist

DEPARTMENT OF ENTOMOLOGY AND ECONOMIC ZOOLOGY

C. E. MICKEL, Ph.D., Entomologist, Head
 A. A. GRANOVSKY, Ph.D., Entomologist
 A. C. HODSON, Ph.D., Entomologist
 F. G. HOLDAWAY, Ph.D., Entomologist
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 L. L. SMITH, JR., Ph.D., Associate Zoologist
 T. L. AAMODT, B.S., Assistant Entomologist
 JAMES R. BEER, Ph.D., Assistant Zoologist
 L. K. CUTKOMP, Ph.D., Associate Entomologist
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¹⁷R. L. BUTLER, M.S., Research Associate
 A. G. PETERSON, Ph.D., Research Associate
 A. R. BARR, Ph.D., Assistant in Entomology
 E. F. COOK, Ph.D., Assistant in Entomology
¹⁸H. C. CHIANG, Ph.D., Research Fellow
 R. L. FISCHER, Ph.D., Research Fellow
 B. A. HAWS, M.S., Research Fellow
¹⁹B. W. WARREN, M.S., Research Fellow

SCHOOL OF FORESTRY

F. H. KAUFERT, Ph.D., Forester, Director
 THORVALD SCHANTZ-HANSEN, Ph.D., Forester; Director, Itasca Forestry and Biological Station
 R. M. BROWN, M.F., Associate Forester
 H. L. HANSEN, Ph.D., Associate Forester

¹⁷ Appointed October 16, 1952
¹⁸ Resigned March 15, 1953
¹⁹ Appointed July 1, 1952

R. L. HOSSFELD, Ph.D., Associate Forester
 L. W. REES, Ph.D., Associate Forester
 A. E. SCHNEIDER, Ph.D., Associate Forester
²⁰S. H. SPURR, Ph.D., Associate Forester
 J. R. NEETZEL, M.F., Research Associate
 D. P. DUNCAN, Ph.D., Assistant Forester
 O. F. HALL, M.F., Assistant in Forestry
 A. K. KEMP, M.F., Assistant in Forestry
 M. P. MEYER, M.F., Assistant in Forestry
²¹W. B. WALLIN, M.S., Assistant in Forestry

SCHOOL OF HOME ECONOMICS

LOUISE A. STEDMAN, Ph.D., Professor and Director
 ALICE BIESTER, A.M., Home Economist
 JANE M. LEICHSENRING, Ph.D., Home Economist
 ISABEL NOBLE, Ph.D., Home Economist
 ETHEL PHELPS, M.S., Home Economist
 DOROTHY F. SIMMONS, M.S., Home Economist

DEPARTMENT OF HORTICULTURE

²²W. H. ALDERMAN, B.S.A., Horticulturist, Head; Superintendent, Fruit Breeding Station
 J. D. WINTER, M.S., Associate Horticulturist

Section of Pomology

W. G. BRIERLEY, Ph.D., Horticulturist

Section of Fruit Breeding

T. S. WEIR, M.S., Associate Horticulturist and Assistant Superintendent of Fruit Breeding Station
 A. N. WILCOX, Ph.D., Associate Horticulturist

Section of Vegetable Gardening

T. M. CURRENCE, Ph.D., Horticulturist
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 A. E. HUTCHINS, Ph.D., Associate Horticulturist
 R. E. NYLUND, Ph.D., Associate Horticulturist

Section of Floriculture and Ornamental Horticulture

R. A. PHILLIPS, M.S., Assistant Horticulturist
 R. E. WIDMER, M.S., Assistant in Horticulture

²⁰ Resigned August 31, 1952
²¹ Appointed September 16, 1952
²² Retired June 30, 1953

Detailed by the United States Department of Agriculture,
Bureau of Plant Industry,
Soils and Agricultural Engineering, for Cooperative Work

