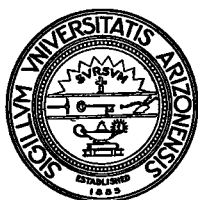


*Annual Report*  
of the  
Arizona  
Agricultural Experiment Station

FOR THE 64TH YEAR

ENDING JUNE 30, 1953



AGRICULTURAL EXPERIMENT STATION  
UNIVERSITY OF ARIZONA, TUCSON

BOARD OF REGENTS  
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	Term Expires
WALTER R. BIMSON, President.....	January, 1955
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EVELYN JONES KIRMSE, A.M.....	January, 1959
ALEXANDER G. JACOME, B.S.....	January, 1961
WILLIAM R. MATHEWS, A.B., Secretary.....	January, 1961

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ROBERT L. NUGENT, Ph.D.....Vice-President of the University  
ALFRED ATKINSON, D.Sc.....Executive Advisor to the Board of Regents

EXPERIMENT STATION

PHIL S. ECKERT, Ph.D.....Director  
RALPH S. HAWKINS, Ph.D.....Vice-Director

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This report is limited to an inventory of active research projects, an enumeration of publications issued during the year, a roll of staff members, and an account of receipts and disbursements of federal and state funds. The results of completed investigations are published in general and technical bulletins, mimeographed reports, and in technical journals. Reports of research progress, digests of general and technical bulletins, and developments not associated with specific projects are carried in *Progressive Agriculture in Arizona*, a quarterly publication of the College of Agriculture, University of Arizona.

# AGRICULTURAL EXPERIMENT STATION

## I. ACTIVE PROJECTS

### AGRICULTURAL CHEMISTRY AND SOILS

Lysimeter study of the nitrogen balance in irrigated arid soils (Purnell 169, Hatch and State).

Nutritional, chemical and physical studies on the more important soil types in Arizona (Purnell 265 and State).

Fertilization of field crops on alkaline-calcareous soils of different types, under semiarid and irrigated conditions (Research and Marketing 266 and State).

Availability of native soil phosphate and new commercial phosphate fertilizers in Arizona calcareous soils (Purnell 280 and Atomic Energy Commission).

Fundamental soil studies on the properties and use of soil correctives (Purnell 281, Hatch and State).

The nature of microflora and their activity in Arizona soils as affected by soil temperature, moisture, salinity, pH, and other factors peculiar to semiarid soils (Purnell 283 and State).

Soil structures and permeability under field conditions as affected by soil amendments and cultural practice (Regional Research 288 and State).

A study of the effect of temperature variation on various chemical and physical soil properties which affect fertility (Purnell 289 and State).

The soil plant system with reference to availability and uptake of moisture (State 307).

Uptake of strontium by crops (Atomic Energy Commission and State).

Study of soil aggregate stabilizers (Monsanto Chemical Company and State).

Weather records (State).

Control laws — Fertilizer, Feed, Economic Poisons, Agricultural Minerals (State).

Soil survey (State).

Analytical service (State).

### AGRICULTURAL ECONOMICS

Supply-price relationships and trends as they apply to Arizona farm and ranch products (Bankhead-Jones 196 and State).

Marketing research directed at opening up channels of trade for irrigated cotton (Research and Marketing 267, Regional Research and State).

Differential in prices between the producer and consumer that may be attributed to trade barriers in the Western Region (Research and Marketing 300, Regional Research and State).

Agricultural credit facilities in Arizona: An analysis of existing structure and problem areas (Bankhead-Jones 312 and State).

## AGRICULTURAL ENGINEERING

Groundwater studies (Adams 1, Hatch and State).

Water-supply forecasting and needed areal adjustment in irrigated agriculture during drouths. The annual water supply forecast (Hatch 215 and State).

The production and utilization of tamarisk. The tamarisk tree and its wood preservative treatment of tamarisk fence posts (Purnell 231, Hatch and State).

Mechanization of cotton production and harvesting (Research and Marketing 269, Regional Research and State).

