

FIFTY-FOURTH ANNUAL REPORT

Agricultural Experiment Station
University of Minnesota

JULY 1, 1946 TO JUNE 30, 1947



UNIVERSITY FARM, ST. PAUL

LETTERS OF TRANSMITTAL

UNIVERSITY OF MINNESOTA, MINNEAPOLIS, MINN.

July 1, 1947

*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, 1947.

Respectfully transmitted,

JAMES L. MORRILL,

President of the Board of Regents

UNIVERSITY OF MINNESOTA, MINNEAPOLIS, MINN.

July 1, 1947

*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, 1947.

Respectfully transmitted,

JAMES L. MORRILL,

President of the University of Minnesota

UNIVERSITY FARM, ST. PAUL, MINN.

July 1, 1947

*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, 1947.

Respectfully submitted,

C. H. BAILEY, *Director*

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FIFTY-FOURTH ANNUAL REPORT

MINNESOTA AGRICULTURAL EXPERIMENT STATION

JULY 1, 1946 TO JUNE 30, 1947

C. H. Bailey, Director

H. Macy, Associate Director

FOREWORD

The importance of agricultural research was clearly enunciated by the Congress of the United States when it enacted Public Law 733, approved by the President, August 14, 1946. This act of the Seventy-ninth Congress is now known as the Research and Marketing Act of 1946 and has been popularly designated as the Hope-Flannagan Bill. It provides for further research into basic laws and principles relating to agriculture and for investigations to improve and facilitate the marketing and distribution of agricultural products.

The diversity of problems facing agriculture is clearly described in Section I of Title I of the Research and Marketing Act. This section is worthy of reproduction, at least in part, as follows:

"Section I. It is hereby declared to be the policy of the Congress to promote the efficient production and utilization of products of the soil as essential to the health and welfare of our people and to promote a sound and prosperous agriculture and rural life as indispensable to the maintenance of maximum employment and national prosperity. It is also the intent of Congress to assure agriculture a position in research equal to that of industry which will aid in maintaining an equitable balance between agriculture and other sections of our economy. For the attainment of these objectives, the Secretary of Agriculture is authorized and directed to conduct and to stimulate research into the laws and principles underlying the basic problems of agriculture in its broadest aspects, including but not limited to: Research relating to the improvement of the quality of, and the development of new and improved methods of the production, marketing, distribution, processing, and utilization of plant and animal commodities at all stages from the original producer through to the ultimate consumer; research into the problems of human nutrition and the nutritive value of agricultural commodities, with particular reference to their content of vitamins, minerals, amino and fatty acids, and all other constituents that may be found necessary for the health of the consumer and to the gains or losses in nutritive value that may take place at any stage in their production, distribution, processing, and preparation

for use by the consumer ; research relating to the development of present, new, and extended uses and markets for agricultural commodities and by-products as food or in commerce, manufacture, or trade, both at home and abroad, with particular reference to those foods and fibers for which our capacity to produce exceeds or may exceed existing economic demand ; research to encourage the discovery, introduction, and breeding of new and useful agricultural crops, plants, and animals, both foreign and native, particularly for those crops and plants which may be adapted to utilization in chemical and manufacturing industries ; research relating to new and more profitable uses for our resources of agricultural manpower, soils, plants, animals, and equipment than those to which they are now, or may hereafter be, devoted ; research relating to the conservation, development, and use of land, forest, and water resources for agricultural purposes ; research relating to the design, development, and the more efficient and satisfactory use of farm buildings, farm homes, farm machinery, including the application of electricity and other forms of power ; research relating to the diversification of farm enterprises, both as to the type of commodities produced, and as to the types of operations performed, on the individual farm ; research relating to any other laws and principles that may contribute to the establishment and maintenance of a permanent and effective agricultural industry including such investigations as have for their purpose the development and improvement of the rural home and rural life, and the maximum contribution by agriculture to the welfare of the consumer and the maintenance of maximum employment and national prosperity ; and such other researches or experiments bearing on the agricultural industry or on rural homes of the United States as may in each case be deemed advisable, having due regard to the varying conditions and needs of Puerto Rico, the respective States, and Territories. . . .”

The Eightieth Congress appropriated nine million dollars to carry out the purposes of the act during the fiscal year 1947-48. A portion of these funds has come to each state experiment station for the support of fundamental research under the direction of the states independently and in cooperation with one another as well as with the federal government. Such funds have supplemented money which has been available to the experiment stations from state and federal sources in recent years. It has meant a substantial stimulation in the activities of the agricultural research workers and has encouraged a high degree of cooperation, both intrastate and interstate and between state and federal agencies.

The emphasis in the Research and Marketing Act is on research in the field of marketing. This is a most difficult but important area for investigation and development. It will require long and patient study to reveal the factors which influence marketing efficiency. A promising beginning has been made toward the solution of many of these problems and, with added funds made available from time to time, there is every

reason to believe that the investigators will answer many of the questions that have puzzled agriculture for years.

This expanded support of agricultural research by the federal government has been matched by an increased interest on the part of individuals, industries, associations, foundations, and state governments. The Minnesota Agricultural Experiment Station has been called upon by all branches of the agricultural industry for additional research. The staff of the Experiment Station is exerting every effort to meet this demand so far as facilities and personnel will permit. There is a gradual return to normal conditions following the war, and the results of research already under way are being applied effectively by all branches of agriculture from the farm to the ultimate consumer. The next few years should witness a much more efficient agriculture based upon the new information provided by the scientific investigator.

CHANGES IN STAFF**Appointments**

Richard B. Aakre, B.S., as assistant agricultural engineer, North Central Experiment Station, effective September 6, 1946.

R. M. Anderson, M.S., as instructor, Division of Animal and Poultry Husbandry, effective July 1, 1946.

W. J. Aunan, B.S., as instructor, Division of Animal and Poultry Husbandry, effective July 29, 1946.

R. R. Beneke, M.S., as assistant in agricultural economics, Division of Agricultural Economics, effective September 1, 1946.

R. A. Bottomley, M.S., as research fellow, Division of Agricultural Biochemistry, effective June 16, 1947.

R. W. Brown, B.S., V.M.D., as research fellow, Division of Veterinary Medicine, effective February 1, 1947.

A. H. Burman, B.S., as assistant in agricultural engineering, Division of Agricultural Engineering, effective December 16, 1946.

A. L. Burroughs, Ph.D., as assistant entomologist, Division of Entomology and Economic Zoology, effective September 16, 1946.

