

FIFTY-FIFTH ANNUAL REPORT

Agricultural Experiment Station
University of Minnesota

JULY 1, 1947 TO JUNE 30, 1948



UNIVERSITY FARM, ST. PAUL

LETTERS OF TRANSMITTAL

UNIVERSITY OF MINNESOTA, MINNEAPOLIS, MINN.

July 1, 1948

*To His Excellency, Luther W. Youngdahl,
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, 1948.

Respectfully transmitted,

JAMES L. MORRILL,
President of the Board of Regents

UNIVERSITY OF MINNESOTA, MINNEAPOLIS, MINN.

July 1, 1948

*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, 1948.

Respectfully transmitted,

JAMES L. MORRILL,
President of the University of Minnesota

UNIVERSITY FARM, ST. PAUL, MINN.

July 1, 1948

*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, 1948.

Respectfully submitted,

C. H. BAILEY, *Director*

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FIFTY-FIFTH ANNUAL REPORT
MINNESOTA AGRICULTURAL EXPERIMENT STATION
JULY 1, 1947, TO JUNE 30, 1948

C. H. Bailey, Director
H. Macy, Associate Director

FOREWORD

A significant addition was made to the facilities of the Agricultural Experiment Station during 1947-48 when the Rosemount Research Center was made available to the University of Minnesota. Nearly eighteen hundred acres of productive land in the vast tract became a part of the resources of the Experiment Station. This was a most notable acquisition because the fields at University Farm were becoming inadequate for the expanding research program in agriculture. The Rosemount area will make possible a much more comprehensive attack on problems of crop production; disease control; livestock, poultry, and turkey production, breeding, and nutrition; housing and sanitation; development and testing of new agricultural machinery and farm equipment; control of weeds; soil conservation; fertilizer efficiency; land utilization, drainage, and development of farm woodlots. The additional land will make possible a more rapid increase of newly developed varieties of farm crops and studies on pasture management.

Field work was actually begun at the Rosemount Center during the crop season of 1948, and a program of construction of the necessary farm buildings is under way. It is evident that the Rosemount Research Center will contribute widely to the solution of many of our difficult agricultural problems, both directly and indirectly. The facilities are available for many new lines of research, and every branch of agriculture in the State will benefit by the activities of the Experiment Station staff in this new area devoted to the interests of agriculture. A fine beginning has been made, and the future holds much promise for real accomplishment.

During the past year, significant progress has been made in many fields of research through the support by funds provided by the Research and Marketing Act of 1946. The investigations have been local, regional and, indeed, even national in scope. In many cases, all twelve of the north central states have been cooperating in attacks on problems common to the entire region, with each state assigned specific phases of these problems for intensive study, thus avoiding duplication of effort. The program

is just getting under way, but the results during the first few months augur well for the accumulation of valuable data which will be useful to every farmer and citizen of the State.

The results of the investigations by the Experiment Station staff have been presented in bulletins, farm papers, scientific publications, and a great variety of other periodicals and newspapers. The information has been disseminated by the spoken word at local, state, regional, and national meetings and over the radio. Considerable progress has been made in the solution of some of the most perplexing problems facing agriculture, but much more research must be done for the benefit of agriculture and related interests of the State. The program in agricultural research at the University of Minnesota is comprehensive; and, so far as resources permit, the most pressing problems are being studied. In some cases, the results will be available in the near future; but, in many instances, the projects will require long years of intensive study before significant facts are revealed. The search for truth is never ended.

CHANGES IN STAFF

Appointments

B. C. Beresford, M.S., as assistant professor, Northwest Experiment Station, effective July 1, 1947.

G. M. Briggs, Ph.D., as assistant professor, Division of Animal and Poultry Husbandry, effective November 16, 1947.

H. L. Carnahan, M.S., as research fellow, Division of Agronomy and Plant Genetics, effective March 1, 1948.

G. H. Conner, B.S., M.S., D.V.M., as instructor, Division of Veterinary Medicine, effective September 1, 1947.

L. K. Cutkomp, Ph.D., as assistant professor, Division of Entomology and Economic Zoology, effective September 1, 1947.

D. P. Duncan, M.S., as instructor, Division of Forestry, effective September 8, 1947.

B. F. Dunn, B.S., as research associate, Division of Horticulture, effective April 1, 1947.

H. D. Fausch, B.S., as instructor, Northwest Experiment Station, effective August 16, 1947.

T. H. Fenske, M.S., as associate director of field operations, effective July 1, 1947.

R. S. Freeman, M.S., as research fellow, Division of Entomology and Economic Zoology, effective September 1, 1947.

Lettie Gudmestad, B.A., as assistant to the editor, Agricultural Bulletins, Division of Publications, effective March 29, 1948.

W. J. Hadlow, D.V.M., as instructor, Division of Veterinary Medicine, effective April 16, 1948.

H. L. Hansen, Ph.D., as assistant professor, Division of Forestry, effective July 25, 1947.

H. H. Hoyt, D.V.M., as instructor, Division of Veterinary Medicine, effective January 1, 1948.

J. J. Jezeski, Ph.D., as assistant professor, Division of Dairy Husbandry, effective December 19, 1947.

R. L. Kitchell, D.V.M., as instructor, Division of Veterinary Medicine, effective July 1, 1947.

C. E. Logsdon, B.A., as research fellow, Division of Plant Pathology and Botany, effective June 1, 1947.

J. H. Miller, M.S., as agent, Division of Agronomy and Plant Genetics, effective April 1, 1948.

H. E. Milliron, Ph.D., as instructor, Division of Entomology and Economic Zoology, effective September 16, 1947.

C. R. Olsen, B.S., as instructor, North Central Experiment Station, effective August 1, 1947.

R. G. Robinson, M.S., as assistant professor, Division of Agronomy and Plant Genetics, effective July 1, 1947.

J. H. Sautter, D.V.M., as instructor, Division of Veterinary Medicine, effective October 1, 1947.

Fred Smith, B.Sc., Ph.D., D.Sc., as professor, Division of Agricultural Biochemistry, effective January 1, 1948.

L. L. Smith, Jr., Ph.D., as associate professor, Division of Entomology and Economic Zoology, effective July 1, 1947.

F. A. Spurrell, B.S., D.V.M., as research fellow, Division of Veterinary Medicine, effective October 1, 1947; and as instructor, Division of Veterinary Medicine, effective January 1, 1948.

F. R. Taylor, M.S., as instructor, Division of Agricultural Economics, effective January 1, 1948.

Promotions

P. D. Boyer, Ph.D., assistant professor to associate professor, Division of Agricultural Biochemistry, effective July 1, 1947.

A. C. Caldwell, Ph.D., assistant professor to associate professor, Division of Soils, effective July 1, 1947.

C. M. Christensen, Ph.D., assistant professor to associate professor, Division of Plant Pathology and Botany, effective July 1, 1947.

C. H. Christopherson, M.A., assistant professor to associate professor, Division of Agricultural Engineering, effective July 1, 1947.

J. O. Culbertson, Ph.D., associate professor to professor, Division of Agronomy and Plant Genetics, effective August 24, 1947.

T. M. Currence, Ph.D., associate professor to professor, Division of Horticulture, effective July 1, 1947.

R. S. Dunham, M.S., associate professor to professor, Division of Agronomy and Plant Genetics, effective July 1, 1947.

A. W. Edson, M.S., assistant professor to assistant professor and superintendent, West Central Experiment Station, effective January 1, 1948.

C. J. Eide, Ph.D., associate professor to professor, Division of Plant Pathology and Botany, effective July 1, 1947.

L. O. Gilmore, Ph.D., assistant professor to associate professor, Division of Dairy Husbandry, effective July 1, 1947.

Helen Hart, Ph.D., associate professor to professor, Division of Plant Pathology and Botany, effective July 1, 1947.