Sprinkler irrigation studies under arid Southwestern conditions (Adams 303, Hatch and State).

## AGRONOMY

Irrigated pastures (Bankhead-Jones 248 and State).

The control of weeds on irrigated lands (Bankhead-Jones 261 and State).

Cotton yield and quality as affected by soil and climatic environment (Purnell 264 and State).

Oil seed crops, yield and quality as affected by heredity, soil, climate, and other environmental factors (Purnell 275 and State).

Seed production of special forage grasses and legumes (Purnell 304 and State).

The culture and improvement of cereals (Research and Marketing 305 and State).

The culture and improvement of flax (State).

Alfalfa (State).

Grain sorghums (State).

## ANIMAL HUSBANDRY

Nutritional studies of Arizona range plants and animals (Purnell 183 and State).

Comparative value of irrigated pastures for meat production (Bankhead-Jones 248 and State).

Progeny testing of Hereford sires (Research and Marketing 279 and Regional Research).

Investigation of an achondroplasia-like condition in Hereford cattle (Purnell 282 and State).

The effect of shade location on summer gains of fattening cattle (State).

Alfalfa moisture studies as related to soilage and silage (State).

Rumen fermentation (State).

Influence of high salt intake on cellulose digestion (State).

## ANIMAL PATHOLOGY

Range livestock losses from poisonous plants (Purnell 171 and State).

Infectious keratitis in cattle on range and feed lots (Purnell 199, Hatch and State).

An investigation of cattle death losses occurring on alfalfa, alfalfa-barley and barley pastures (Purnell 217 and State).

- The influence of salt on the physiology of ruminants (State).
- Abortion in range cattle (State).
- Diagnostic laboratory service (State).
- The incidence of leptospirosis in domestic animals in Arizona (Department of Health, Education and Welfare).

#### BOTANY AND RANGE ECOLOGY

- The range resources of Arizona (Purnell 232 and State).
- The nutritional requirements for increased fat production by selected crop plants (Purnell 250 and State).
- Control of noxious shrubs on Southwestern ranges (Research and Marketing 285).
- Factors affecting the noxious shrub control program on Arizona rangelands (Bankhead-Jones 292 and State).
- Grasses of Arizona (Grazing value and management of some common Arizona range grasses) (State 174).
- Asphalt-paved runoff basins as a source of stock water on semi-arid ranges (American Bitumuls & Asphalt Company, Arizona Game & Fish Commission and State).
- University of Arizona herbarium (State).

#### DAIRY HUSBANDRY

- Calf pasture vs. dry lot (Hatch 274 and State).
- A study of some nutritional properties of the constituents of milk (Bankhead-Jones 290 and State).
- Dehydrated alfalfa pellets for dairy heifers (State 291).
- Vitamin-A requirements for dairy cows in a hot, arid climate (Purnell 311 and State).

#### ENTOMOLOGY

- Insect pests of Arizona vegetable crops (Purnell 257 and State).
- Insect vectors of plant diseases affecting Arizona crops (Hatch 301 and State).
- Arizona insects of economic importance (Purnell 302 and State).

#### HOME ECONOMICS

- Indoor dining areas for rural homes in the Western Region (Regional Research 287b).

#### HORTICULTURE

- Lettuce breeding in Arizona (Purnell 297, Hatch and State).
- Lettuce physiology and cultural management (Purnell 298 and State).
- Melon breeding and improvement of varieties (Purnell 295, Hatch and State).
- Melon physiology and cultural management (Purnell 296 and State).
- Factors affecting the shipping quality and consumer acceptability of Arizona-grown vegetables (Research and Marketing 308).
- Citrus physiology and cultural management (Purnell 299, Hatch and State).

- Pecan production and quality in Arizona (Purnell 262 and State).
- Date maturation, storage and quality (Research and Marketing 270 and State).
- Cardinal grape maturity and culture (State).
- Deciduous fruit variety adaptation (State).
- Vegetable variety adaptation (State).
- Breeding miscellaneous vegetable crops (State).
- Cultural management and physiology of miscellaneous vegetables (State).

