Station Editor's Copy

FALL 1958

Progressive Agriculture IN ARIZONA

PUBLISHED BY THE COLLEGE OF AGRICULTURE OF THE UNIVERSITY OF ARIZONA AT TUCSON

Expansion at Yuma

See Page 10-11-12

3 New Men to Help You

You'll see some new faces in the future, as you attend agricultural gatherings in which College of Agriculture personnel take part. Most of the old faces will still be around — but there will be several new ones.

Among these, we'd direct your attention particularly to the three new administrators whom your University's College of Agriculture acquired July 1. An article in this issue of *Progressive Agriculture* tells you something about the splendid background of these men — Directors Frevert, Pou and Metcalfe.

We feel that we have chosen well, that you folks out in the state will take to these new administrators as we have; that you will learn to like them and admire their energy and judgment and talents. For their part, these three are eager to get out and meet you, to learn about the State of Arizona and its agriculture, and to meet its wonderful people.

Bringing these three men to Arizona is part of a general effort to upgrade your University's College of Agriculture, strengthening our extension, teaching and research staffs with young men who have marked ability, excellent training, great vigor and sound judgment.

It is no disparagement of those older people, who have served our state's agriculture well as members of this staff, that we replace them as retirement nears with the best young men we can afford.

Agriculture in Arizona is more advanced in all its techniques than agriculture anywhere else in the world, and that advance is continuing. Such a progressive, efficient, technically skilled and wonderfully varied agriculture deserves the best possible backing from the state's College of Agriculture.

That is what we are trying to provide.

Harold E. Myers

Dean
College of Agriculture and
School of Home Economics

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In This Issue

Progressive Agriculture IN ARIZONA

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Editorial Board Members: Howard R. Baker, Extension Service; Mitchell G. Vavich, Experiment Station; Russell W. Cline, Resident Instruction; Mildred R. Jensen, School of Home Economics; Richard K. Frevert, chairman; Joe McClelland, ex-officio.

Arizona farmers, ranchmen and homemakers may have their names placed on the mailing list to receive **Progressive Agriculture** at no cost by sending a request to the College of Agriculture, University of Arizona, Tucson, Arizona.

New Bulletins

These new U of A publications are available at no cost to you from your local county agricultural agent.

REPORTS

170 — Marketing Barley and Grain Sorghum in Arizona

171 — History of the Arizona Dairy Industry

172 — Report on Lemon Maturity Studies — 1957

BULLETINS

298 — Arizona Range Grasses

299 — The Desert Grassland

FOLDERS

68 — Free Farm and Home Publications

75 — More for Your Cotton

Coming Events

Check this calendar with your calendar; plan to attend those events which interest you and where you will get information helpful in your farming business.

Oct. 2—Cotton Fiber Conference for Homemakers, University of Arizona's Cotton Research Center, near Phoenix.

Oct. 12-15—National Association of Agricultural Marketing Officials meeting, Scottsdale.

Oct. 15—Cotton Research Field Day, at Cotton Research Center.

Oct. 24—Dedication of New University of Arizona Dairy Research Center, Tucson.

Oct. 24—Annual Fall Field Day, Mesa Experiment Station, Mesa.