A. C. Hodson, Ph.D., associate professor to professor, Division of Entomology and Economic Zoology, effective July 1, 1947.

Andrew Hustrulid, Ph.D., associate professor to professor, Division of Agricultural Engineering, effective July 1, 1947.

A. E. Hutchins, Ph.D., assistant professor to associate professor, Division of Horticulture, effective July 1, 1947.

Robert Jenness, Ph.D., assistant professor to associate professor, Division of Agricultural Biochemistry, effective July 1, 1947.

F. H. Kaufert, Ph.D., professor to professor and chief, Division of Forestry, effective July 1, 1947.

P. R. McMiller, M.S., associate professor to professor, Division of Soils, effective July 1, 1947.

T. R. Nodland, Ph.D., instructor to assistant professor, Division of Agricultural Economics, effective July 1, 1947.

Ethel Phelps, M.S., associate professor to professor, Division of Home Economics, effective July 1, 1947.

H. C. Regnier, deputy to chief inspector, Division of Plant Pathology and Botany, effective July 1, 1947.

R. G. Robinson, M.S., research fellow to assistant professor, Division of Agronomy and Plant Genetics, effective April 1, 1948.

H. B. Swanson, B.A., instructor and information specialist to editor, Division of Publications, effective January 1, 1948.

H. L. Thomas, Ph.D., assistant professor to associate professor, Division of Agronomy and Plant Genetics, effective July 1, 1947.

J. D. Winter, M.S., assistant professor to associate professor, Division of Horticulture, effective July 1, 1947.

Leaves of Absence

Clyde H. Bailey, Ph.D., dean and director, Department of Agriculture, on leave to serve as Agricultural Research Training Specialist, American Mission for Aid to Greece, Athens, Greece, May 10, 1948, to June 30, 1948.

C. R. Burnham, Ph.D., professor, Division of Agronomy and Plant Genetics, sabbatical leave, September 1, 1947, to June 30, 1948.

W. W. Green, Ph.D., associate professor, Division of Animal and Poultry Husbandry, on leave to serve as head of the Animal Husbandry Department, Rio Piedras, Puerto Rico, B.W.I., September 1, 1947, to June 30, 1948.

W. J. Hadlow, D.V.M., instructor, Division of Veterinary Medicine, on leave to work on a Bureau of Animal Industry project at the University of Minnesota, May 1, 1948, to June 30, 1948.

O. B. Jesness, Ph.D., professor and chief, Division of Agricultural Economics, on leave to England, August 16, 1947, to September 15, 1947.

Resignations

H. W. Bockstahler, M.S., assistant professor, Division of Plant Pathology and Botany, to accept a position at Michigan State College, East Lansing, Michigan, effective May 1, 1948.

T. H. Fenske, M.S., superintendent, West Central Experiment Station, to accept a position as associate director of field operations, Department of Agriculture, University of Minnesota, St. Paul 1, Minnesota, effective July 1, 1947.

W. H. Foote, M.S., research fellow, Division of Agronomy and Plant Genetics, to accept a position as assistant professor, Oregon State College, Corvallis, Oregon, effective February 29, 1948.

H. W. Halvorson, M.S., instructor, Division of Agricultural Economics, to accept a position in the Division of Agricultural Economics, University of Wisconsin, Madison 6, Wisconsin, effective December 31, 1947.

D. E. Jasper, M.S., research fellow, Division of Veterinary Medicine, to accept a position as assistant professor of Veterinary Medicine, University of California, Davis, California, effective August 31, 1947.

P. C. Johnson, B.S., editor, Division of Publications, to accept a position as editor of *Prairie Farmer* and Station WLS, Chicago, Illinois, effective October 28, 1947.

L. A. Kanegis, D.V.M., research fellow, Division of Veterinary Medicine, to accept a position at the Lederle Laboratories, Pearl River, New York, effective September 15, 1947.

A. S. Kitzes, Ph.D., research associate, Division of Dairy Husbandry, to accept a position as senior chemical engineer at the Oak Ridge National Laboratory, Oak Ridge, Tennessee, effective March 19, 1948.

R. W. Kunkel, Ph.D., research associate, Division of Dairy Husbandry, to accept a position with the Kraft Foods Company, Research Laboratories, Glenview, Illinois, effective November 30, 1947.

E. O. Mader, Ph.D., assistant professor, Division of Plant Pathology and Botany, to accept a position at the Andrews Nursery in Faribault, Minnesota, effective May 31, 1948.

D. E. Smith, M.S., instructor, Division of Agricultural Biochemistry, to accept a position with General Mills, Inc., Minneapolis, Minnesota, effective October 1, 1947.

Audrey Swanson, B.A., assistant to editor, *Agricultural Bulletins*, Division of Publications, to accept a position at Brown and Bigelow, St. Paul, Minnesota, effective February 29, 1948.

J. A. Zivnuska, Ph.D., instructor, Division of Forestry, to accept a position as instructor in the School of Forestry, University of California, Berkeley 4, California, effective December 31, 1947.

Retirements

None

Deaths

None

PUBLICATIONS

AGRICULTURAL EXPERIMENT STATION

General Bulletin Series

396. Effect of an erosion control program on labor and power requirements. S. A. Engene and A. W. Anderson, Agricultural Economics. 16 pages, 5,000.
397. Weed seedlings. R. S. Dunham, A. H. Larson, and R. G. Robinson, Agronomy and Plant Genetics. 36 pages, 5,000.
398. Trends in prices of purebred cattle. Austin A. Dowell and Arnold Brekke, Agricultural Economics. 20 pages, 5,000.
399. Fertilization of sugar beets in the Red River Valley. C. O. Rost, H. W. Kramer, and T. M. McCall, Soils. 16 pages, 2,500.

Technical Bulletin Series

179. Inheritance studies in the pepper, *Capsicum frutescens*. M. L. Odland, Horticulture, 32 pages, 3,000.
180. Durability of concretes and mortars in acid soils, with particular reference to drain tile. Dalton G. Miller and Philip W. Manson, Agricultural Engineering. 80 pages, 3,000.

Minnesota Farm and Home Science

- Volume V, Number 1. 16 pages, 16,500.
- Volume V, Number 2. 16 pages, 16,500.
- Volume V, Number 3. 16 pages, 16,500.

Report Series

- Fifty-fourth annual report of the Minnesota Agricultural Experiment Station, July 1, 1946, to June 30, 1947. 32 pages, 2,500.
- Miscellaneous Report No. 4. Varietal trials of farm crops. H. K. Hayes, E. R. Ausemus, J. O. Culbertson, and J. W. Lambert, Agronomy and Plant Genetics. 16 pages, 10,000.
- Miscellaneous Report No. 5. Maturity ratings of corn hybrids registered for sale in Minnesota in 1947. R. F. Crim, H. K. Hayes, E. H. Rinke, Gertrud Joachim, R. E. Hodgson, R. O. Bridgford, and O. C. Soine, Agronomy and Plant Genetics. 24 pages, 7,500.

AGRICULTURAL EXTENSION SERVICE

Bulletin Series

356. Better soils for better living. Paul M. Burson, Soils. 36 pages, 20,000.
357. Fighting the European corn borer in Minnesota. H. E. Milliron and A. W. Buzicky, Agricultural Extension. 12 pages, 25,000.

258. Evergreens. L. C. Snyder, Raymond J. Wood, Clyde M. Christensen, and A. C. Hodson. Extension, Plant Pathology, and Entomology. 28 pages, 7,500.