B. M. Craig, M.S., as research fellow, Division of Agricultural Biochemistry, effective July 1, 1946.

H. A. Harland, M.S., as assistant dairy bacteriologist, Division of Dairy Husbandry, effective October 1, 1946.

H. G. Heggeness, M.S., as assistant in plant physiology, Division of Plant Pathology and Botany, effective June 7, 1947.

Ralph L. Hossfeld, Ph.D., as associate forester, Division of Forestry, effective September 1, 1946.

M. F. Kernkamp, Ph.D., as assistant plant pathologist, Division of Plant Pathology and Botany, effective October 15, 1946.

Thor Kommedahl, M.S., as assistant in plant pathology, Division of Plant Pathology and Botany, effective September 16, 1946.

R. L. Mann, B.S., as research fellow, Division of Agricultural Biochemistry, effective August 1, 1946.

Douglas G. Marshall, Ph.D., as assistant rural sociologist, Rural Sociology, effective September 15, 1946.

A. G. Peterson, M.S., as research fellow, Division of Entomology and Economic Zoology, effective January 1, 1947.

D. C. Quimby, M.S., as assistant zoologist, Division of Entomology and Economic Zoology, effective July 1, 1946.

O. E. Reece, M.S., as agent, Division of Agronomy and Plant Genetics, effective December 30, 1946.

S. B. Silverborg, B.S., as research fellow, Division of Plant Pathology and Botany, effective July 1, 1946.

E. W. Stringam, M.S., as instructor, Division of Animal and Poultry Husbandry, effective October 1, 1946.

O. C. Turnquist, M.S., as research fellow, Division of Horticulture, effective April 1, 1947.

Promotions

W. H. Foote, M. S., research assistant to research fellow, Division of Agronomy and Plant Genetics, effective January 1, 1947.

T. W. Gullickson, Ph.D., assistant professor to associate professor, Division of Dairy Husbandry, effective July 1, 1946.

R. W. Kunkel, M.S., research fellow to research associate, Division of Dairy Husbandry, effective July 1, 1946.

R. H. Landon, Ph.D., instructor to assistant professor, Division of Plant Pathology and Botany, effective July 1, 1946.

K. P. Miller, M.S., instructor to assistant professor, North Central Experiment Station, effective July 1, 1946.

H. W. Soderburg, M.A., instructor to assistant professor, Northwest Experiment Station, effective July 1, 1946.

John Strait, M.S., assistant in agricultural engineering to assistant agricultural engineer, Division of Agricultural Engineering, effective July 1, 1946.

T. S. Weir, M.S., assistant horticulturist to associate horticulturist and assistant superintendent of the Fruit Breeding Station, Division of Horticulture, effective July 1, 1946.

Leaves of Absence

E. F. Koller, Ph.D., agricultural economist, Division of Agricultural Economics, sabbatical leave, July 1, 1946 to June 30, 1947.

Resignations

M. K. Brakke, B.S., assistant in agricultural biochemistry, Division of Agricultural Biochemistry, to accept a position with the Brooklyn Botanical Garden, Brooklyn, New York, effective June 15, 1947.

L. K. Crowe, M.S.Agr., research associate, Division of Dairy Husbandry, to accept a position in the Division of Dairy Husbandry at the University of Nebraska, Lincoln 1, Nebraska, effective September 30, 1946.

J. N. Cummings, M.S., assistant in animal husbandry, North Central Experiment Station, to accept a position in the Division of Animal and Poultry Husbandry at the University of Minnesota, St. Paul 1, Minnesota, effective July 1, 1946.

R. H. Daggy, Ph.D., assistant entomologist, Division of Entomology and Economic Zoology, to accept a position as medical entomologist of the Saudi Arabian Oil Company, Dhahran, Saudi, Arabia, effective February 28, 1947.

Dorothy Day, Ph.D., research associate, Division of Plant Pathology and Botany, to accept a position at the Quartermaster Depot, Philadelphia, Pennsylvania, effective September 30, 1946.

R. A. Hamilton, M.S., assistant horticulturist, North Central Experiment Station, to accept a position at Rugby, North Dakota, effective May 31, 1947.

E. W. Hanson, Ph.D., agent, Division of Plant Pathology and Botany, to accept a position in the Department of Plant Pathology at the University of Wisconsin, Madison 6, Wisconsin, effective August 31, 1946.

R. W. Henderson, M.S., associate geneticist, Division of Agronomy and Plant Genetics, to accept a position at the University of Oregon, Corvallis, Oregon, effective August 24, 1946.

R. A. Larsen, M.S., research fellow, Division of Agricultural Biochemistry, to accept a position with the du Pont Company, Wilmington, Delaware, effective June 30, 1947.

Max Milner, Ph.D., research associate, Division of Agricultural Biochemistry, to accept a position in the Department of Milling Industry, Kansas State College, Manhattan, Kansas, effective January 15, 1947.

O. E. Reece, M.S., research fellow, Division of Agronomy and Plant Genetics, to accept a position directly with the U. S. Department of Agriculture, cooperating with the Division of Agronomy and Plant Genetics, University of Minnesota, St. Paul 1, Minnesota, effective December 28, 1946.

A. L. Richardson, M. S., assistant in horticulture, North Central Experiment Station, to accept a position as superintendent of the Horticulture Experiment Station at the University of Montana, Missoula, Montana, effective September 25, 1946.

S. B. Silverborg, B.S., research fellow, Division of Plant Pathology and Botany, to accept a position in the College of Forestry, Syracuse, New York, effective June 30, 1947.

T. P. Singer, Ph.D., assistant agricultural biochemist, Division of Agricultural Biochemistry, to accept a position in the Medical School at Western Reserve University, Cleveland 6, Ohio, effective December 31, 1946.

F. V. Stevenson, M.S., assistant in plant pathology, Division of Plant Pathology and Botany, to accept a position at California Polytechnic Institute, San Luis Obispo, California, effective July 1, 1946.

I. W. Tervet, Ph.D., assistant plant pathologist, Division of Plant Pathology and Botany, to accept a position at the University of Nebraska, Lincoln 1, Nebraska, effective July 31, 1946.

O. C. Turnquist, M.S., assistant in horticulture, Northwest Experiment Station, to accept a position in the Division of Horticulture at the University of Minnesota, St. Paul 1, Minnesota, effective April 1, 1947.

Kathleen Webb, B.S., assistant to the editor, Agricultural Bulletins, Division of Publications, to accept a position as assistant research and extension editor at the University of Vermont, Burlington, Vermont, effective March 7, 1947.