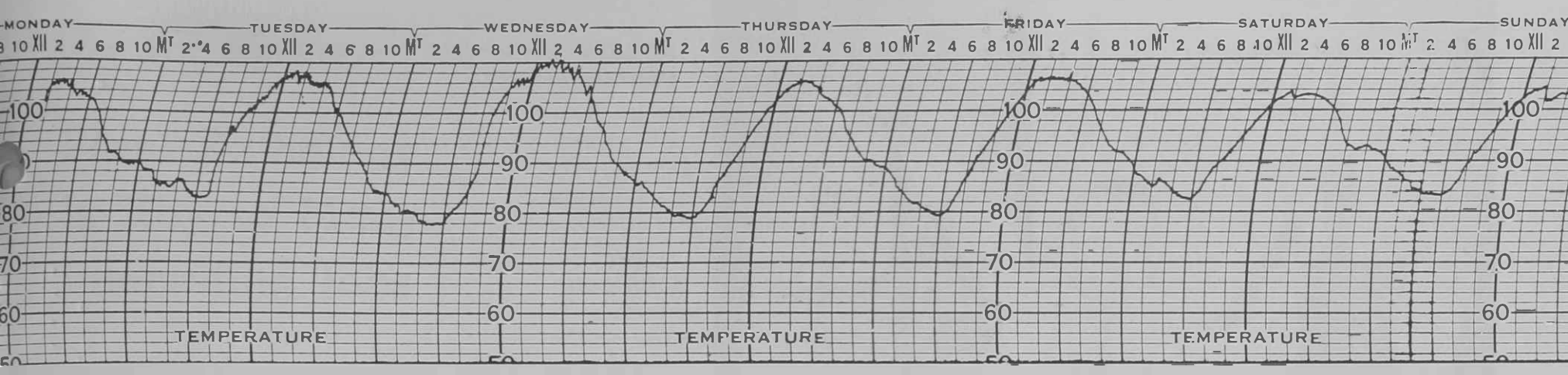
Oct. 30—Citrus Field Day, University of Arizona Citrus Field Station, near Phoenix.

Oct. 31-Nov. 11—Arizona State Fair, Phoenix.

Nov. 6-7—Western Growers' Association annual convention (for California and Arizona), Los Angeles.

Nov. 14—Yuma Fall Field Day, University of Arizona's Yuma Experiment Station, Yuma.

Dec. 9-10 — Arizona Nurserymen's Short Course, Chandler.



ABOVE — Recording machine record taken during these trials. Note that peak temperatures exceeded 100 degrees each day, and nighttime minimums seldom dropped far below 80 degrees.

Breeding Leghorn Hens That Lay When It's Hot

M. W. Pasvogel

Department of Poultry Science

AVERAGE EGG PRODUCTION PER HEN IN THESE TRIALS

	1954		1957	
	Annually	3 Summer Mos.	Annually	3 Summer Mos.
Line A (heavy)	187.1	34.3	207	46.1
Line B (heavy)	210.2	47.4	227.2	50.2
Line C (light)	190	35.8	217.6	41.3
Line D (light)	207.6	41.5	223.1	46.5

All domestic livestock is sensitive to the stress of extremes of temperature. None is more affected by extremes of heat than the laying hen. Traditionally in the southwestern states egg production has fallen below area needs during the heat of summer, requiring importation of eggs produced in another part of the country. This may result in lower quality products for the consumer.

During June, July and August the temperature in the Tucson area will reach or exceed 90° F. on about 90 of these 92 summer days and will reach or exceed 100° F. on approximately 40 days.

Both the human and animal population of this region are subjected to considerable heat stress during this period. The result is lowered productivity. This lowered productivity and efficiency may be offset by modifying the diet to overcome heat, modifying the environment by cooling the animal quarters, or modifying the animal by selecting parent stock which exhibits heat tolerance or heat adaptation.

Seek Summer Layers

In an attempt to establish a heat tolerant or heat adapted strain of Single Comb White Leghorns at the University of Arizona's Poultry Research Center, the basis for selection of birds has been total reproductive performance, with major emphasis on production during the summer.

Pick Heat-Tolerant Hens

Each year families representing the best heat tolerance as determined under natural conditions are selected as breeders and are distributed in equal numbers to the breeding pens. For this study the summer period extends from June 1 to August 31, a total of 92 days.

The heat tolerant offspring are housed in pens having a capacity of 50 hens each. These pens are all located in the same building and are situated so that all birds are subjected to identical environmental conditions. The outside walls of these pens are constructed of one inch wire netting, allowing for movement of air through the building. No other devices are employed to cool the hens or the house.

At present four strains have been established. Since body weight is an important consideration for animals living under semi-arid conditions, and is also an important factor in efficiency of egg production, considerable emphasis was placed on this characteristic. (As a general rule, light-bodied animals fare best in the desert heat.)