Pamphlet Series

153. Livestock and feed outlook. S. B. Cleland, Division of Agricultural Extension. 6 pages, 12,000.

154. Dairy products outlook. M. K. Hinds and W. H. Dankers, Division of Agricultural Extension. 8 pages, 12,000.

155. The egg and poultry outlook. W. H. Dankers and M. K. Hinds, Division of Agricultural Extension. 6 pages, 12,000.

156. Wheat, flax, and soybean outlook. D. C. Dvoracek, Division of Agricultural Extension. 4 pages, 12,000.

157. Fruit, vegetable, and potato outlook. R. V. Backstrom, Division of Agricultural Extension. 4 pages, 5,000.

158. 1948 agricultural outlook. W. H. Dankers and M. K. Hinds, Division of Agricultural Extension. 6 pages, 12,000.

159. Farm costs outlook. J. B. McNulty, Division of Agricultural Extension. 6 pages, 10,000.

160. Chemical weed killers for 1948. R. S. Dunham, A. H. Larson, L. M. Stahler, and R. F. Crim, Division of Agricultural Extension. 8 pages, 15,000.

161. A career for you in home demonstration. Evelyn Morrow, Division of Agricultural Extension. 8 pages, 10,000.

Folder Series

144. Control swine and poultry tuberculosis. A Minnesota program. 4 pages, 20,000.

145. Fertilizer grades and ratios for Minnesota. C. O. Rost, Paul M. Burson, and E. R. Duncan, Divisions of Soils and Agricultural Extension. 12 pages, 30,000.

146. Loose housing for dairy cattle. S. A. Engene, Division of Agricultural Engineering. 8 pages, 20,000.

Miscellaneous Folder. School of Agriculture information folder, School of Agriculture. 6 pages, 30,000.

Boys' and Girls' Club Bulletin Series

2. (Reprint) 4-H pig project. H. G. Zavoral, Division of Agricultural Extension. 8 pages, 10,000.

3. (Reprint) 4-H beef project. W. E. Morris, Division of Agricultural Extension. 16 pages, 10,000.

9. (Reprint) Dairy heifer project. H. R. Searles, Division of Agricultural Extension. 8 pages, 10,000.

16. (Revised) 4-H health. Eleanor Loemis, Division of Agricultural Extension. 4 pages, 75,000.

22. (Reprint) 4-H poultry project. Cora Cooke, Division of Agricultural Extension. 8 pages, 12,000.

31. (Reprint) Clothing construction helps. Margaret Fobes and Ethel Gorham, Division of Agricultural Extension. 8 pages, 10,000.

Newsletters

Name of publication	Issues	Pages	Circulation
Ask University Farm	12	51	4,793
Bob Hodgson's Farm Talks	12	104	1,487
Club Leader Letter	7	32	33,699
Dairy Herd Improvement News	3	21	8,987
Extension News Digest	6	12	5,203
Farm Business Notes	11	44	27,558
Garden Fact Sheet	8	20	3,155
Garden and Table	5	21	2,000
Minnesota Farm and Home Science	3	48	51,606
Poultry News Letter	6	14	2,335
Turkey Letter	6	12	18,532
University Farm Radio Shorts	50	100	2,054
University Farm Shorts	12	24	4,793
Visual Aids Tip Sheet	12	24	4,316
Weekly Review	14	28	1,451
	167	555	171,969

SCIENTIFIC JOURNAL SERIES PAPERS

Agricultural Biochemistry

2295. Electrophoretic patterns of blood sera in poliomyelitis and Guillain-Barre disease. V. C. Kelley, D. R. Briggs, and Reynold A. Jensen. *Journal of Pediatrics* 29:433-438. 1946.

2322. On the mechanism of enzyme inhibition by sulfhydryl reagents. Thomas P. Singer. *The Journal of Biological Chemistry* 174:11-21. 1948.

2350. Grain storage studies. VII. Influence of certain mold inhibitors of respiration of moist wheat. Max Milner, Clyde M. Christensen, and W. F. Geddes. *Cereal Chemistry* 24:507-517. 1947.

2352. Electrophoretic mobilities and conductometric activities of potassium, sodium and lithium salts of gum arabic. D. R. Briggs. *Journal of Physical and Colloid Chemistry* 52:76-83. 1948.

2355. Studies on bread staling. II. Water relationships during staling of bread crumb and the retrogradation of starch. Howard L. Bachrach and D. R. Briggs. *Cereal Chemistry* 24:492-506. 1947.

2370. Measurement of fluorescent materials in milk and milk products. Robert Jenness and S. T. Coulter. *Journal of Dairy Science* 31:367-381. 1948.

Agronomy and Plant Genetics

2280. Reaction of sugar beet strains to *Aphanomyces cochlioides*. R. W. Henderson and H. W. Bockstahler. *Proceedings—*

Fourth General Meeting—1946 American Society Sugar Beet Technologists 237-245.

2335. Methods of combining linkage intensity values from backcross, F_2 and F_3 genetic data. H. H. Kramer and C. R. Burnham. *Genetics* 32:379-390. 1947.

2340. Pasture or woodland? A. C. Arny. *Journal of the American Society of Agronomy* 39:724-732. 1947.

2356. Cytogenetic studies of a translocation between chromosomes 1 and 7 in maize. C. R. Burnham. *Genetics* 33:5-21. 1948.

2357. The product method of calculating linkage from F_2 data involving semisterility; and its application to a barley translocation. Gertrud Stanton Joachim. *Genetics* 32:580-591. 1947.

2365. A reciprocal translocation in sorghum *Versicolor anderss.* E. D. Garber. *American Journal of Botany* 35:295-297. 1948.

Animal and Poultry Husbandry

2318. Duration of sperm fertility in the ewe. W. W. Green. *American Journal of Veterinary Research* 8(28):299-300. July, 1947.

2326. The heritability of some factors affecting productivity of brood sows. J. N. Cummings, L. M. Winters, and H. A. Stewart. *Journal of American Science* 6(3):257-272. August, 1947.

2329. A study of factors affecting survival from birth to weaning and total weaning weight of the litter in swine. L. M. Winters, J. N. Cummings, and H. A. Stewart. *Journal of Animal Science* 6(3):297-304. August, 1947.

2342. Reaction of the fowl to inbreeding (abstract). R. N. Shoffner. *Poultry Science* 26:555. 1947.

2362. The variation within an inbred line of S.C.W. leghorns. R. N. Shoffner. *Poultry Science* 27:235-236. 1948.

Dairy Husbandry

2358. The keeping quality of dry whole milk spray dried in an atmosphere of an inert gas. S. T. Coulter. *Journal of Dairy Science*. 30(12):995-1002. December, 1947.

Entomology and Economic Zoology

2162. The morphology of the mouthparts of the non-biting blackfly, *Eusimulium dacotense* D. & S., as compared with those of the biting species, *Simulium venustum* Say (Simuliidae: Diptera). H. Page Nicholson. *Annals of the Entomological Society of America* 38:281-297. 1945.

2193. New species and previously undescribed naiads of some Minnesota mayflies (Ephemeroptera). R. H. Daggy. *Annals of the Entomological Society of America* 38:373-396. 1945.

2228. Possibilities of budworm control in jack pine by forest management. A. C. Hodson and P. J. Zehngraff. *Journal of Forestry* 44:198-200. 1946.

2291. The temperature coefficients of DDT action in insects. H. Y. Fan and A. G. Richards. *Physiological Zoology* 21:48-59. 1948.

2293. Thermal decomposition of DDT dispersed in water. L. K. Cutkomp. *Journal of Economic Entomology* 40:444. 1947.

2321. Helminth parasites of rabbits of the genus *Sylvilagus*. A. B. Erickson. *Journal of Wildlife Management* 11:255-263. 1947.

2341. A turntable light trap for taking insect samples over regulated periods of the night. R. H. Nagel and A. A. Granovsky. *Journal of Economic Entomology* 40:583-586. 1947.