Retirements

E. G. Cheyney, A.B., forester, Division of Forestry, effective June 30, 1947.

H. B. White, M.S., assistant agricultural engineer, Division of Agricultural Engineering, effective June 30, 1947.

Deaths

None

PUBLICATIONS

AGRICULTURAL EXPERIMENT STATION

General Bulletin Series

393. Farm housing needs in Minnesota. Vernon Davies, Rural Sociology. 20 pages, 5,000.

394. Farm retirement in Minnesota. Lowry Nelson, Rural Sociology. 20 pages, 5,000.

395. Hybrid corn maturity trials. R. F. Crim, H. K. Hayes, E. H. Rinke, Gertrud Joachim, R. E. Hodgson, R. O. Bridgford, and O. C. Soine, Division of Agronomy and Plant Genetics. 16 pages, 7,500.

Technical Bulletin Series

177. An analysis of some important factors affecting the results of fumigation tests. Yun-Pei Sun, Division of Entomology and Economic Zoology. 104 pages, 3,000.

178. Susceptibility of processed soy flour and soy grits in storage to attack by *Tribolium castaneum* (Herbst). Clarence E. Mickel and John Standish, Division of Entomology and Economic Zoology. 20 pages, 3,000.

Minnesota Farm and Home Science

Volume IV, Number 1. 16 pages, 16,000.

Volume IV, Number 2. 16 pages, 16,000.

Volume IV, Number 3. 16 pages, 16,500.

Report Series

Fifty-third annual report of the Minnesota Agricultural Experiment Station, July 1, 1945, to June 30, 1946. 32 pages, 2,500.

AGRICULTURAL EXTENSION SERVICE**Bulletin Series**

253. Insulation and ventilation of animal shelter buildings. Dennis M. Ryan and Robert E. Pile, Division of Agricultural Extension. 20 pages, 25,000.

254. Soil fertility and conservation . . . a Minnesota program. Paul M. Burson, C. O. Rost, and E. R. Duncan, Division of Soils. 8 pages, 25,000.

255. The home fruit planting. Leon C. Snyder, Division of Agricultural Extension. 44 pages, 20,000.

Pamphlet Series

147. Farm costs are mounting. J. B. McNulty, Division of Agricultural Extension. 4 pages, 12,000.

148. Feed and livestock situation. S. B. Cleland, Division of Agricultural Extension. 6 pages, 12,000.

149. Minnesota outlook for dairy products, fats and oils, eggs and poultry. M. K. Hinds and W. H. Dankers, Division of Agricultural Extension. 8 pages, 12,000.

150. Agricultural outlook. W. H. Dankers, Division of Agricultural Extension. 8 pages, 12,000.

151. The fruit, vegetable, and potato outlook for 1947. Ralph V. Backstrom, Division of Agricultural Extension. 6 pages, 12,000.

152. Wheat, flax and soybean outlook for 1947. D. C. Dvoracek, Division of Agricultural Extension. 4 pages, 5,000.

Folder Series

143. Fertilizer grades and ratios for Minnesota. C. O. Rost, Paul M. Burson, and E. R. Duncan, Division of Soils. 12 pages, 20,000.

Boys' and Girls' Club Series

24. (Revised.) 4-H farm and home safety. Glenn Prickett, Division of Agricultural Extension. 16 pages, 25,000.

Newsletters

Name of publication	Issues	Pages	Circulation
Ask University Farm	10	40	4,848
Bob Hodgson Talks, weekly	12	105	1,479
Club Leader Letter, monthly	9	36	37,659
Dairy Herd Improvement News	9	45	19,470
Extension News Digest, semimonthly	24	48	19,409
Farm Business Notes, monthly	12	48	32,400
Farm Shorts	10	20	4,030
Market Garden Letter	5	16	6,433
Poultry News Letter	5	13	1,730
Radio Shorts	5	10	130
Rural Youth News	2	8	6,000
Sheep Letter	7	7	25,098
Turkey News Letter	10	20	30,693
Visual Aids Tip Sheet	12	24	4,215
Weekly Review	52	101	5,460
	184	541	199,064

SCIENTIFIC JOURNAL SERIES PAPERS

Agricultural Biochemistry

2179. Preliminary studies with the extensograph. Paul P. Merritt and C. H. Bailey. *Cereal Chemistry* 22:372-391. September, 1945.

2203. The vitamin A potency of creamery butter produced in Minnesota. Robert Jenness and L. S. Palmer. *Journal of Dairy Science* 28:473-494. 1945.

2210. Ozonizer capable of producing a constant amount of ozone. Fred L. Greenwood. Analytical Edition, *Industrial and Engineering Chemistry* 17:446-447. July, 1945.

2275. Utility of sulfa drugs for the inhibition of mold respiration in grain. Max Milner. *Science* 104:463-464. 1946.

2297. The controlled sodium amalgam reduction of aldonolactones and their esters to aldoses and an improved synthesis of D-arabinose. Nathan Sperber, Harold E. Zaugg, and W. M. Sandstrom. *Journal of the American Chemical Society* 69:915-920. April, 1947.

2303. Electrokinetics XXVII. The electroviscosity effect. D. R. Briggs. *Recueil des Travaux Chimiques des Pays-Bas* 65:591-594. September, 1946.

2304. Grain storage studies. IV. Biological and chemical factors involved in the spontaneous heating of soybeans. Max Milner and W. F. Geddes. *Cereal Chemistry* 23(5):449-470. September, 1946.

2313. Processing the wheat kernel. C. H. Bailey. *Food Technology* 1(2):290-295. April, 1947.

2315. Grain storage studies. V. Chemical and microbiological studies on "sick" wheat. Max Milner, Clyde M. Christensen, and W. F. Geddes. *Cereal Chemistry* 24(1):23-38. January, 1947.

2334. Grain storage studies. VI. Wheat respiration in relation to moisture content, mold growth, chemical deterioration, and heat. Max Milner, Clyde M. Christensen, and W. F. Geddes. *Cereal Chemistry* 24:182-199. May, 1947.

Agronomy and Plant Genetics

2286. An "oenothera" or multiple translocation method of establishing homozygous lines. C. R. Burnham. *Journal of the American Society of Agronomy* 38:702-707. 1946.

2289. Yield genes, heterosis and combining ability. H. K. Hayes. *The American Naturalist* 80:430-445. July-August, 1946.

2294. Self-fertility studies in three species of commercial grasses. Chung-Fu Cheng. *Journal of the American Society of Agronomy* 38:873-881. 1946.

2308. Breeding hard red winter wheats for the northern Great Plains area. E. R. Ausemus and R. H. Bamberg. *Journal of the American Society of Agronomy* 39:198-206. March, 1947.