Two of the strains developed at the university are classed as large-bodied and two other strains are light-bodied. Average weight of birds in each lot was: Line A — 5 lb., 11 oz.; Line B — 5 lb., 2 oz.; Line C — 4 lb., 5 oz.; Line D — 4 lb., 8 oz. The table above shows how the original lots performed in comparison with their selected offspring four years later.

Over 15% Increase

Averaging the four lines, we find that summer egg production, during these four years of selective breeding, increased by 6.3 eggs per bird during the 92 days, or 15.8 per cent. We also judge from these results that body size apparently does not greatly affect the ability of hens to lay during hot weather or influence their tolerance to heat.

It is evident that the hens in these four lines have the ability to adapt to the high summer temperatures of the semi-arid regions of the southwestern part of the United States. It is possible to improve production and maintain good production by using selective breeding rather than the more expensive task of modifying or cooling the laying pens.

Future studies will delve into the physiology of heat-adapted hens, in comparison with birds less able to withstand high temperatures.

AT LEFT, left to right, Directors Frevert, Metcalfe and Pou.

Three New Directors Join College of Agriculture Staff

Harold Wylie
Assistant Station Editor

Three new directors for the University of Arizona College of Agriculture assumed administrative duties July 1. The three new directors are: Experiment Station — Dr. Richard K. Frevert, formerly assistant experiment station director and professor of agricultural engineering at Iowa State College; Resident Instruction — Dr. Darrel S. Metcalfe, formerly professor of agronomy and assistant director of student affairs at Iowa State; and Extension Service — Dr. J. W. Pou, former head of the department of animal industry at North Carolina State College.

As director of the Agricultural Experiment Station, Dr. Frevert succeeds Dr. Ralph S. Hawkins who reached the retirement age of 70 last spring. Dr. Metcalfe replaces Dr. T. F. Buehrer as director of resident instruction. Dr. Buehrer will remain with the College of Agriculture as professor of agricultural chemistry and soils and coordinator of the university's Point Four program with Iraq. Dr. Pou took over from Charles U. Pickrell as extension service director. Mr. Pickrell will continue on the College of Agriculture staff as member of the extension information office.

Coincident with these appointments, Dr. D. F. McAlister, head of the agronomy department, becomes assistant experiment station director, and Dr. W. D. Pew, horticulturist at the Mesa Experiment Station, is named superintendent there. Each adds his new assignment to existing duties.

Dr. Frevert

Dr. Frevert received his college degrees from Iowa State College and served as faculty member there for several years.

He is an author of texts in the field of soil and water conservation. An agricultural engineer, he has majors in both soil physics and soil and water conservation.

Dean Harold E. Myers of the College of Agriculture says, "Dr. Frevert's record as an agricultural scientist and author, and his experience at Iowa State College, indicate that he has the proven administrative ability needed as director of the UA Agricultural Experiment Station."

Dr. Frevert is married and father of a seven-year-old son. He is a member of several professional societies.

As experiment station director, Dr. Frevert will supervise all agricultural research activities of the University of Arizona, including research done on the University campus and on the University's several experimental farms throughout the state.

Dr. Metcalfe

Dr. Metcalfe, the new director of resident instruction for the College of Agriculture, is also from Iowa. He is a competent teacher and writer, having recently been invited to address the American Society of Agronomy on "Teaching as a Profession." At this annual national meeting Dr. Metcalfe received the society's achievement award in agronomic education. He is co-author of one of the leading college textbooks on farm crops.

Dr. Metcalfe graduated from River Falls State Teachers College in Wisconsin and taught grade school for five years. He then returned to college, and earned his Ph.D. in crop production and crop breeding at Iowa State.

At Ames Dr. Metcalfe served as president of Kiwanis, Community Chest director, and member of the Boy Scout committee, Interchurch Council and board of trustees of the Methodist church. He is married and father of two boys of school age.

Dr. Pou

Dr. Pou, the new Agricultural Extension Service director, comes from North Carolina State College, where he obtained his bachelor's degree in animal husbandry and held his most recent position. He received his master's from the University of Wisconsin, and his Ph.D. from Cornell University.