#### NUTRITION

The nutritive value of certain Arizona-produced foods and their relationship to various factors (Purnell 258A, B, C, and State).

The interdependence and physiological availability of amino acids, vitamins and other nutrients in foods (Research and Marketing 271).

Nutritional status and dietary needs of population groups in selected areas of the West (Regional Research 313-1 and 2).

Amino acid metabolism in rheumatoid arthritis (U.S. Public Health Service H-490 (C-3)).

#### PLANT BREEDING

A study of variability in adapted commercial alfalfa varieties and methods for their improvement (Adams 4, Hatch and State).

A study of the inheritance of fiber qualities in selfed lines of hybrids of Upland cottons (Adams 47, Hatch and State).

Breeding cotton for disease and insect resistance and for plant types suitable for mechanized harvesting (Research and Marketing 278 and State).

Breeding small grains for increased yield, strength of straw and disease resistance (Adams 293 and State).

Breeding long staple cotton (*Gossypium Barbadense*) for length, fineness and strength of fiber and improved type of plant with high production (Adams 294 and State).

Breeding sorghums for increased uniformity in the field and for improved agronomic characteristics and increased production of grain and forage (Bankhead-Jones 309 and State).

#### PLANT PATHOLOGY

Control of phymatotrichum (Cotton or Texas) root rot on irrigated lands (Adams 42 and State).

Control of dry root rot and other root diseases of citrus (Purnell 222 and State).

Development of wilt-resistant varieties of alfalfa (Adams 227, Hatch and State).

Verticillium wilt of cotton (Adams 256, Hatch and State).

Virus diseases of vegetable crops, including melons, in Arizona (Research and Marketing 286 and State).

The control of drop or watery brown rot (*Sclerotiniose*) in lettuce and other vegetables through the use of "Aero" calcium cyanamide (American Cyanamid Company).

The cause and control of cantaloupe crown blight (State).

Miscellaneous studies (State).

## POULTRY HUSBANDRY

Establishing a sixth character to be added to the present five-character system (Purnell 229C, Hatch and State).

Effect of inbreeding and hybrids upon egg production (Purnell 314 and State).

Correlation of chemical tests with present methods for determining quality of shell eggs (Hatch 315 and State).

Poultry feeding (Hormone) (State 90).

X-Ray treatment of eggs (State).

Arizona egg-laying test (State 53).

## II. PUBLICATIONS

## TECHNICAL BULLETINS

127. The Natural Vegetation of Arizona (Revision of TB 68), by A. A. Nichol.
128. Effect of Kind of Phosphate Fertilizer and Method of Placement on Phosphorus Absorption by Crops Grown on Arizona Calcareous Soil, by W. H. Fuller.

## GENERAL BULLETINS

243. Common Arizona Range Grasses — Their Description, Forage Value and Management, by R. R. Humphrey, A. L. Brown and A. C. Everson.
244. Forage Production on Arizona Ranges. III Mohave County, by R. R. Humphrey.
245. Arizona Agriculture 1953, by George W. Barr and R. E. Seltzer.
246. The Cost of Pumping Irrigation Water, Pinal County, 1951, by Rex D. Rehnberg.
247. Fertilization of Field Crops in Arizona, by W. T. McGeorge.
248. Barriers to the Interstate Movement of Agricultural Products By Motor Vehicle in the Eleven Western States, by J. S. Hillman and J. D. Rowell.

## REPORTS

110. A Summary of Administrative Rules and Regulations Relating to the Interstate Movement of Agricultural Products in the Eleven Western States, by J. S. Hillman and J. D. Rowell.
111. Summary of 1952 Experiments for the Control of Insects and Mites Affecting Crops in Yuma County, Arizona, by D. M. Tuttle, G. D. Butler, Jr. and L. A. Carruth.

## ANNUAL REPORT

Sixty-third Annual Report for Fiscal Year Ending  
June 30, 1952.