2345. The North American gall midges of the tribe *Micromyini* Itonididae (Cecidomyiidae); Diptera. A. Earl Pritchard. *Entomologica Americana* 27 (1-2):1-44,45-87. 1947.

2346. Electron micrographs of centipedes setae and microtrichia. A. G. Richards and F. H. Korda. *Entomological News* 58:141-145. 1947.

2348. *Salmonella pullorum* recovered from a wild pheasant in Minnesota. J. S. Cass and J. E. Williams. *Journal of the American Veterinary Medical Association* 111:282. October, 1947.

2351. The toxicity of organic arsenicals. Hsing Yun Fan. *Journal of Economic Entomology* 40:883-895. 1947.

2366. Further studies of lures attractive to the apple maggot. A. C. Hodson. *Journal of Economic Entomology* 41:61-66. 1948.

2367. A new method for rearing *Drosophila*. A. C. Hodson and H. C. Chiang. *Science* 107:176-177. 1948.

2383. Studies on arthropod cuticle: II. Electron microscope studies of extracted cuticle. A. G. Richards and F. H. Korda. *Biological Bulletin* 94:212-235. 1948.

Home Economics

2278. The effect of the addition of sodium bicarbonate on the ascorbic acid content of tomato juice. Eva G. Donelson and Doris Grambow. *Journal of the American Dietetic Association* 23:105,107-108. 1947.

Horticulture

2285. Elimination and retention of pollen sterility in potato improvement. Zola M. Fineman. *Journal of Agricultural Research* 75:135-145. 1947.

2324. The use of chemicals for the control of weeds in carrots. R. E. Nylund. *American Society for Horticulture Science* 49:332-338. 1947.

2333. Studies related to field plot technique with tomatoes. T. M. Currence. *American Society for Horticulture Science* 50:290-296. 1947.

2336. A new era in potato varieties. F. A. Krantz. *Annual Proceedings of the Ohio Vegetable and Potato Growers Association*. 1947.

2337. Hollow heart in potatoes. F. A. Krantz. *Annual Proceedings of the Ohio Vegetable and Potato Growers Association*. 1947.

2347. Recent developments in potato breeding. F. A. Krantz. *American Potato Journal* 24 (7):223-226. 1947.

2349. The clustering habit in Haralson, Minjon, and Wealthy apples. W. G. Brierley. *American Society for Horticulture Science* 50:17-20. 1947.

Plant Pathology and Botany

2343. A corrective measure for "soil sickness" occurring in sand media. E. O. Mader. *Phytopath* 37:682-683. 1947.

2344. Physiological exhaustion of strawberry plants as a factor in winter killing. E. O. Mader and A. W. Feldman. *Phytopath* 38:137-141. 1948.

2360. The mold flora of stored wheat and corn and its relation to heating of moist grain. C. M. Christensen and Dorothy R. Gordon. *Cereal Chemistry* 25:41-51. 1948.

2369. Pathogenicity of single spore isolates of the Fusarium wilt organisms of muskmelon and watermelon (abstract). H. H. Murakishi. *Phytopath* 38:13. 1948.

2371. The relation of barberries to physiologic races of *Puccinia graminis* in the United States in recent years (abstract). E. C. Stakman and W. Q. Loegering. *Phytopath* 38:24. 1948.

2372. Factors affecting the development of *Melampsora lini* (abstract). A. P. Misra. *Phytopath* 38:18. 1948.

2373. Parasitic races of *Ustilago tritici* on spring wheats (abstract). M. B. Moore. *Phytopath* 38:18. 1948.

2374. The effect of repeated passage of *Helminthosporium sativum* through the host of genetic variation and pathogenicity (abstract). J. J. Christensen and C. L. Schneider. *Phytopath* 38:5. 1948.

2375. Changes induced in *Sclerotinia fructicola* on copper sulphate media (abstract). E. O. Mader and C. L. Schneider. *Phytopath* 38:17. 1948.

2376. An unusual host response to certain paired monosporial cultures of *Ustilago zeae* (abstract). D. E. Munnecke. *Phytopath* 38:19. 1948.

2377. The effect of temperature and nitrogen source on the development of stem rust of wheat (abstract). J. M. Daly. *Phytopath* 38:7. 1948.

2378. Root nodulation of Holland Jumbo strain peanut grown from seed treated with a fungicide (abstract). L. I. Miller. *Phytopath* 38:18. 1948.

2380. Incidence in wheat flour (abstract). M. Cohen and C. M. Christensen. *American Journal of Botany* 34:593-594. 1947.
2382. The mold population of corn and wheat and its relation to heating (abstract). C. M. Christensen. *American Journal of Botany* 34:593. 1947.
2389. Physiological effect of *Ustilago zae* on corn (abstract). A. W. Feldman. *Phytopath* 38:8-9. 1948.
2390. Investigations on the physiology and pathogenicity of *Ustilago zae* (abstract). A. W. Feldman. *Phytopath* 38:8. 1948.

Soils

2327. A study of some solonetzic soil complexes in Saskatchewan. C. F. Bentley and C. O. Rost. *Scientific Agriculture* 27:7. July, 1946.

Veterinary Medicine

2149. Callus at sight of gunshot wound. H. C. H. Kernkamp. *Medical Radiography and Photography* 23(2):49. 1947.
2323. Newcastle disease in Minnesota. R. Fenstermacher, B. S. Pomeroy, and Winston A. Malmquist. *Proceedings Fiftieth Annual Meeting of the U. S. Livestock Sanitary Association* 151-157. 1947.
2332. Leucemic lymphoblastoma in a cow with involvement of the udder. W. L. Boyd, Alfred G. Karlson, D. E. Jasper, A. F. Sellers, and J. R. Collier. *American Journal of Veterinary Research* 8(29):330-337. October, 1947.
2339. The interpretation of low agglutination titers in the control of swine brucellosis. H. C. H. Kernkamp and M. H. Roepke. *American Journal of Veterinary Research* 9(30):46-49. January, 1948.
2348. *Salmonella pullorum* recovered from a wild pheasant in Minnesota. J. S. Cass and J. E. Williams. *Journal of the American Veterinary Medical Association* 111(847):282. October, 1947.
2354. Sulfonamides in the control of salmonellosis of chicks and poults. B. S. Pomeroy, R. Fenstermacher, and M. H. Roepke. *Journal of the American Veterinary Medical Association* 112(853):296-303. April, 1948.
2361. Phosphatase activity in suckling pigs. George A. Young, Jr., and Norman R. Underdahl. *Journal of Biological Chemistry* 172(2):759-761. February, 1948.

MISCELLANEOUS JOURNAL SERIES PAPERS

Agricultural Biochemistry

567. Planning research to serve the milling industry. C. H. Bailey. *American Miller and Processor* 1:71-72,211-212. January, 1947.

Agronomy and Plant Genetics

608. Residual effect of 2,4-D sprayed on soil in fall. R. S. Dunham and R. G. Robinson. *Proceedings of the Fourth Annual Meeting of the North Central Weed Control Conference* 241. 1947.
609. Response of Koto flax to applications of 2,4-D. R. S. Dunham. *Proceedings of the Fourth Annual Meeting of the North Central Weed Control Conference* 204. 1947.
610. Residual effect of 2,4-D sprayed on soil in spring. R. S. Dunham and R. G. Robinson. *Proceedings of the Fourth Annual Meeting of the North Central Weed Control Conference*. 241. 1947.
611. Pre-emergence herbicide applications. R. S. Dunham and R. G. Robinson. *Proceedings of the Fourth Annual Meeting of the North Central Weed Control Conference* 240-241. 1947.
612. Response of flax varieties to 2,4-D. R. K. Tandon and R. S. Dunham. *Proceedings of the Fourth Annual Meeting of the North Central Weed Control Conference* 207-208. 1947.
614. Response of Koto flax to applications of 2,4-D. R. S. Dunham. *Proceedings of the Fourth Annual Meeting of the North Central Weed Control Conference* 35-36. 1947.
615. Response of flax varieties to 2,4-D. R. K. Tandon. *Proceedings of the Fourth Annual Meeting of the North Central Weed Control Conference*. 36. 1947.