2314. Chromosomal stability in certain rust resistant derivatives from a *T. vulgare* x *T. timopheevi* cross. William Semeniuk. *Scientific Agriculture* 27:7-20. January, 1947.

2317. Morphologic and agronomic variation in *Poa pratensis* L. in relation to chromosome numbers. Herbert H. Kramer. *Journal of the American Society of Agronomy* 39:181-191. March, 1947.

2328. A selection experiment with Kentucky bluegrass. H. L. Thomas and H. K. Hayes. *Journal of the American Society of Agronomy* 39:192-197. March, 1947.

Animal and Poultry Husbandry

2265. Comparative growth of the sheep and bovine animal during prenatal life. W. W. Green, *American Journal of Veterinary Research* 7(25):395-402. October, 1946.

2319. Artificial rearing of baby pigs. W. W. Green, H. H. Brugman, and L. M. Winters. *Journal of Animal Science* 6(2):146-153. May, 1947.

Dairy Husbandry

2307. Cardiac failure in cattle on vitamin E-free rations as revealed by electrocardiograms. Thor W. Gullickson and Chas. E. Calverley. *Science* 104:312-313. 1946.

2311. The prophylactic administration of vitamins to dairy calves. L. O. Gilmore, L. M. Jones, L. A. Kanegis, and M. H. Roepke, *Journal of the American Veterinary Medical Association* 110:390-393. June, 1947.

Entomology and Economic Zoology

2218. The spring molt of the northern red squirrel in Minnesota. Bernard A. Nelson. *Journal of Mammalogy* 26:397-400. 1945.

2219. Incidence of worm parasites in Minnesota Mustelidae and host lists and keys to North American species. Arnold B. Erickson. *The American Midland Naturalist* 36(2):494-509. September, 1946.

2230. Value of pollen substitutes for brood rearing of honeybees. Mykola H. Haydak. *Journal of Economic Entomology* 38:484-487. 1945.

2233. Taxonomic studies of Nearctic Cryptini (Ichneumonidae, Hymenoptera). Harry Davis Pratt. *The American Midland Naturalist* 34(3):549-661. November, 1945.

2277. Buccal food impaction in whitetailed deer and *Actinomyces necrophorus* in big game. Jules S. Cass. *Journal of Wildlife Management* 11:91-94. January, 1947.

2302. The organization of arthropod cuticle: a modified interpretation. A. Glenn Richards. *Science* 105:170-171. February 14, 1947.

2338. Fowl spirochetosis transmitted by *Argas persicus* (Oken), 1818 from Texas. A. L. Burroughs. *Science* 105:577. May 30, 1947.

Home Economics

2283. The corpuscular constants of college women of the North Central States. Gladys Kinsman Lewis, Margaret A. Ohlson, Dena Cederquist, and Eva G. Donelson. *The Journal of Laboratory and Clinical Medicine* 32:419-422. April, 1947.

2288. Effect of fertilizer treatment on total and reduced ascorbic acid content of potato tubers. Jane M. Leichsenring, Loana M. Norris, Doris A. Grambow, and Eva G. Donelson. *Food Research* 12(2):151-157. March-April, 1947.

2325. Relative serviceability of three weights of wool serge. Lillian O. Lund, Ethel L. Phelps, Helen Ward Norton, and Barbara Bailey Miller. *Journal of Home Economics* 39:81-84. February, 1947.

Horticulture

2216. Progeny tests of asparagus plants. T. M. Currence. *Journal of Agricultural Research* 74(3):65-76. February 2, 1947.

2244. A study of cold resistance of the roots of the Latham red raspberry. W. G. Brierley and R. H. Landon. *Proceedings of the American Society for Horticultural Science* 47:215-218. 1946.

2292. Some relationships between rest period, rate of hardening, loss of cold resistance and winter injury in the Latham raspberry. W. G. Brierley and R. H. Landon. *Proceedings of the American Society for Horticultural Science* 47:224-234. 1946.

2301. Cellulose sponge tests for moisture loss in wrapping material at 0° F. J. D. Winter. *Food Freezing* 1(12):480-482. October, 1946.

2316. The influence of sprout-inhibiting and sprout-inducing treatments on the growth and yields of potatoes. E. A. Pujals, R. E. Nylund, and F. A. Krantz. *American Potato Journal* 24:47-56. February, 1947.

Plant Pathology and Botany

2272. Effect of fusarial head blight on the development of bunt of wheat (abstract). E. W. Hanson. *Phytopathology* 36:400. May, 1946.

2287. *Polyporus guttulatus* and *Ptychogaster rubescens*. Ross W. Davidson, Clyde M. Christensen, and Ellis F. Darley. *Mycologia* 38:652-663. November-December, 1946.

2309. Growth and variation of six physiologic races of *Actinomyces scabies* on different culture media. W. D. Thomas, Jr. *Phytopathology* 37(5):319-331. May, 1947.

Soils

2211. The effect of chlorine in soils and fertilizers on its distribution in the potato tuber. J. M. MacGregor and C. O. Rost. *Soil Science Society of American Proceedings* 9:79-85. 1944.

2300. The chemical composition of the colloidal clay fraction of some solodi soils of Minnesota. A. L. Brown and A. C. Caldwell. *Soil Science* 63:183-194. March, 1947.

2320. Clay mineral content of the colloidal material extracted from a solodi soil profile. A. L. Brown and A. C. Caldwell. *Soil Science Society of American Proceedings* 11:213-215. 1946.

2331. Determining new and better fertilizer ratios. A. C. Caldwell. *Better Crops with Plant Food* 31:25-26, 42-44. June-July, 1947.

Veterinary Medicine

2281. An unusual structure associated with bovine necrotic mastitis. D. E. Jasper, L. A. Kanegis, and F. J. Weirether. *The Cornell Veterinarian* 36(3):268-276. July, 1946.

2282. Adamantinoma in the bovine. Donald E. Jasper and Leon A. Kanegis. *The Cornell Veterinarian* 36:262-267. July, 1946.

2305. The chemotherapy of calf pneumonia. I. Some pharmacologic aspects of sulfonamide administration to normal calves. L. Meyer Jones, D.V.M., Ph.D. *American Journal of Veterinary Research* 8:1-13. January, 1947.

2306. The chemotherapy of calf pneumonia. II. The use of sulfathiazole, sulfapyridine, and sulfadiazine in the treatment of calf pneumonia. L. Meyer Jones. *American Journal of Veterinary Research* 8:14-28. January, 1947.