## OTHER PUBLICATIONS

Quarterly: Progressive Agriculture in Arizona — Vol. IV, No. 2, July, August, September, 1952; Vol. IV, No. 3, October, November, December, 1952; Vol. IV, No. 4, January, February, March, 1953; Vol. V, No. 1, April, May, June, 1953.



- Fifteenth Annual Report of Arizona Feed Control Office of Arizona.  
Fifteenth Annual Report of the Arizona Fertilizer Control Office —  
Fertilizers and Agricultural Minerals.
- Seventh Annual Report Economic Poisons Control.
- Monthly and Final Reports of Arizona Egg-Laying Test — July, 1952  
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- Semi-monthly Vegetable Research Newsletter, Arizona Agricultural  
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Chemical Control of Insects, by West, Hardy and Ford. *Bios* 24  
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Physiology, by Roeder (editor); Insect, Fungus and Weed  
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Cells As Measured by the Neubauer Technique. *Soil Science*.  
74:417. December 1952.

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- Harris, Karl: Cotton Irrigation. *Cotton Trade Journal*. 34:9. 1952.
- Hilgeman, R. H.: Observations Upon Date Culture in Israel. *Annual Report Date Growers' Institute*. Vol. 30. 1952.
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- Keener, Paul D.: A Species of *Gymnosporangium* on Quince, Pear, and Hawthorn in Arizona. *USDA Plant Disease Reporter* 37 (4): 235, April 15, 1953. illus.
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### III. STAFF

PHIL S. ECKERT.....	Director
RALPH S. HAWKINS.....	Vice-Director

#### AGRICULTURAL CHEMISTRY AND SOILS DEPARTMENT

WILLIAM T. McGEORGE.....	Agricultural Chemist
THEOPHIL F. BUEHRER.....	Physical Chemist
PAUL S. BURGESS.....	Associate Agricultural Chemist
WALLACE H. FULLER.....	Associate Biochemist
HOWARD V. SMITH.....	Associate Agricultural Chemist
JAMES L. ABBOTT.....	Assistant Agricultural Chemist
EDWARD L. BREAZEALE.....	Assistant Agricultural Chemist
GEORGE E. DRAPER.....	Assistant Agricultural Chemist

#### AGRICULTURAL ECONOMICS DEPARTMENT

*GEORGE W. BARR.....	Agricultural Economist
RAYMOND E. SELTZER.....	Acting Head of Department
JIMMYE S. HILLMAN.....	Assistant Agricultural Economist
JOHN D. ROWELL.....	Assistant Agricultural Economist
JAMES S. ST. CLAIR.....	Assistant Agricultural Economist
ANDREW VANVIC.....	Assistant Agricultural Economist

#### AGRICULTURAL ENGINEERING DEPARTMENT (Irrigation)

HAROLD C. SCHWALEN.....	Agricultural Engineer
GEORGE E. P. SMITH.....	Agricultural Engineer
KENNETH R. FROST.....	Assistant Agricultural Engineer
EMMETT R. HOLEKAMP.....	Assistant Agricultural Engineer
RICHARD J. SHAW.....	Assistant Agricultural Engineer

\*On Leave

## AGRONOMY DEPARTMENT

DEAN F. MCALISTER.....	Agronomist
†KARL HARRIS.....	Associate Irrigation Engineer (Phoenix)
LARUE C. CHAPMAN.....	Assistant Agronomist
*HOWARD P. CORDS.....	Assistant Agronomist
EVERETT H. EVERSON.....	Assistant Agronomist

## ANIMAL HUSBANDRY DEPARTMENT

ERNEST B. STANLEY.....	Animal Husbandman
BARTLEY P. CARDON.....	Associate Animal Husbandman
O. FLOYD PAHNISH.....	Assistant Animal Husbandman
CARL E. SAFLEY.....	Assistant Animal Husbandman

## ANIMAL PATHOLOGY DEPARTMENT

WILLIAM J. PISTOR.....	Animal Pathologist
BARTLEY P. CARDON.....	Associate Animal Pathologist
RAYMOND E. REED.....	Assistant Animal Pathologist