Animal and Poultry Husbandry

579. The Minnesota No. 1 hog. L. M. Winters. *One World* (British journal).

Dairy Husbandry

604. Psychrophiles, mesophiles, thermophiles and thermoturics—What are we talking about? Joseph C. Olson, Jr. *Milk Plant Monthly* 36(11):32-36. November, 1947.

Entomology and Economic Zoology

621. Effective chemicals for household insects. L. K. Cutkomp. *Everybody's Health* 33:4-16. 1948.

Forestry

597. Chemical utilization of aspen. Part II (Bark). R. L. Hossfeld. *Lake States Aspen Report No. 18* 1-19. November, 1947.
600. Aspen lumber for building purposes. L. W. Rees. *Lake States Aspen Report No. 9* 1-11. December, 1947.
607. Forty-five year old red pine plantation gives valuable information. J. H. Allison. *Lake States Timber Digest* 3-4. November, 1947.
623. The preservative treatment of aspen. F. H. Kaufert. *Lake States Aspen Report No. 19* 1-19. May, 1948.

632. Logging methods and barking of aspen. T. Schantz-Hansen. *Lake States Aspen Report No. 3* 1-12. July, 1948.

Home Economics

616. The thiamine and riboflavin content of pork sausage. Isabel Noble, Joan Gordon, and Lois Catterson. *Miscellaneous Series*. March, 1948.

622. The retention of ascorbic acid in turnips cooked various lengths of time in a pressure saucepan. Isabel Noble, Lois Catterson, and Lucille Gomez. *Miscellaneous Series*. April, 1948.

624. The retention of ascorbic acid in Greengold squash during cooking by different methods. Isabel Noble, Lucille Gomez, and Lois Catterson. *Miscellaneous Series*. March, 1948.

625. The retention of ascorbic acid in turnips during cooking by different methods. Isabel Noble, Lucille Gomez, and Lois Catterson. *Miscellaneous Series*. March, 1948.

627. The retention of ascorbic acid in rutabagas cooked for various lengths of time in a pressure saucepan. Isabel Noble, Lucille Gomez, and Lois Catterson. *Miscellaneous Series*. 1948.

628. The retention of ascorbic acid in rutabagas cooked for various time periods in boiling water. Isabel Noble, Lois Catterson, and Lucille Gomez. *Miscellaneous Series*. 1948.

629. The thiamine and riboflavin content of beef heart. Isabel Noble, Lois Catterson, and Lucille Gomez. *Miscellaneous Series*. 1948.

Horticulture

602. Winter hardiness complex in deciduous woody plants. W. G. Brierley. *American Society for Horticultural Science* 50: 10-16. 1947.

605. The use of 2,4-D for pre-emergence weed control in vegetable crops (abstract). R. E. Nylund. *Report of the Research Committee of the North Central Weed Control Conference and Supplement to the Proceedings of the Annual Meeting*. December, 1947.

606. A preliminary study on the value of various chemicals for the control of weeds in onions (abstract). R. E. Nylund. *Report of the Research Committee of the North Central Weed Control Conference and Supplement to the Proceedings of the Annual Meeting*. December, 1947.

Rural Sociology

572. Comparison of farm housing factors among the states. Vernon Davies. *Social Forces* 25 (4): 429-434. May, 1947.

598. The number and distribution of hospital facilities and physicians in Minnesota, 1930-1946. Lowry Nelson. Mimeographed publication. September, 1947.

620. Nationality and the emerging culture. Douglas G. Marshall. *Rural Sociology* 13 (1):40-47. March, 1948.

Veterinary Medicine

595. An epidemiological study of baby pig disease. George A. Young, Jr. and Norman R. Underdahl. *Cornell Veterinarian* 37 (3):175-203. July, 1947.

596. Infestation in domestic turkeys with intestinal flukes. R. L. Kitchell, J. S. Cass, and J. H. Sautter. *Journal of the American Veterinary Medical Association* 111 (848):379-381. November, 1947.

617. Sub-typical hog cholera. H. C. H. Kernkamp and R. Fenstermacher. *Proceedings Fifty-first Annual Meeting of the U. S. Livestock Sanitary Association* 96-99. 1948.

SUMMARY OF PUBLICATIONS

July 1947—June 1948

Kind of publication	Number issued	Number of pages	Number of copies in edition
General Series Bulletins	3	72	15,000
Technical Series Bulletins	1	20	3,000
Minnesota Farm and Home Science	3	48	49,500
Report Series	2	48	12,500
Extension Service			
Bulletins	2	48	45,000
Pamphlets	9	56	100,000
Folders	3	22	80,000
4-H Bulletins	6	52	127,000
Newsletters	167	555	171,969
	196	921	603,969

Summary of Journal Series Papers

Divison	Scientific Journal Series		Miscellaneous Journal Series	
	Number issued	Number of pages	Number issued	Number of pages
Agricultural Biochemistry	6	66	1	4
Agricultural Economics	0	0	0	0
Agricultural Engineering	0	0	0	0
Agronomy and Plant Genetics	6	62	7	10
Animal and Poultry Husbandry	5	29	1	2
Dairy Husbandry	1	8	1	5
Entomology and Economic Zoology	14	208	1	13
Forestry	0	0	5	63
Home Economics	1	3	7	26
Horticulture	7	42	3	9
Plant Pathology and Botany	16	50	0	0
Soils	1	1	0	0
Veterinary Medicine	7	32	3	36
Rural Sociology	0	0	3	25
	64	501	32	193
Total Publications	292			

NEW EXPERIMENT STATION PROJECTS

Agricultural Biochemistry

FH-2215-1. The effect of maternal nutrition on development, growth and performance of the young.

Agricultural Economics

143. An economic study of the earnings and financial progress of farm operators receiving vocational training under the G. I. Bill of Rights in the public schools under the direction of the Vocational Division of the State Department of Education.

145. A study of the costs involved in producing canning peas, and other crops in south central Minnesota.

NCM-1. Maintaining and expanding the market for dairy products.

NCM-3. Marketing slaughter livestock by carcass weight and grade. (See also Animal and Poultry Husbandry NCM-3.)

NCM-4. The place of frozen food locker plants and home freezer units in the slaughtering, processing, distribution and consumption of meats.

NCM-6. Development and analysis of improved techniques for marketing eggs.

FH-2211-1. A study of problems and methods of farm finance.

FH-2211-2. Production costs on mechanized farms.

FH-2211-3. Economic analysis of artificial insemination of dairy cattle.

FH-2211-M1. Business analysis of Farmers' Marketing and Purchasing Association.

FH-2211-M2. Economic analysis of milk drying plants.

FH-2211-M3. Methods of sampling for study of consumer demand.

FH-2211-M4. The interests of Minnesota agriculture in world trade.

Agricultural Engineering

143. A comparative study of six inch and seven inch grain drill spacing. (See also Agronomy and Plant Genetics 143.)

144. Mechanical equipment in weed control. (See also Agronomy and Plant Genetics 144.)

NC-3. A study of dairy barns and related structures.

NC-4. Selection and utilization of materials for farm buildings construction.

NC-9. Farm house requirements. (See also Home Economics NC-9.)

FH-2212-1. Supplemental irrigation in Minnesota.

Agronomy and Plant Genetics

143. A comparative study of six inch and seven inch grain drill spacing. (See also Agricultural Engineering 143.)

144. Mechanical equipment in weed control. (See also Agricultural Engineering 144.)

FH-2213-1. Alfalfa improvement by breeding for Minnesota conditions.