Dr. Pou's experience includes work as assistant county agricultural agent in North Carolina, the post of extension dairy specialist in both North Carolina and Maryland, research work as an animal scientist, and World War II service in the Pacific, achieving rank of major.

Dr. Pou is married and has a daughter and a son. In civic affairs he has been active in YMCA, Chamber of Commerce, and has been college Sunday school superintendent.

Dean Myers says, "Dr. Pou's excellent experience in coordinating extension, teaching and research programs in North Carolina provides an ideal background for service to Arizona agriculture as director of the university's Agricultural Extension Service."

One in a Series . . .

Plant Pathology Is Key to Many Interesting Jobs

R. B. Streets

Department of Plant Pathology

Although plant pathology is considered to be a highly specialized field, it offers a wide variety of opportunities suited to the interests, training and capabilities of the individual.

Universities, colleges and experiment stations offer interesting careers in three fields: research, teaching (in many instances the individual participates in both activities), and agricultural extension, either as specialists in plant pathology or as county agents.

U.S.D.A. Eager Employer

Another large employer of plant pathologists is Agricultural Research Service of the U. S. Department of Agriculture which needs specialists in diseases of the various crop plants such as cotton, corn, small grains, citrus, deciduous fruits, small fruits, potatoes, sweet potatoes, and other vegetables and also ornamental plants. While most of these are research positions, there are also opportunities in extension and a few in exploration in foreign countries.

Another government agency, the Forest Service, maintains laboratories for research on diseases of conifers and hardwoods, and on fungus deterioration of lumber, pulpwood and other wood products. Other branches of their work include pathology in relation to forest protection, and forest nurseries where seedling diseases are often a problem.

Border Plant Inspection

The U. S. Bureau of Plant Quarantine maintains a staff of trained pathologists at all ports of entry to inspect shipments into the United States in order to intercept any dangerous plant diseases or insects. These plant pathologists are of great value in preventing the introduction of diseases and pests which could cause great damage to crops in this country.

Foreign service under the Point Four and a number of other government programs offers well paid opportunities to serve in one or more of a great many foreign countries. As these positions are often in undeveloped areas, they are more attractive to the younger and more adventuresome scientists.

Closer to home, many states have departments of agriculture engaged largely in quarantine and regulatory work, providing many desirable positions for plant pathologists. Some departments also engage in service and extension work in plant pathology. In some states the counties also maintain county agricultural services, independent of the extension service.

Industrial Field Growing

Commercial companies are also making increased use of plant pathologists. Manufacturers are financing extensive research on the developing and testing of new fungicides. Their chemists develop a large number of compounds which the plant pathologists screen for fungicidal value. Promising compounds are put through an intensive testing of their effectiveness before they are put on the market.

Smelters and chemical plants which must dispose of large quantities of smoke, fumes or other waste, maintain departments which include plant pathologists who conduct research on the toxicity of the waste products, estimate damage to any crops injured and strive to maintain good public relations.

Large wholesale and retail businesses often maintain specialists for promotion, sales, and service for customers of their products, including fungicides and soil fumigants.

New Branch — Nematology

Nematology — the study of nematodes, the minute worm-like organisms attacking a multitude of plants — has been included in the field of plant pathology, although it is rapidly developing as a separate science. This highly specialized and interesting phase of plant pathology leads to employment in public service or with corporations. Many chemical companies are constantly striving for better soil fumigants to control nematodes. Here the plant pathologist utilizes his training in testing soil compounds.

Some scientists have established consultation services in plant pathology. While the number of these services is still small, some of them have been very successful.

BELOW — Playing doctor to sick plants is a career which can be very interesting and highly remunerative both in scientific accomplishment and in money.