## BOTANY AND RANGE ECOLOGY DEPARTMENT

WALTER S. PHILLIPS.....	Botanist
JOHN J. THORNBER.....	Taxonomist
ROBERT R. HUMPHREY.....	Associate Range Ecologist
EDWIN B. KURTZ, JR.....	Assistant Botanist
KITTIE F. PARKER.....	Assistant Taxonomist
DAVID G. WILSON.....	Assistant Range Ecologist
FRED H. TSCHIRLEY.....	Research Assistant

## DAIRY HUSBANDRY DEPARTMENT

RICHARD N. DAVIS.....	Dairy Husbandman
F. GORDON HARLAND.....	Assistant Dairy Husbandman
JOHN W. STULL.....	Assistant Dairy Husbandman

## ENTOMOLOGY DEPARTMENT

LAURENCE A. CARRUTH.....	Entomologist
GEORGE D. BUTLER, JR.....	Assistant Entomologist
DONALD M. TUTTLE.....	Assistant Entomologist (Yuma)

## HOME ECONOMICS (School of)

B. ELEANOR JOHNSON.....	Director
ELIZABETH B. HURLEY.....	Research Assistant

## HORTICULTURE DEPARTMENT

LELAND BURKHART.....	Horticulturist
ROBERT E. FOSTER.....	Associate Horticulturist (Mesa)
ROBERT H. HILGEMAN.....	Associate Horticulturist (Tempe)
WEYMOUTH D. PEW.....	Associate Horticulturist (Mesa)
CLIFTON W. VAN HORN.....	Associate Horticulturist (Yuma)
STEVE FAZIO.....	Assistant Horticulturist
JOSEPH S. FOLKNER.....	Assistant Horticulturist
GEORGE C. SHARPLES.....	Assistant Horticulturist (Tempe)
JOSEPH K. STEWART.....	Assistant Horticulturist (Mesa)

## NUTRITION DEPARTMENT

ARTHUR R. KEMMERER.....	Nutrition Chemist
MITCHELL G. VAVICH.....	Associate Nutrition Chemist

\*On Leave

†In co-operation with U.S.D.A., Soil Conservation Service

‡EMILY C. BRODIE.....	Research Associate
‡ALICE B. STANFIELD.....	Research Associate
§WILLIAM F. MCCAUGHEY.....	Research Assistant
NICHOLAS RAICA, JR.....	Research Assistant

## PLANT BREEDING DEPARTMENT

WALKER E. BRYAN.....	Plant Breeder
ELIAS H. PRESSLEY.....	Plant Breeder
DONALD W. GEORGE.....	Assistant Plant Breeder
SMITH WORLEY, JR.....	Assistant Plant Breeder

## PLANT PATHOLOGY DEPARTMENT

RUBERT B. STREETS.....	Acting Head of Department
JAMES G. BROWN.....	Plant Pathologist
ROSS M. ALLEN.....	Assistant Plant Pathologist
ALICE M. BOYLE.....	Assistant Plant Pathologist
PAUL D. KEENER.....	Assistant Plant Pathologist
ROBERT B. MARLATT.....	Assistant Plant Pathologist (Mesa)

## POULTRY HUSBANDRY DEPARTMENT

HARRY EMBLETON.....	Poultry Husbandman
HUBERT B. HINDS.....	Associate Poultry Husbandman

## SUBSTATIONS

D. C. AEPPL.....	General Superintendent and Supt., Mesa
G. E. BELL.....	Foreman, Mesa
A. M. BLISS.....	Superintendent, Safford
L. R. COOPER.....	Foreman, Yuma, Mesa, Somerton
R. H. HILGEMAN.....	Superintendent, Salt River Valley Citrus Research
E. H. HUSSMANN.....	Superintendent, University Station, Tucson
C. W. VAN HORN.....	Superintendent, Yuma
F. W. RICHARDSON.....	Superintendent, University Poultry Station, Tucson
W. A. RISSETTER.....	Foreman, University Poultry Station, Tucson
C. O. STANBERRY.....	Superintendent, Yuma Mesa (in co-op. with U.S.D.A., Wellton-Mohawk Div., Gila Irrigation Project)