Animal and Poultry Husbandry

505. Factors affecting the hatchability of goose eggs.

506. A study of embryological development in the fowl as affected by systems of breeding.

508. Efficiency of turkey meat production as influenced by inheritance.

NC-1. The improvement of beef cattle through breeding methods.

NC-8. The improvement of quality and productiveness of poultry through breeding.

NCM-3. Marketing slaughter livestock by carcass weight and grade. (See also Agricultural Economics NCM-3.)

NCM-7. Changes in poultry meat as related to methods of processing and storage.

FH-2214-2. Physiological factors involved in diet selection in poultry.

Dairy Husbandry

NC-2. Improvement of dairy cattle through breeding.

FH-2216-1. The use of identical twins to study inheritance in the bovine.

Entomology and Economic Zoology

162. Limiting factors in the production of certified seed potatoes in Minnesota.

FH-2217-1. A study of methods of estimating insect abundance.

Forestry

155. Studies in wood technology and wood utilization.

156. Studies on forest land taxation, forest economics, forest survey and land utilization.

157. Tree and stand improvement studies.

158. Natural reproduction and planting studies.

159. Forest management studies.

FH-2219-1. The management, utilization and marketing of aspen.

Home Economics

NC-5. Nutritional status and dietary needs of population groups in the North Central Region.

NC-9. Farm house requirements. (See also Agricultural Engineering NC-9.)

FH-2220-1. The blood picture of infants in a well baby clinic, with observations on the effects of substituting potato for cereal as the first solid food in the infant's diet.

FH-2220-2. The nutritive value and quality as determined by objective tests of frozen fruits and vegetables.

Horticulture

420. Variety and growth factors as they affect production and handling practices and also as they affect market and culinary qualities of the potato.

NCM-2. Influence of consumers' acceptance on the marketing of fruits and vegetables.

NCM-5. The quality-price relationships of potatoes at the retail level.

FH-2221-1. Breeding an improved strain of asparagus.

Plant Pathology and Botany

126. Seed-borne diseases of potatoes.

NC-7. Testing newly introduced plants for susceptibility of resistance to diseases.

FH-2222-1. Epidemiology of leaf spots and other foliage diseases of crop plants.

FH-2222-M1. Cause and control of biological and chemical deterioration of agricultural products in storage.

Rural Sociology

FH-2250-1. The relation between local governmental units and the natural rural community areas.

Soils

FH-2225-1. A study of physical, chemical and morphological properties of dominant soil types in Minnesota and soil management practices essential to their best utilization.

Veterinary Medicine

- 117. Diseases of swine.
- NC-6. Control of Newcastle disease of poultry.
- FH-2226-1. Pathological factors affecting the young pig.

West Central Experiment Station

- 110. Varietal tests of vegetables.

SUMMARY OF PROJECTS

Division	Total	Active	Inactive	Closed	New
Agricultural Biochemistry	17	17	0	0	1
Agricultural Economics	28	28	0	1	13
Agricultural Engineering	16	16	0	5	6
Agronomy and Plant Genetics	25	24	1	0	3
Animal and Poultry Husbandry.....	20	20	0	4	8
Dairy Husbandry	15	15	0	2	2
Entomology and Economic Zoology	18	18	0	4	2
Forestry	9	9	0	13	6
Home Economics	13	13	0	0	4
Horticulture	20	20	0	4	4
Plant Pathology and Botany	31	31	0	0	4
Soils	9	9	0	1	1
Veterinary Medicine	11	11	0	0	3
Rural Sociology	3	3	0	0	1
North Central Experiment Station....	4	4	0	0	0
Northeast Experiment Station	6	6	0	0	0
Northwest Experiment Station	7	6	1	0	0
Southeast Experiment Station	1	1	0	0	0
West Central Experiment Station....	6	6	0	0	1
Total	259	257	2	34	59

FINANCIAL STATEMENT
Income 1947-1948

Sources of Revenue	University Farm	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 fund	62,041.49	.....	.....	.....	.....	.....	62,041.49
Research and Marketing fund	44,038.61	.....	.....	.....	.....	.....	44,038.61
Regional Research Fund	16,550.00	.....	.....	.....	.....	.....	16,550.00
State appropriations:							
General University support....	626,177.12	\$45,210.62	\$46,380.07	\$37,710.70	\$26,118.95	\$12,610.30	794,207.76
Special appropriations	252,000.00	.....	.....	.....	.....	.....	252,000.00
Endowments, fellowships, and other similar grants							
.....	73,976.17	.....	.....	.....	.....	.....	73,976.17
Fees, sales, and miscellaneous							
.....	75,155.26	30,413.61	32,385.86	19,805.19	15,188.33	56,596.14	229,544.39
Total	\$1,239,938.65	\$75,624.23	\$78,765.93	\$57,515.89	\$41,307.28	\$69,206.44	\$1,562,358.42

Expenditure 1947-1948

Classification	University Farm	Branch Stations					Total
		Crookston	Morris	Grand Rapids	Duluth	Waseca	
Services and labor	\$ 733,922.59	\$50,437.57	\$53,636.97	\$30,439.04	\$26,205.59	\$43,277.63	\$ 937,919.39
Travel expenses	25,561.53	648.40	438.13	501.15	662.57	381.61	28,193.39
Transportation of things	3,616.20	947.03	1,482.29	577.27	13.41	347.81	6,984.01
Communication service	4,508.20	560.09	547.31	290.52	207.35	306.36	6,329.83
Rents and utility service	13,802.35	1,666.67	1,189.52	1,861.14	694.20	497.72	19,711.60
Printing and binding	6,311.67						6,311.67
Other contractual services	91,386.73	5,765.36	1,713.16	4,853.98	2,909.04	3,319.84	109,948.11
Supplies and materials	153,062.04	13,548.21	17,454.79	15,324.71	9,693.19	14,191.55	223,274.49
Equipment	92,752.11	2,015.29	2,378.10	3,153.54	410.79	5,132.20	105,842.03
Lands and structures (contractual)	71,737.71	35.61	15.66	514.54	511.14	1,751.72	74,566.38
Annuities	1,346.18						1,346.18
Balance brought forward for R.M. and R.R.F. funds	41,931.34						41,931.34
Total	\$1,239,938.65	\$75,624.23	\$78,765.93	\$57,515.89	\$41,307.28	\$69,206.44	\$1,562,358.42

EXPERIMENT STATION STAFF

The Board of Regents

THE HON. JAMES F. BELL, Minneapolis	-	-	-	-	-	1951
THE HON. DANIEL C. GAINNEY, Owatonna	-	-	-	-	-	1949
THE HON. RICHARD L. GRIGGS, Duluth	-	-	-	-	-	1951
THE HON. GEORGE W. LAWSON, St. Paul	-	-	-	-	-	1951
THE HON. ALBERT J. LOBB, Rochester	-	-	-	-	-	1953
THE HON. E. E. NOVAK, New Prague	-	-	-	-	-	1949
THE HON. A. J. OLSON, Renville	-	-	-	-	-	1949
THE HON. J. S. JONES, St. Paul	-	-	-	-	-	1953
THE HON. RAY J. QUINLIVAN, St. Cloud	-	-	-	-	-	1951
THE HON. F. J. ROGSTAD, Detroit Lakes	-	-	-	-	-	1949
THE HON. FRED B. SNYDER, Minneapolis	-	-	-	-	-	1953
THE HON. SHELDON V. WOOD, Minneapolis	-	-	-	-	-	1953

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 WYLLE B. McNEAL, M.A., Chief, Division of Home Economics
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 Fruit Breeding Farm, Excelsior
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 T. M. McCALL, M.S., Superintendent, Northwest Experiment Station,
 Crookston
 R. E. HODGSON, M.S., Superintendent, Southeast Experiment Station,
 Waseca
 A. W. EDSON, M.S., Superintendent, West Central Experiment Station,
 Morris
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 tion, Itasca Park