MISCELLANEOUS JOURNAL SERIES PAPERS

Agronomy and Plant Genetics

568. Oat varieties for 1947. H. K. Hayes. *The Minnesota Seed Grower* 9(6):1,3,4. December, 1946.

576. Some observations on hybrid corn. H. K. Hayes. *The Minnesota Seed Grower* 20(1):1,6. February, 1947.

Animal and Poultry Husbandry

542. Lean and efficient. L. M. Winters. *The Farm Quarterly* 1(3):72-75, 141. 1946.

563. Minnesota No. 2 line of swine. L. M. Winters. *American Feed and Grain Dealer* 30:8,9,30. August, 1946.

Entomology and Economic Zoology

561. Flies, mosquitoes, and DDT. Richard H. Daggy. *Everybody's Health* 31:2-3. June, July, August, 1946.

564. Cockroaches as household pests: their control with DDT. Richard H. Daggy. *Everybody's Health* 31:5, 15. November, December, 1946.

571. Pantry insects—what to do about them. Richard H. Daggy. *Everybody's Health* 31:5,16-17. February, 1947.

573. Summer-time control of gladiolus insects. Part I. Caterpillars, beetles, soil insects. A. A. Granovsky. *The Minnesota Horticulturist* 75:36-37. March, 1947.

574. Summer-time control of gladiolus insects. Part II. Sucking Insects. A. A. Granovsky. *The Minnesota Horticulturist* 75:59-60. April, 1947.

575. Summer-time control of gladiolus insects. Part III. Gladiolus Thrips. A. A. Granovsky. *The Minnesota Horticulturist* 75:74-75. May, 1947.

577. Rearing clothes moth and black carpet beetle in the laboratory. Mykola H. Haydak. *Journal of Economic Entomology* 40(2):279-280. April, 1947.

578. Beekeepers' note book. M. H. Haydak. *The Minnesota Horticulturist* 75:46-47. March, 1947.

580. Wings of agriculture. M. H. Haydak. *American Bee Journal* 87:218-219, 235. May, 1947.

Forestry

504. Red squirrel damage to mature red pine. T. Schantz-Hansen. *Journal of Forestry* 43:604-605. August, 1945.

505. Harvesting young aspen on the Cloquet Forest. T. Schantz-Hansen. *Journal of Forestry* 43:506-507. July, 1945.

531. Winter dissemination of red pine seed. T. Schantz-Hansen. *Journal of Forestry* 44:593-594. August, 1946.

570. Green lumber in home building. L. W. Rees and E. A. Behr. *The Mississippi Valley Lumberman* 78(2):36. January 10, 1947.

583. A preliminary study of several logging methods for aspen. T. Schantz-Hansen. *Timber Producers Association Monthly Bulletin* 2(10):7-10. June, 1947.

Home Economics

584. The retention of ascorbic acid and color in green peas during cooking by different methods. Isabel Noble and Florence Turnbull. *Miscellaneous Series* April, 1947.

585. The retention of thiamine and riboflavin in green peas during cooking by different methods. Isabel Noble and Joan Gordon. *Miscellaneous Series* April, 1947.

586. The retention of ascorbic acid in green beans prepared for cooking in different ways and cooked by different methods. Isabel Noble and Florence Turnbull. *Miscellaneous Series* April, 1947.

587. The retention of color in green beans prepared for cooking in different ways and cooked by different methods. Isabel Noble. *Miscellaneous Series* April, 1947.

588. The retention of thiamine and riboflavin in Asgrow Stringless Wonder green beans during cooking by different methods. Isabel Noble, Joan Gordon, and Mavis Nymon. *Miscellaneous Series* April, 1947.

589. The retention of ascorbic acid and color in cabbage during cooking for different lengths of time. Isabel Noble and Florence Turnbull. *Miscellaneous Series* April, 1947.

590. The retention of ascorbic acid and color in green beans during cooking with different amounts of water. Isabel Noble and Florence Turnbull. *Miscellaneous Series* April, 1947.

591. The retention of thiamine and riboflavin during the pan-broiling and broiling of bacon. Isabel Noble and Joan Gordon. *Miscellaneous Series* March, 1947.

592. The retention of ascorbic acid and color in cabbage during cooking with different amounts of water. Isabel Noble and Florence Turnbull. *Miscellaneous Series* April, 1947.

593. The thiamine and riboflavin content of beef tongue. Isabel Noble, Joan Gordon, and Lois Catterson. *Miscellaneous Series* April, 1947.

Horticulture

565. New Minnesota fruits, Redwell apple, Chestnut crabapple, Arrowhead strawberry. W. H. Alderman, A. N. Wilcox, T. S. Weir, W. G. Brierley, and J. D. Winter. *The Minnesota Horticulturist* 74: 131-132. November, 1946.

566. The "Rainbow"—a new family-size squash. A. E. Hutchins. *The Minnesota Horticulturist* 75:5-6. January, 1947.

Rural Sociology

582. Are Minnesota's farm youth in school? Milo Peterson and Douglas Marshall. Multilithed publication. April, 1947.

Veterinary Medicine

558. Parasites and parasitic diseases of swine. H. C. H. Kernkamp. *Veterinary Medicine* 41:315-318. September, 1946.

560. A case of Pasteurella endocarditis in a pig. J. H. Sautter, B. S. Pomeroy, and R. Fenstermacher. *Journal of the American Veterinary Medical Association* 109:369-371. November, 1946.

SUMMARY OF PUBLICATIONS

July 1946 - June 1947

Kind of publication	Number issued	Number of pages	Number of copies in edition
General Series Bulletins	3	56	17,500
Technical Series Bulletins	2	124	6,000
Minnesota Farm and Home Science	3	48	48,500
Report Series	1	32	2,500
Extension Service			
Bulletins	3	72	70,000
Pamphlets	6	36	65,000
Folders	1	12	20,000
4-H Bulletins	1	16	25,000
News Letters	184	541	199,064
	<u>204</u>	<u>937</u>	<u>453,564</u>

Summary of Journal Series Papers

Division	Scientific Journal Series		Miscellaneous Journal Series	
	Number issued	Number of pages	Number issued	Number of pages
Agricultural Biochemistry	10	118	1	4
Agricultural Economics	0	0	0	0
Agricultural Engineering	0	0	0	0
Agronomy and Plant Genetics	7	71	2	5
Animal and Poultry Husbandry	2	16	2	8
Dairy Husbandry	2	6	0	0
Entomology and Economic Zoology	7	45	9	19
Forestry	0	0	5	11
Home Economics	3	15	10	56
Horticulture	5	40	2	4
Plant Pathology and Botany	3	26	0	0
Soils	4	26	0	0
Veterinary Medicine	4	43	2	7
Rural Sociology	0	0	1	9
	<u>47</u>	<u>406</u>	<u>34</u>	<u>123</u>
Total publications	285			