## APPOINTMENTS

JAMES L. ABBOTT.....	Assistant Agricultural Chemist
ROSS M. ALLEN.....	Assistant Plant Pathologist
PATRICIA M. DOHNER.....	Research Assistant
EVERETT H. EVERSON.....	Assistant Agronomist
JOSEPH S. FOLKNER.....	Assistant Horticulturist
ROBERT B. MARLATT.....	Assistant Plant Pathologist (Mesa)
NICHOLAS RAICA, JR.....	Research Assistant
RAYMOND E. REED.....	Assistant Animal Pathologist
FRED H. TSCHIRLEY.....	Research Assistant
ANDREW VANVIC.....	Assistant Agricultural Economist
DAVID G. WILSON.....	Assistant Range Ecologist

## RESIGNATIONS

DOUGLAS E. BEECROFT.....	Manager, Milk Processing
ALBERT L. BROWN.....	Assistant Range Ecologist
PATRICIA M. DOHNER.....	Research Assistant
B. ELEANOR JOHNSON.....	Head, School of Home Economics
A. MARK MCKINNEY.....	Assistant Animal Husbandman
REX D. REHNBERG.....	Assistant Agricultural Economist
W. M. WOOTTON.....	Assistant Superintendent (Yuma)

‡In co-operation with Southwestern Clinic

§In co-operation with American Dehydrators' Assn.

||Died June 8, 1953

IV. FINANCIAL STATEMENT, 1952-53, UNIVERSITY OF ARIZONA, AGRICULTURAL EXPERIMENT STATION

	Hatch	Adams	Purnell	Bankhead-Jones	Research & Marketing	Regional Research	Non-Federal Funds	Total
Received from the Treasurer of the U.S. ....	\$15,000.00	\$15,000.00	\$60,000.00	\$16,740.68	\$31,555.29	\$26,750.00		\$165,045.97
State Appropriations .....								
Main Station .....							\$239,199.30	239,199.30
Sub-Stations .....							127,081.46	127,081.46
Special Endowments .....							41,729.87	41,729.87
Sales .....							43,544.86	43,544.86
Total Receipts .....	\$15,000.00	\$15,000.00	\$60,000.00	\$16,740.68	\$31,555.29	\$26,750.00	\$451,555.49	\$616,601.46

RECEIPTS

DISBURSEMENTS

Personal Services.....	13,697.91	12,310.70	40,524.02	13,177.30	21,327.29	17,556.12	336,076.98	454,670.32
Travel .....	827.15	1,475.24	2,790.56	1,524.01	2,846.52	684.43	11,681.63	21,829.54
Transportation of Things .....		133.54	267.27	5.46	180.62	17.80	1,312.67	1,917.36
Communication Service .....	.82	44.64	211.59	327.00	182.50	41.15	3,204.81	4,012.51
Rents and Utility Service .....		45.36	17.50	18.00	12.00		1,136.72	1,229.58
Printing and Reproduction .....	60.62		1,777.16	24.95	616.19	1,121.00	7,963.88	11,563.80
Other Contractual Service .....		247.13	1,675.47	297.94	1,227.99	1,376.93	16,216.64	21,042.10
Supplies and Materials .....	1.50	472.39	8,941.92	1,020.59	2,262.11	2,326.75	44,118.02	59,143.28
Equipment .....	412.00	271.00	2,244.49	345.43	2,900.07	3,625.82	19,024.38	28,823.19
Land and Structures .....			1,550.02				7,444.42	8,994.44
Industrial Insurance .....							3,375.34	3,375.34
Total Disbursements .....	\$15,000.00	\$15,000.00	\$60,000.00	\$16,740.68	\$31,555.29	\$26,750.00	\$451,555.49	\$616,601.46