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 R. L. MANN, B.S., Research Fellow
 D. SIMONOVITCH, Ph.D., Research Fellow

Section of Cereal Technology

*C. H. BAILEY, Ph.D., Agricultural Biochemist
 W. F. GEDDES, Ph.D., Agricultural Biochemist
 C. W. BICE, M.S., Research Fellow
 R. A. BOTTOMLEY, M.S., Research Fellow
 B. M. CRAIG, M.S., Research Fellow
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 R. J. STENBERG, B.S., Research Fellow

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
 CORNELIA KENNEDY, Ph.D., Associate Agricultural Biochemist

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

J. A. SCHRICKER, B.S., Assistant Biochemist

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 W. C. WAITE, Ph.D., Agricultural Economist
 R. W. COX, Ph.D., Assistant Agricultural Economist
 S. A. ENGEL, Ph.D., Assistant Agricultural Economist
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⁴H. W. HALVORSON, M.S., Assistant in Agricultural Economics
⁵F. R. TAYLOR, M.S., Assistant in Agricultural Economics

* On leave May 10, 1948, to June 30, 1948

¹ Appointed January 1, 1948

² Resigned October 1, 1947

³ On leave August 16, 1947, to September 15, 1947

⁴ Resigned December 31, 1947

⁵ Appointed January 1, 1948

DIVISION OF AGRICULTURAL ENGINEERING

A. J. SCHWANTES, M.S., Agricultural Engineer, Chief

Section of Farm Power and Machinery

A. J. SCHWANTES, M.S., Agricultural Engineer
 JOHN STRAIT, M.S., Assistant Agricultural Engineer
 J. B. TORRANCE, B.S., Assistant Agricultural Engineer
 J. G. DENT, Assistant in Agricultural Engineering
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Section of Farm Structures

C. H. CHRISTOPHERSON, M.A., Associate Agricultural Engineer
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ANDREW HUSTRULID, Ph.D., Agricultural Engineer
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P. W. MANSON, M.S., Associate Agricultural Engineer
 E. R. ALLRED, M.S., Assistant Agricultural Engineer

Section of Land Clearing

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

Detailed by the Public Roads Administration of Federal Works Agency, for
 Cooperative Work

D. G. MILLER, C.E., Materials Engineer

DIVISION OF AGRONOMY AND PLANT GENETICS

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 *C. R. BURNHAM, Ph.D., Plant Geneticist
 R. S. DUNHAM, M.S., Agronomist
 R. F. CRIM, B.S., Associate Agronomist and Extension Specialist in Agriculture
 E. H. RINKE, Ph.D., Associate Plant Geneticist
 H. L. THOMAS, Ph.D., Associate Plant Geneticist
 C. BORGESON, M.S., Assistant Agronomist
 J. W. LAMBERT, Ph.D., Assistant Plant Geneticist
 †R. G. ROBINSON, M.S., Assistant Agronomist
 A. R. SCHMID, Ph.D., Assistant Agronomist
 ‡H. L. CARNAHAN, M.S., Research Fellow
 §W. H. FOOTE, M.S., Research Fellow
 ¶E. L. PINNELL, M.S., Assistant in Plant Genetics

* Sabbatical leave September 1, 1947, to June 30, 1948

† Appointed July 1, 1947

‡ Appointed March 1, 1948

§ Resigned February 29, 1948

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
L. M. STAHLER, Ph.D., Associate Agronomist
¹⁰J. H. MILLER, M.S., Agent
O. E. REECE, M.S., Agent

DIVISION OF ANIMAL AND POULTRY HUSBANDRY

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P. A. ANDERSON, B.S., Associate Animal Husbandman
A. L. HARVEY, Ph.D., Associate Animal Husbandman
R. M. ANDERSON, M.S., Instructor
W. J. AUNAN, M.S., Instructor

Section of Animal Feeding

E. F. FERRIN, M.Agr., Animal Husbandman

Section of Animal Breeding

L. M. WINTERS, Ph.D., Animal Husbandman
¹¹W. W. GREEN, Ph.D., Associate Animal Husbandman
J. N. CUMMINGS, M.S., Research Fellow
C. F. SIERK, M.S., Research Fellow

Section of Poultry Husbandry

H. J. SLOAN, Ph.D., Poultry Husbandman
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¹²G. M. BRIGGS, Ph.D., Assistant Poultry Husbandman
R. N. SHOFFNER, Ph.D., Assistant Poultry Husbandman

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J. B. FITCH, M.S., Dairy Husbandman, Chief

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L. O. GILMORE, Ph.D., Associate Dairy Husbandman
T. W. GULLICKSON, Ph.D., Associate Dairy Husbandman

Section of Dairy Products

W. B. COMBS, M.A., Dairy Husbandman
S. T. COULTER, Ph.D., Dairy Husbandman
H. A. HARLAND, M.S., Research Associate
¹³A. S. KITZES, Ph.D., Research Associate
¹⁴R. W. KUNKEL, Ph.D., Research Associate
E. L. THOMAS, M.S., Assistant in Dairy Husbandry

¹⁰ Appointed April 1, 1948

¹¹ On leave September 1, 1947, to June 30, 1948

¹² Appointed November 16, 1947

¹³ Resigned March 19, 1948

¹⁴ Resigned November 30, 1947

Section of Dairy Bacteriology

H. MACY, Ph.D., Dairy Bacteriologist

¹⁵J. J. JEZESKI, Ph.D., Assistant Dairy Bacteriologist

J. C. OLSON, Jr., M.S., Assistant in Dairy Bacteriology

ENTOMOLOGY AND ECONOMIC ZOOLOGY

C. E. MICKEL, Ph.D., Entomologist, Chief

A. A. GRANOVSKY, Ph.D., Entomologist

A. C. HODSON, Ph.D., Entomologist

M. H. HAYDAK, Ph.D., Associate Apiculturist

W. H. MARSHALL, Ph.D., Associate Zoologist

A. G. RICHARDS, Ph.D., Associate Entomologist

¹⁶L. L. SMITH, Jr., Ph.D., Associate Zoologist

T. L. AAMODT, B.S., Assistant Entomologist

A. L. BURROUGHS, Ph.D., Assistant Entomologist

¹⁷L. K. CUTKOMP, Ph.D., Assistant Entomologist

H. Y. FAN, Ph.D., Research Associate

J. S. CASS, M.S., Research Fellow

¹⁸R. S. FREEMAN, M.S., Research Fellow¹⁹H. E. MILLIRON, Ph.D., Assistant in Entomology

A. G. PETERSON, M.S., Research Fellow

D. C. QUIMBY, M.S., Assistant in Zoology

FORESTRY

F. H. KAUFERT, Ph.D., Forester, Chief

J. H. ALLISON, Ph.B., M.F., Forester

T. SCHANTZ-HANSEN, Ph.D., Forester and Director of Lake Itasca Forestry
and Biological Station

HENRY SCHMITZ, Ph.D., Forester

R. M. BROWN, M.F., Associate Forester

R. L. HOSSFELD, Ph.D., Associate Forester

L. W. REES, Ph.D., Associate Forester

²⁰H. L. HANSEN, Ph.D., Assistant Forester²¹D. P. DUNCAN, M.S., Assistant in Forestry²²J. A. ZIVNUSKA, Ph.D., Assistant in Forestry