²³ROLAND C. BLAKE, Special Agent

²⁴FLORIAN I. LAUER, Special Agent

DEPARTMENT OF PLANT PATHOLOGY AND BOTANY

²⁵E. C. STAKMAN, Ph.D., Plant Pathologist and Botanist, Head

J. J. CHRISTENSEN, Ph.D., Plant Pathologist, Acting Head

C. M. CHRISTENSEN, Ph.D., Plant Pathologist

C. J. EIDE, Ph.D., Plant Pathologist

HELEN HART, Ph.D., Plant Pathologist

M. F. KERNKAMP, Ph.D., Associate Plant Pathologist

T. H. KING, Ph.D., Associate Plant Pathologist

L. T. DOSDALL, Ph.D., Assistant Plant Pathologist

R. H. LANDON, Ph.D., Assistant Plant Physiologist

A. H. LARSON, B.S., Assistant Botanist

JOHN B. ROWELL, Ph.D., Research Associate

DAVID W. FRENCH, Ph.D., Assistant in Plant Pathology

H. G. HEGGENESS, M.S., Assistant in Plant Pathology

M. B. MOORE, M.S., Assistant in Plant Pathology

JAMES BROYLES, M.S., Research Fellow

EDWARD BUTLER, M.S., Research Fellow

JAMES DEVAY, Ph.D., Research Fellow

Detailed by the United States Department of Agriculture,
Bureau of Plant Industry, Soils, and Agricultural Engineering,
for Cooperative Work Division of Cereal Crops and Diseases

M. N. LEVINE, Ph.D., Pathologist

E. B. HAYDEN, B.S., Pathologist

Division of Sugar Plant Investigation

C. L. SCHNEIDER, M.S., Assistant Pathologist

Bureau of Entomology and Plant Quarantine Division of Plant Disease Control

R. U. COTTER, Ph.D., Pathologist

THAIN H. STEWART, B.S., State Leader of Barberry Eradication

DONALD M. STEWART, Ph.D., Pathologist

Detailed by the State Department of Agriculture,
Dairy and Food, for Cooperative Work

A. G. TOLASS, M.S., In Charge Office of Seed Potato Certification

J. L. LARSON, Seed Analyst in Charge of Seed Germination

H. C. REGNIER, Chief Inspector, Office of Seed Potato Certification

²³ Resigned June 30, 1952

²⁴ Resigned June 30, 1953

²⁵ On leave November 5, 1952, to December 10, 1952. Retired June 30, 1953

DEPARTMENT OF POULTRY HUSBANDRY

²⁶E. L. JOHNSON, Ph.D., Poultry Husbandman, Head

H. J. SLOAN, Ph.D., Poultry Husbandman

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H. F. ARNEMAN, Ph.D., Assistant Soils Chemist

Detailed by the United States Department of Agriculture,
Bureau of Plant Industry, Soils, and Agricultural Engineering,
Division of Soils, for Cooperative Work

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ROUSE, S. FARNHAM, Ph.D., Research Fellow

Soil Conservation Service

ALEX ROBERTSON, B.S., Collaborator Soil Scientist

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H. E. DZIUK, B.S., Assistant in Veterinary Medicine

²⁶ Appointed June 1, 1953

²⁷ Resigned January 31, 1953

²⁸ Appointed July 1, 1952

²⁹CHARLES GALE, D.V.M., Assistant in Veterinary Medicine
 A. L. GOOD, D.V.M., M.S., Assistant in Veterinary Medicine
 P. B. HAMMOND, D.V.M., Assistant in Veterinary Medicine
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³²D. G. LOW, D.V.M., Assistant in Veterinary Medicine
³³WALLACE MATTSON, D.V.M., Research Fellow
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³⁸E. A. USENICK, D.V.M., Assistant in Veterinary Medicine
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⁴⁰ROY G. FRANCIS, Ph.D., Assistant Rural Sociologist

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⁴³L. M. LAMOIS, Assistant in Forestry and Horticulture
⁴⁴A. B. SALMELA, M.S., Assistant in Animal Husbandry

²⁹ Appointed July 1, 1952

³⁰ Resigned May 31, 1953

³¹ Resigned June 15, 1953

³² On leave May 5, 1953, to June 30, 1953

³³ Appointed July 1, 1952. Resigned April 30, 1953

³⁴ Resigned October 15, 1952

³⁵ Resigned April 30, 1953

³⁶ Appointed October 1, 1952

³⁷ Resigned June 15, 1953

³⁸ Appointed September 16, 1952

³⁹ Appointed July 1, 1952

⁴⁰ Appointed September 16, 1952. On leave September 16, 1952, to June 30, 1953

⁴¹ Appointed July 1, 1952

⁴² Resigned September 30, 1953

⁴³ Appointed July 1, 1952

⁴⁴ Appointed November 16, 1952

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⁴⁵ Retired June 30, 1953

⁴⁶ Appointed July 16, 1952

⁴⁷ Appointed October 1, 1952

⁴⁸ Appointed January 1, 1952

⁴⁹ Resigned July 1, 1952

⁵⁰ Appointed September 1, 1952

⁵¹ Resigned September 4, 1952

⁵² Appointed April 1, 1953