DONATIONS FOR AGRICULTURAL EDUCATION AND RESEARCH

The generous contributions received this past year from various agencies in support of the work of the College of Agriculture are hereby gratefully acknowledged. *Harold E. Myers*

A.T. & S.F. Railway System $1,575.00
Railroad fares to National 4-H Congress

Abbott Laboratories 500.00
Research by Department of Horticulture

Allis-Chalmers Mfg. Co. 238.00
Trip to National 4-H Congress

American Cyanamid Company 500.00
Grant-in-aid (Entomology) continuation

American Cyanamid Company 225.00
250 lbs. Aurofac 10 (Poultry Sc.)

American Dairy Association 4,500.00
Grant-in-aid to study consumer preferences for milks fortified with nonfat solids

Arizona Association of Soil Conservation Districts .. 75.00
Research at the Snowflake Branch of the Plant Materials Center

Arizona Bankers Association 250.00
4-H program of Arizona

Arizona Cotton Planting Seed Dist. 2,500.00
Land leveling and cementing irrigation ditches at Cotton Research Center

Arizona Cotton Planting Seed Dist. 18,055.27
Pl. Breeding Dept., Agronomy & Entomology

Arizona Crop Hail Adjustment & Research Assn. 300.00
Research of effects of simulated hail damage on lettuce (Hort.)

Arizona Dairy Technology Society 250.00
Dairy Science scholarship

Arizona Dairymen's League 1,000.00
Research work in butterfat tests

Arizona Dairymen's League 2,500.00
Hay purchases for experiments to determine the value of different protein content for milk production

Arizona Dietetic Association 125.00
Scholarship (Home Economics)

Arizona Federation of Garden Clubs 150.00
Establish Horticulture scholarship

Arizona Fertilizers, Inc. 103.00
one-half ton Ammonium Nitrate and one-half ton Ammonium Phosphate

Arizona Highway Department 1,500.00
Research on roadside landscaping improvement

Arizona Home Economics Assn. 100.00
Scholarship (Home Economics)

Arizona Quarter Horse Breeders Assn. 100.00
Livestock Judging Team (An. Sci.)

Armour & Company 225.00
30 lbs. Cholesterol U.S.P. (Poul. Sci.)

Armour Laboratories ..... $ 150.00
9,000 units of oxytocin (Dairy Sci.)

Atomic Energy Commission 7,083.00
Renewal of grant for research project "The Synthesis of Fatty Acids in a Higher Plant" (Botany)

Atomic Energy Commission 6,000.00
Renewal "Relationship of Phosphorous in Soils to Plant Utilization and Maturity" (Agric. Chem. & Soils)

Babson Brothers Company 8,500.00
Six stall installation equipment with stainless steel wash vats and electrobrain

M. O. Best Memorial Foundation 2,000.00
Student Loan Fund

Boquillas Cattle Company 1,000.00
Animal Science Experimental program

J. G. Boswell Company 200.00
Fellowship fund for department of agronomy and range management

California Spray-Chemical Corp. 4,300.00
Grant-in-aid on nitric phosphate studies (Ag. Chem. & Soils)

California Spray-Chemical Corp. 1,000.00
Grant-in-aid for research on vegetable fertility studies (Hort.)

Charles Lathrop Pack Foresty Fund 5,200.00
Agronomy & Range Management

Chas. Pfizer & Co., Inc. 1,500.00
Grant-in-aid for research on Vitamin A and carotene in cattle

Coats & Clark, Inc. 238.00
Trip to National 4-H Congress

Cudahy Packing Company 420.00
Two trip awards to 4-H Congress

Farmers Investment Company 500.00
1 Ewing steam generator (used) (An. Sci.)

Foote Mineral Company 2,000.00
Research on the fungicidal properties of lithium compounds (Pl. Path.)