NEW EXPERIMENT STATION PROJECTS

Agricultural Biochemistry

125. A study of factors influencing the keeping quality and processing value of corn. (Cooperative with Plant Pathology)

Dairy Husbandry

218. Nutritive requirements for dairy calves. (Cooperative with Agricultural Biochemistry)

Home Economics

14. Effect of certain factors on calcium utilization in human subjects.

15. The blood picture of youths participating in 4-H Club programs.

SUMMARY OF PROJECTS

Division	Total	Active	Inactive	Closed	New
Agricultural Biochemistry	15	15	0	2	2
Agricultural Economics	17	17	0	0	0
Agricultural Engineering	15	12	3	1	0
Agronomy and Plant Genetics	23	22	1	0	0
Animal and Poultry Husbandry	14	14	0	0	2
Dairy Husbandry	15	15	0	1	1
Entomology and Economic Zoology	20	18	2	1	0
Forestry	18	14	4	1	0
Home Economics	10	10	0	3	2
Horticulture	20	18	2	5	0
Plant Pathology and Botany	27	27	0	0	1
Soils	9	9	0	0	0
Veterinary Medicine	7	7	0	0	0
Rural Sociology	2	2	0	1	0
North Central Experiment Station.....	4	4	0	0	0
Northeast Experiment Station	6	6	0	0	0
Northwest Experiment Station	12	11	1	0	0
Southeast Experiment Sation	2	2	0	0	0
West Central Experiment Station	8	8	0	1	0
Total	244	231	13	16	8

FINANCIAL STATEMENT

Income 1946-1947

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	62,041.48						62,041.48
State appropriations:							
General University support	359,538.26	\$34,481.43	\$32,262.13	\$27,558.62	\$18,181.20	\$19,246.45	491,268.09
Special appropriations	90,000.00						90,000.00
Endowments, fellowships, and other similar grants							
.....	57,730.95						57,730.95
Fees, sales, and miscellaneous	96,682.48	25,792.09	31,257.38	14,163.04	16,318.88	36,363.52	220,577.39
Total	\$755,993.17	\$60,273.52	\$63,519.51	\$41,721.66	\$34,500.08	\$55,609.97	\$1,011,617.91

Expenditure 1946-1947

Classification	University Farm	Branch Stations					Total
		Crookston	Morris	Grand Rapids	Duluth	Waseca	
Services and labor	\$539,321.51	\$36,536.44	\$41,613.73	\$21,948.20	\$20,624.12	\$32,179.31	\$692,223.31
Travel expenses	16,625.83	265.26	293.11	638.91	621.52	183.70	18,628.33
Transportation of things	4,358.52	240.60	307.77	344.76	92.63	439.17	5,783.45
Communication service	4,583.83	455.57	414.36	251.17	217.26	183.30	6,105.49
Rents and utility service	11,378.52	999.32	820.54	1,143.11	436.93	756.54	15,534.96
Printing and binding	5,097.55	43.25	21.00	261.29			5,423.09
Other contractual services	35,949.54	3,570.83	1,175.27	2,962.45	2,847.34	2,384.78	48,890.21
Supplies and materials	93,831.44	13,007.46	15,186.67	11,349.46	6,701.75	11,974.76	152,051.54
Equipment	34,665.83	2,010.59	3,687.06	2,822.31	2,958.53	7,508.41	53,652.73
Lands and structures (contractual)	8,015.43	3,144.20					11,159.63
Annuities	2,165.17						2,165.17
Total	\$755,993.17	\$60,273.52	\$63,519.51	\$41,721.66	\$34,500.08	\$55,609.97	\$1,011,617.91

EXPERIMENT STATION STAFF

The Board of Regents

The HON. J. L. MORRILL, President	- - - - -	<i>Ex officio</i>
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

Administrative Officers

- C. H. BAILEY, Ph.D., Director
- H. MACY, Ph.D., Associate Director
- W. T. MIDDLEBROOK, A.B., M.C.S., Treasurer
- W. F. GEDDES, Ph.D., Chief, Division of Agricultural Biochemistry
- O. B. JESNESS, Ph.D., Chief, Division of Agricultural Economics
- A. J. SCHWANTES, M.S., Chief, Division of Agricultural Engineering
- H. K. HAYES, D.Sc., Chief, Division of Agronomy and Plant Genetics
- W. H. PETERS, M.Agr., Chief, Division of Animal and Poultry Husbandry
- J. B. FITCH, M.S., Chief, Division of Dairy Husbandry
- C. E. MICKEL, Ph.D., Chief, Division of Entomology and Economic Zoology
- HENRY SCHMITZ, Ph.D., Chief, Division of Forestry
- WYLLIE B. McNEAL, M.A., Chief, Division of Home Economics
- W. H. ALDERMAN, B.S.A., Chief, Division of Horticulture, Superintendent, Fruit Breeding Farm, Excelsior
- E. C. STAKMAN, Ph.D., Chief, Division of Plant Pathology and Botany
- C. O. ROST, Ph.D., Chief, Division of Soils
- W. L. BOYD, D.V.S., Chief, Division of Veterinary Medicine
- D. L. DAILEY, B. S., Superintendent, North Central Experiment Station, Grand Rapids
- M. J. THOMPSON, M.S., Superintendent, Northeast Experiment Station, Duluth
- T. M. McCALL, M.S., Superintendent, Northwest Experiment Station, Crookston
- R. E. HODGSON, M.S., Superintendent, Southeast Experiment Station, Waseca
- T. H. FENSKE, M.S., Superintendent, West Central Experiment Station, Morris
- T. SCHANTZ-HANSEN, Ph.D., Director of the Forestry and Biological Station, Itasca Park
- PAUL C. JOHNSON, B.A., Bulletin Editor
- E. W. McDIARMID, Ph.D., Librarian
- HARRIET W. SEWALL, B.A., Agricultural Librarian