DIVISION OF HOME ECONOMICS

WYLLE B. MCNEAL, M.A., Home Economist, Chief

ALICE BIESTER, M.A., Home Economist

JANE M. LEICHSENTRING, Ph.D., Home Economist

ISABEL NOBLE, Ph.D., Home Economist

ETHEL PHELPS, M.S., Home Economist

¹⁵ Appointed December 19, 1947¹⁶ Appointed July 1, 1947¹⁷ Appointed September 1, 1947¹⁸ Appointed September 1, 1947¹⁹ Appointed September 16, 1947²⁰ Appointed July 25, 1947²¹ Appointed September 8, 1947²² Resigned December 31, 1947

DIVISION OF HORTICULTURE

W. H. ALDERMAN, B.S.A., Horticulturist, Chief and Superintendent of
Fruit Breeding Station
J. D. WINTER, M.S., Associate Horticulturist

Section of Pomology

W. G. BRIERLEY, Ph.D., Horticulturist
²³B. F. DUNN, B.S., Research Associate

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
F. A. KRANTZ, Ph.D., Horticulturist
A. E. HUTCHINS, Ph.D., Associate Horticulturist
R. E. NYLAND, Ph.D., Assistant Horticulturist
O. C. TURNQUIST, M.S., Research Fellow

Section of Floriculture and Ornamental Horticulture

L. E. LONGLEY, Ph.D., Assistant Horticulturist
R. A. PHILLIPS, B.S., Assistant in Horticulture

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

KENNETH W. HANSEN, Special Agent
PAUL K. YAGYU, B.S., Special Agent

DIVISION OF PLANT PATHOLOGY AND BOTANY

E. C. STAKMAN, Ph.D., Plant Pathologist and Botanist, Chief

Section of Plant Pathology

J. J. CHRISTENSEN, Ph.D., Plant Pathologist
C. J. EIDE, Ph.D., Plant Pathologist
HELEN HART, Ph.D., Plant Pathologist
E. C. STAKMAN, Ph.D., Plant Pathologist
C. M. CHRISTENSEN, Ph.D., Associate Plant Pathologist
LOUISE T. DOSDALL, Ph.D., Assistant Plant Pathologist
M. F. KERNKAMP, Ph.D., Assistant Plant Pathologist
²⁴E. O. MADER, Ph.D., Assistant Plant Pathologist
THOR KOMMEDAHL, M.S., Assistant in Plant Pathology
²⁵C. E. LOGSDON, B.A., Research Fellow
M. B. MOORE, M.S., Assistant in Plant Pathology
S. B. SILVERBERG, B.S., Research Fellow

²³ Appointed April 1, 1947

²⁴ Resigned May 31, 1948

²⁵ Appointed June 1, 1947

Section of Plant Physiology and Agricultural Botany

R. H. LANDON, Ph.D., Assistant Plant Physiologist
 A. H. LARSON, B.S., Assistant Botanist
 H. G. HEGGENESS, M.S., Assistant in Plant Physiology

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

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

Division of Sugar Plant Investigation

²⁰H. W. BOCKSTAHLER, 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
 W. Q. LOEGERING, Agent

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

A. G. TOLAAS, M.S., In Charge, Office of Seed Potato Certification
 J. L. LARSON, Seed Analyst in Charge, Seed Germination
 H. C. REGNIER, Chief Inspector, Office of Seed Potato Certification

DIVISION OF SOILS

C. O. ROST, Ph.D., Soils Chemist, Chief
 P. R. McMILLER, M.S., Soils Chemist
 A. C. CALDWELL, Ph.D., Associate Soils Chemist
 J. M. MACGREGOR, Ph.D., Assistant Soils Chemist
 H. F. ARNEMAN, M.S., Assistant in Soils Chemistry

DIVISION OF VETERINARY MEDICINE

W. L. BOYD, D.V.S., Veterinarian, Chief
 H. C. H. KERNKAMP, M.S., Veterinarian
 M. H. ROEPKE, Ph.D., Biological Chemist
 R. FENSTERMACHER, D.V.M., Associate Pathologist
 B. S. POMEROY, Ph.D., Associate Animal Pathologist
 R. W. BROWN, B.S., V.M.D., Research Fellow
²⁷G. H. CONNER, D.V.M., B.S., M.S., Assistant in Veterinary Medicine
^{28,29}W. J. HADLOW, D.V.M., Assistant in Veterinary Medicine
³⁰H. H. HOYT, D.V.M., Assistant in Veterinary Medicine
³¹D. E. JASPER, M.S., Research Fellow
³²L. A. KANEGIS, D.V.M., Research Fellow
³³R. L. KITCHELL, D.V.M., Assistant in Veterinary Medicine
 W. A. MALMQUIST, D.V.M., Research Fellow

²⁸ Resigned May 1, 1948

²⁷ Appointed September 1, 1947

²⁸ Appointed April 16, 1948

²⁹ On leave May 1, 1948, to June 30, 1948

³⁰ Appointed January 1, 1948

³¹ Resigned August 31, 1947

³² Resigned September 15, 1947

³³ Appointed July 1, 1947

³⁴J. H. SAUTTER, D.V.M., Assistant in Veterinary Medicine
 A. F. SELLERS, M.S., Assistant in Veterinary Medicine
^{35,36}F. A. SPURRELL, D.V.M., B.S., Assistant in Veterinary Medicine
 J. E. WILLIAMS, D.V.M., Research Fellow

RURAL SOCIOLOGY

LOWRY NELSON, Ph.D., Rural Sociologist
 DOUGLAS G. MARSHALL, Ph.D., Assistant Rural Sociologist

NORTH CENTRAL EXPERIMENT STATION

D. L. DAILEY, B.S., Superintendent
 RICHARD B. AAKRE, B.S., Assistant Agricultural Engineer
 C. H. GRIFFITH, M.S., Assistant Agronomist
 K. P. MILLER, M.S., Assistant Animal Husbandman
³⁷C. R. OLSEN, B.S., Assistant in Horticulture and Poultry

NORTHEAST EXPERIMENT STATION

M. J. THOMPSON, M.S., Superintendent

NORTHWEST EXPERIMENT STATION

T. M. MCCALL, M.S., Superintendent
³⁸B. C. BERESFORD, M.S., Assistant Horticulturist
 A. M. FOKER, Assistant Agricultural Engineer
 O. M. KISER, M.S., Assistant Animal Husbandman
 H. W. SODERBURG, M.A., Assistant Agricultural Engineer
 O. C. SOINE, Ph.D., Assistant Agronomist
³⁹H. D. FAUSCH, B.S., Assistant in Animal Husbandry
 A. M. PILKEY, Assistant in Poultry Husbandry

SOUTHEAST EXPERIMENT STATION

R. E. HODGSON, M.S., Superintendent

WEST CENTRAL EXPERIMENT STATION

A. W. EDSON, M.S., Superintendent
⁴⁰T. H. FENSKE, M.S., Superintendent
 R. O. BRIDGFORD, M.S., Assistant Agronomist
 H. G. CROOM, B.S., Assistant Poultry Husbandman
 A. C. HEINE, Assistant Agricultural Engineer and Assistant Superintendent

³⁴ Appointed October 1, 1947
³⁵ Appointed October 1, 1947
³⁶ Appointed January 1, 1943
³⁷ Appointed August 1, 1947
³⁸ Appointed July 1, 1947
³⁹ Appointed August 16, 1947
⁴⁰ Resigned July 1, 1947

P. S. JORDAN, B.S., Assistant Animal Husbandman

B. E. YOUNGQUIST, B.S., Assistant Agricultural Engineer

PUBLICATIONS

⁴¹PAUL C. JOHNSON, B.S., Editor

HAROLD B. SWANSON, B.A., Editor

⁴²LETTIE GUDMESTAD, B.A., Assistant to Editor, Agricultural Bulletins

⁴³AUDREY SWANSON, B.A., Assistant to Editor, Agricultural Bulletins

⁴¹ Resigned October 28, 1947

⁴² Appointed March 29, 1948

⁴³ Resigned February 29, 1948