Ford Motor Company 238.00
Trip to National 4-H Congress

Herman Frasch Foundation 7,000.00
Grant-in-aid for project "Detoxication Mechanisms of Foreign Organic Chemicals in Insects"

General Mills, Inc. 238.00
Trip to National 4-H Congress

Hercules Powder Company $2,000.00
Grant-in-aid for research project involving use of insecticidal agents

Hercules Powder Company 238.00
Trip to National 4-H Congress

Hess & Clark, Inc. 3,500.00
Research on the effect of furazolidone on the reproductive performance of mature laying hens housed in cages and on the floor

Hoover Company 300.00
Items to be used by Home Ec. students

International Harvester Co. 238.00
Trip to National 4-H Congress

S. C. Johnson & Son, Inc. 75.00
Convertible floor polisher, and waxing, scrubbing and rug cleaning kits

J. W. Kieckhefer Foundation 100.00
For use of Livestock Judging Team

Lilly Research Laboratories 500.00
Support research in Horticulture

Mayrath, Inc. 185.00
One 27-foot Mayrath grain auger (An. Sci.)

Merck, Sharp & Dohme Research Lab. 356.20
Crystalline vitamins for use in purified diets

Monsanto Chemical Company 297.50
50 lbs. Clycine and
100 lbs. Methionine Hydroxy Analogue

Montgomery Ward 238.00
Trip to National 4-H Congress

National Cottonseed Products Assn., Inc. 1,500.00
Grant-in-aid for research project "Factors in Cottonseed Meal that Causes Pink Discoloration in Cold Storage Eggs" (Ag. Biochem.)

National Geographic Society 250.00
Work on pollen identification (Botany)

National Institutes of Health 4,272.00
Allergy & infectious disease research (An. Path.)

National Institutes of Health 12,715.00
Arthritis & Metabolic disease research (Ag. Biochem.)

National Institutes of Health 4,272.00
Coccidioidomycocis in animals research

National Science Foundation 1,900.00
Western North American Gentians research (Botany)

National Plant Food Institute 200.00
Undergraduate scholarship

Norge Sales Corporation 1,300.00
Items to be used by Home Mgmt. house

Norge Sales Corporation 800.00
18-cu. ft. freezer and 36-inch gas range (Home Ec.)

Olin Mathieson Chemical Corp. 1,500.00
Nitrogen and phosphate fertilizers research on range grasses

Oliver Corporation ..... $ 238.00
Trip to 4-H Congress

Phillips Petroleum Company 1,200.00
Vegetable research

Producers Gin Company 200.00
Fellowship fund for Department of Agronomy

Ralston Purina Company 500.00
Scholarship

Harold O. Reif 1,758.14
Two registered Angus heifers

Rocky Mt. Forest & Range Exp. Sta. 450.00
Shrub ring growth study in desert grasslands ($300)
Study of insects associated with mesquite in southern Arizona ($150)

Salt River Project 300.00
Sponsored one delegate to 4-H National Conference

Sears-Roebuck Foundation 476.00
Two trip awards to National 4-H Congress

Shell Chemical Corporation 1,000.00
Grant-in-aid for testing insecticides on cotton, alfalfa and vegetables

Shell Chemical Corporation 1,000.00
Grant-in-aid for insecticidal chemicals research

Simplicity Pattern Co., Inc. 238.00
Trip to National 4-H Congress

Soft Phosphate Research Institute, Inc. 200.00
Egg breaking equipment

Soft Phosphate Research Institute, Inc. 3,000.00
Research on phosphate's effect on reproductive performance and quality of eggs

Southwestern Clinic & Research Institute, Inc. 1,813.68
(Ag. Biochem.)

Southwestern Clinic & Research Institute, Inc. 2,000.00
Remodeling and operations in the Rheumatoid Arthritis project

Standard Oil Co. of California 1,500.00
4-H Club Scholarships

City of Tucson 4,000.00
Water Supply survey in Tucson area

Tucson Pilot Club 200.00
2 Scholarships (Home Ec.)

U.S. Department of Agriculture 4,000.00
Renewal of cooperative agreement (Cotton Research Center)

United States Steel Corporation 3,000.00
Soils research

Velsicol Chemical Corporation 500.00
Economic entomology research

Western Cotton Products Company 200.00
Fellowship fund for Department of Agronomy

Westinghouse Electric Company 238.00
Trip to National 4-H Congress

Whirpool-Seeger Corporation 238.00
Trip to National 4-H Congress

AT LEFT, combining an increase field of Gila safflower during the fall of 1958.