DIVISION OF AGRICULTURAL BIOCHEMISTRY

W. F. GEDDES, Ph.D., Agricultural Biochemist, Chief

Section of Colloids, Carbohydrates, and Proteins

D. R. BRIGGS, Ph.D., Agricultural Biochemist
 W. M. SANDSTROM, Ph.D., Agricultural Biochemist
¹T. P. SINGER, Ph.D., Assistant Agricultural Biochemist
²M. K. BRAKKE, B.S., Assistant in Agricultural Biochemistry
³R. 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
 D. E. SMITH, M.S., Assistant in Agricultural Biochemistry
 C. W. BICE, M. S., Research Fellow
⁴R. A. BOTTOMLEY, M.S., Research Fellow
⁵B. M. CRAIG, M.S., Research Fellow
⁶R. A. LARSEN, M.S., Research Fellow
⁷MAX MILNER, Ph.D., Research Fellow
 R. J. STENBERG, B.S., Research Fellow

Section of Nutrition, Dairy Chemistry, and Analytical Service

M. O. SCHULTZE, Ph.D., Agricultural Biochemist
 CORNELIA KENNEDY, Ph.D., Associate Agricultural Biochemist
 P. D. BOYER, Ph.D., Assistant Agricultural Biochemist
 ROBERT JENNESS, Ph.D., Assistant Agricultural Biochemist

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

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

DIVISION OF AGRICULTURAL ECONOMICS

O. B. JESNESS, Ph.D., Agricultural Economist, Chief
 A. A. DOWELL, Ph.D., Agricultural Economist
¹E. F. KOLLER, Ph.D., Agricultural Economist
 G. A. POND, Ph.D., Agricultural Economist
 W. C. WAITE, Ph.D., Agricultural Economist
 R. W. COX, Ph.D., Assistant Agricultural Economist
 S. A. ENGENE, Ph.D., Assistant Agricultural Economist
²R. R. BENEKE, M.S., Assistant in Agricultural Economics
 H. W. HALVORSON, M.S., Assistant in Agricultural Economics
 TRUMAN R. NODLAND, Ph.D., Assistant in Agricultural Economics

¹ Resigned December 31, 1946.

² Resigned June 15, 1947.

³ Appointed August 1, 1946.

⁴ Appointed June 16, 1947.

⁵ Appointed July 1, 1946.

⁶ Resigned June 30, 1947.

⁷ Resigned January 15, 1947.

⁸ Sabbatical leave July 1, 1946, to June 30, 1947.

⁹ Appointed September 1, 1946.

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
V. H. JOHNSON, B.A.E., Assistant in Agricultural Engineering

Section of Farm Structures

C. K. OTIS, M.S., Associate Agricultural Engineer
C. H. CHRISTOPHERSON, M.A., Assistant Agricultural Engineer
¹⁰H. B. WHITE, M.S., Assistant Agricultural Engineer
¹¹A. H. BURMAN, B.S., Assistant in Agricultural Engineering

Section of Agricultural Physics

ANDREW HUSTRULID, Ph.D., Associate Agricultural Engineer
A. G. TYLER, B. S., Assistant Agricultural Engineer
A. M. FLIKKE, M.S., Assistant in Agricultural Engineering

Section of Soil and Water Conservation

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 Bureau of Public Roads for Cooperative Work

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

DIVISION of AGRONOMY AND PLANT GENETICS

H. K. HAYES, D.Sc., Agronomist and Plant Geneticist, Chief
C. R. BURNHAM, Ph.D., Plant Geneticist
R. F. CRIM, B.S., Associate Agronomist and Extension Specialist in Agriculture
R. S. DUNHAM, M.S., Associate Agronomist
E. H. RINKE, Ph.D., Associate Plant Geneticist
C. BORGESON, M.S., Assistant Agronomist
J. W. LAMBERT, Ph.D., Assistant Plant Geneticist
A. R. SCHMID, Ph.D., Assistant Agronomist
H. L. THOMAS, Ph.D., Assistant Plant Geneticist
W. H. FOOTE, M.S., Research Fellow
E. L. PINNELL, M.S., Assistant in Plant Genetics
¹²O. E. Reece, M.S., Research Fellow

¹⁰ Retired June 30, 1947.

¹¹ Appointed December 16, 1946.

¹² Resigned December 28, 1946.

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

E. R. AUSEMUS, Ph.D., Agronomist
 J. O. CULBERTSON, Ph.D., Associate Agronomist
¹³R. W. HENDERSON, M.S., Associate Geneticist
 L. M. STAHLER, Ph.D., Associate Agronomist
¹⁴O. E. REECE, M.S., Agent

DIVISION OF ANIMAL AND POULTRY HUSBANDRY

W. H. PETERS, M.Agr., Animal Husbandman, Chief
 P. A. ANDERSON, B.S., Associate Animal Husbandman
 A. L. HARVEY, Ph.D., Associate Animal Husbandman
¹⁵R. M. ANDERSON, M.S., Instructor
¹⁶W. J. AUNAN, B.S., Instructor
¹⁷E. W. STRINGAM, 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
 W. 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
 T. H. CANFIELD, M.S., Associate Poultry Husbandman
 R. N. SHOFFNER, Assistant Poultry Husbandman

DIVISION OF DAIRY HUSBANDRY

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

Section of Dairy Production

J. B. FITCH, M.S., Dairy Husbandman
 W. E. PETERSEN, Ph.D., Dairy Husbandman
 T. W. GULLICKSON, Ph.D., Associate Dairy Husbandman
 L. O. GILMORE, Ph.D., Assistant Dairy Husbandman

Section of Dairy Products

W. B. COMBS, M.A., Dairy Husbandman
 S. T. COULTER, Ph.D., Dairy Husbandman
¹⁸L. K. CROWE, M.S.Agr., Research Associate
¹⁹H. A. HARLAND, M.S., Assistant in Dairy Husbandry

¹³ Resigned August 24, 1946.

¹⁴ Appointed December 30, 1946.

¹⁵ Appointed July 1, 1946.

¹⁶ Appointed July 29, 1946.

¹⁷ Appointed October 1, 1946.

¹⁸ Resigned September 30, 1946.

¹⁹ Appointed October 1, 1946.

A. S. KITZES, M.S. in Ch.E., Research Associate
 R. W. KUNKEL, M.S., Assistant in Dairy Husbandry
 E. L. THOMAS, M.S., Assistant in Dairy Husbandry

Section of Dairy Bacteriology

H. MACY, Ph.D., Dairy Bacteriologist
 J. C. OLSON, JR., M.S., Assistant Dairy Bacteriologist

DIVISION OF ENTOMOLOGY AND ECONOMIC ZOOLOGY

C. E. MICKEL, Ph.D., Entomologist, Chief
 A. A. GRANOVSKY, Ph.D., Entomologist
 M. H. HAYDAK, Ph.D., Associate Apiculturist
 A. C. HODSON Ph.D., Associate Entomologist
 W. H. MARSHALL, Ph.D., Associate Zoologist
 A. G. RICHARDS, Ph.D., Associate Entomologist
 T. L. AAMODT, B.S., Assistant Entomologist
²⁰A. L. BURROUGHS, Ph.D., Assistant Entomologist
²¹R. H. DAGGY, Ph.D., Assistant Entomologist
 H. Y. FAN, Ph.D., Research Associate
²²D. C. QUIMBY, M.S., Assistant Zoologist
 J. S. CASS, M.S., Research Fellow
²³A. G. PETERSON, M.S., Research Fellow

DIVISION OF FORESTRY

HENRY SCHMITZ, Ph.D., Forester, Chief
 J. H. ALLISON, Ph.B., M.F., Forester
²⁴E. G. CHEYNEY, A.B., Forester
 F. H. KAUFERT, Ph.D., Forester
 T. SCHANTZ-HANSEN, Ph.D., Forester and Director of Itasca Forestry and
 Biological Station
 R. M. BROWN, M.F., Associate Forester
²⁵RALPH L. HOSSFELD, Ph.D., Associate Forester
 L. W. REES, Ph.D., Associate Forester
 JOHN A. ZIVNUSKA, M.S., Assistant in Forestry

DIVISION OF HOME ECONOMICS

WYLLE B. MCNEAL, M.A., Home Economist, Chief
 ALICE BIESTER, M.A., Home Economist
 JANE M. LEICHSENRING, Ph.D., Home Economist
 ISABEL NOBLE, Ph.D., Home Economist
 ETHEL PHELPS, Associate Home Economist

DIVISION OF HORTICULTURE

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

²⁰ Appointed September 16, 1946.

²¹ Resigned February 28, 1947.

²² Appointed July 1, 1946.

²³ Appointed January 1, 1947.

²⁴ Retired June 30, 1947.

²⁵ Appointed September 1, 1946.

Section of Pomology

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

Section of Fruit Breeding

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

Section of Vegetable Gardening

F. A. KRANTZ, Ph.D., Horticulturist
 T. M. CURRENCE, Ph.D., Associate Horticulturist
 A. E. HUTCHINS, Ph.D., Assistant Horticulturist
 R. E. NYLUND, 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, for Cooperative Work

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

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
 E. C. STAKMAN, Ph.D., Plant Pathologist
 C. J. EIDE, Ph.D., Associate Plant Pathologist
 HELEN HART, Ph.D., Associate Plant Pathologist
 C. M. CHRISTENSEN, Ph.D., Assistant Plant Pathologist
 LOUISE T. DOSDALL, Ph.D., Assistant Plant Pathologist
²⁶M. F. KERNKAMP, Ph.D., Assistant Plant Pathologist
 ERICH O. MADER, Ph.D., Assistant Plant Pathologist
²⁷I. W. TERVET, Ph.D., Assistant Plant Pathologist
²⁸THOR KOMMEDAHL, M.S., Assistant in Plant Pathology
 M. B. MOORE, M.S., Assistant in Plant Pathology
²⁹S. B. SILVERBERG, B.S., Research Fellow
³⁰F. V. STEVENSON, M.S., Assistant in Plant Pathology

Section of Plant Physiology and Agricultural Botany

³¹DOROTHY DAY, Ph.D., Research Associate
 R. H. LANDON, Ph.D., Assistant Plant Physiologist

²⁶ Appointed October 15, 1946.

²⁷ Resigned July 31, 1946.

²⁸ Appointed September 16, 1946.

²⁹ Appointed July 1, 1946; resigned June 30, 1947.

³⁰ Resigned July 1, 1946.

³¹ Resigned September 30, 1946.

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

³²H. G. HEGGENESS, M.S., Assistant in Plant Physiology

Detailed by thre United States Department of Agriculture, Bureau of
Plant Industry, for Cooperative Work

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

³³E. W. HANSON, Ph.D., Agent

Division of Sugar Plant Investigation

H. W. BOCKSTAHLER, M.S., Assistant Pathologist

Bureau of Entomology and Plant Quarantine

Division of Plant Disease Control

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

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

W. Q. LOEGERING, Agent

Detailed by the State Department of Agriculture 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, Deputy, Office of Seed Potato Certification

DIVISION OF SOILS

C. O. ROST, Ph. D., Soils Chemist, Chief

P. R. McMILLER, M.S., Associate Soils Chemist

A. C. CALDWELL, Ph.D., Assistant 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

³⁴R. W. BROWN, B.S., V.M.D., Research Fellow

D. E. JASPER, M.S., Research Fellow

L. A. KANEGIS, D.V.M., Research Fellow

R. L. KITCHELL, D.V.M., Research Fellow

W. A. MALMQUIST, D.V.M., Research Fellow

J. H. SAUTTER, D.V.M., Research Fellow

A. F. SELLERS, M.S., Assistant in Veterinary Medicine

RURAL SOCIOLOGY

LOWRY NELSON, Ph.D., Rural Sociologist

³⁵DOUGLAS G. MARSHALL, Ph.D., Assistant Rural Sociologist

³² Appointed June 7, 1947.

³³ Resigned August 31, 1946.

³⁴ Appointed February 1, 1947.

³⁵ Appointed September 15, 1946.

NORTH CENTRAL EXPERIMENT STATION

D. L. DAILEY, B.S., Superintendent
³⁶RICHARD B. AAKRE, B.S., Assistant Agricultural Engineer
 C. H. GRIFFITH, M.S., Assistant Agronomist
³⁷R. A. HAMILTON, M.S., Assistant Horticulturist
 K. P. MILLER, M.S., Assistant Animal Husbandman
³⁸J. N. CUMMINGS, M.S., Assistant in Animal Husbandry
³⁹A. L. RICHARDSON, M.S., Assistant in Horticulture

NORTHEAST EXPERIMENT STATION

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

NORTHWEST EXPERIMENT STATION

T. M. MCCALL, M.S., Superintendent
 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
 A. M. PILKEY, Assistant in Poultry Husbandry
⁴⁰O. C. TURNQUIST, M.S., Assistant in Horticulture

SOUTHEAST EXPERIMENT STATION

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

WEST CENTRAL EXPERIMENT STATION

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

PAUL C. JOHNSON, B.S., Bulletin Editor
 HAROLD B. SWANSON, B.A., Instructor and Information Specialist
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³⁶ Appointed September 6, 1946.
³⁷ Resigned May 31, 1947.
³⁸ Resigned July 1, 1946.
³⁹ Resigned September 25, 1946.
⁴⁰ Resigned April 1, 1947.
⁴¹ Resigned March 7, 1947.