GILA, SAFFLOWER FOR SOUTHWEST, IS NOW AVAILABLE

David D. Rubis

Department of Agronomy

Donald S. Black

Crops Research Division, ARS, USDA

In September, 1958, the Arizona Agricultural Experiment Station, in cooperation with the U. S. Department of Agriculture, released Gila, a new safflower variety recommended for production in the irrigated areas of Arizona. Gila is the first variety to have high yielding ability and oil content combined with resistance to Phytophthora root rot. This accomplishment is a milestone in the development of safflower as a crop.

New Variety Needed

Safflower first made its debut in the irrigated Southwest on a production basis in 1950 and 1951 when many new crops were tried on land that was taken out of cotton because of acreage allotments. Although a number of varieties were tried, they all failed for one reason or another. The variety N10 failed because of its extreme susceptibility to Phytophthora root rot under irrigated conditions.

N10 is a variety with good agronomic characteristics and is still the principal variety grown in the United States today. Several thousand acres of N8 were grown in the Salt River Valley in 1951, but very poor production was obtained. The variety N8 is resistant to Phytophthora but is inherently poor in yielding ability and bushel weight.

In 1952 a safflower research project was established at the University of Arizona Experiment Station at Mesa, Arizona, as a cooperative project between the University of Arizona and the Agricultural Research Service, U.S.D.A. One of the primary objectives of the breeding program was to develop a new variety that could be grown under irrigation and was resistant to Phytophthora root rot.

Ten Years Normally Required

To produce a new variety of any crop by normal plant breeding methods generally takes a period of at least 10 years or more. Two parental lines or varieties are chosen to be crossed on the basis that either one or the other possesses the desired characteristics wanted in the new variety. After the next generation, which is the nonsegregating F_1, about four or five generations of selecting and selfing must take place until the progenies of an individual plant selection are pure for the desired characteristics.

Many thousands of plants are evaluated, and normally as much as 90% to 95% of each generation must be discarded. The method of selection is the real proof as to whether a new variety with superior qualities will result. The many pure line selections, resulting after four or five selfed generations, must be tested in yield tests for at least three years to determine their respective average performance under different environmental conditions. If the best line in the yield test is significantly superior to the best existing variety, seed of the line is increased during the following two years and released as foundation seed.

Gila Developed in Six Years

The cross from which Gila was developed was made in 1952 and only six years later seed of a new variety was available to Arizona seed growers. This tremendously rapid development of a new variety was made possible by the use of special breeding methods and techniques, use of special facilities, and the cooperative efforts of a number of plant scientists.

The original cross was made to combine the good agronomic characteristics of N10 with Phytophthora root rot resistance of W.O.14. Three different breeding methods were used simultaneously: (1) Straight selfing and selecting; (2) Backcrossing to the N10 parent once and then selfing and selecting; (3) Straight backcrossing of selected plants to N10 every generation. Many thousands of plants were grown and evaluated with severe selection taking place every generation.

Gila was a selection from N10 x W.O. 14 backcrossed to N10 once and selfed four generations. The original cross, the backcross to N10 and the first two selfed generations, were made by Dr. C. A. Thomas and Dr. L. M. Pultz in USDA greenhouses at Beltsville, Maryland. The early segregating generations were inoculated with the Phytophthora fungus so that a severe test was made as to resistance to root rot. The first four generations were raised in the greenhouse in two years.

Plantings at Mesa in 1954-55

Many greenhouse selections from Beltsville were planted at the Mesa Experiment Station during the 1954-55 crop season. In the 1955-56 season progenies from individual plant selections were tested in an artificially-inoculated Phytophthora root rot nursery, were tested in replicated yield tests, and were evaluated for other characteristics in a space-planted nursery. Selections were made for root rot resistance, high yielding ability, high oil content, earliness, high bushel weight, and uniformity of plant type.

The most promising selections were tested for yield in the 1956-57 and 1957-58 crop seasons at University of Arizona Experiment Stations at four locations — Yuma-Valley, Yuma-Mesa, Mesa, and Safford. The selection which was named Gila ranked among the highest in performance for every year at all locations.

In the summer of 1958 two of the selections which looked the most promising were planted in a shade house for seed increase. About 300 seeds of each were increased 30-fold and planted in one-tenth acre isolation blocks during the 1956-57 season. This increased the seed to over 200 pounds for each line. The seed was used for regional yield tests and for planting an 8-acre field in the 1957-58 season.

Although the original objective was to develop a variety comparable to N10 that had Phytophthora root rot resistance, Gila surpasses this goal. Gila is superior to N10 in both yielding ability and oil content and is similar to N10 in bushel weight, maturity, and height. The big advantage, of course, is its high resistance to the Phytophthora root rot found in Arizona. Other tests have shown Gila to have a lower hull percent, higher protein content, and higher iodine number than N10. These characteristics should all be advantageous for commercial utilization.

VARIOUS LINES and varieties of safflower were tested severely in the Phytophthora root rot nursery, as pictured here. The two light-colored rows were susceptible and were killed by the root rot. Those which survived the root rot tests were evaluated for other characteristics of resistance, yield and quality in the severe "elimination tests" from which Gila was developed.

Gamble Pays Off

These two lines were increased on a gamble that if one of them was the best line and good enough to release, time would be saved in increasing the seed to make it available for Arizona farmers. The gamble paid off and the superior line became the Gila variety. Time was saved and so seed is available at least two years ahead of schedule.

Source of Seed

A limited amount of foundation seed is available for planting in the fall of 1958. Application for foundation seed for 1959 should be made by October 1. Persons interested in growing safflower should contact their county agent's office for further information.

A new UA Experiment Station bulletin describing Gila safflower in more detail will soon be available, also at your county agent's office.

Manpower and Acreage Grow To Meet Community's Needs

Frank Pritchard

Yuma Experiment Stations

OUR COVER PICTURE was taken at the Yuma Valley Station, during construction of the new laboratory-office quarters where U. S. Department of Agriculture research scientists and those from the University of Arizona work side by side in serving the expanding agriculture of the Yuma area.

Since 1953 a phenomenal growth has taken place in the physical facilities and resident staff of the Yuma Substations of the University of Arizona Agricultural Experiment Station system. These Yuma facilities have grown from 125 acres under cultivation and a staff of two research persons in 1953 to 340 acres in cultivation and a staff of 16 research people in 1958. This expansion has kept pace with the expanded agricultural acreage in Yuma County, and the problems that arise in a large agricultural area.

In 1953 the Yuma Station facilities consisted of 65 net acres on the "Old" Yuma Valley Farm that had limited research use due to a high water table, and 60 acres being cropped of a 240 acre Yuma Mesa Station, 50 acres of which were planted to citrus. At that time the staff consisted of one horticulturist shouldering the responsibility of all citrus and vegetable research and one entomologist attempting to keep up with insect research on all crops grown in the area. The Yuma branch now boasts of 6400 square feet of new office-laboratory space being utilized by a staff of 16 professional research personnel.

Area Farmers Keenly Interested

This rapid expansion in research facilities and staff can be attributed mainly to a strong interest in agricultural research by farmers of the Yuma area and a University administration that was quick to recognize need for additional research facilities. In March 1954, the "old" Valley Farm was sold and in its place a new 160 acre farm purchased in upper Yuma Valley. In October 1954, farmers in Yuma County led by the Yuma County Agricultural Research Council, brought 46 land leveling rigs to the new station and in two days completely leveled the east 80 acres of the new farm. This made it possible for the university to plant that part of the farm to alfalfa and prepare the land for research at least one year sooner than could have been done without that help.

The year 1954 also marked the beginning of an extensive animal research program. In the fall, 100 head of bred Rambouillet ewes were obtained, the start of a farm flock sheep breeding program. In addition to the sheep, 45 head of yearling steers were purchased and a feeding experiment started. To provide feed and facilities for this livestock program, 120 acres of the Yuma Mesa Station were leveled and planted to alfalfa. Cattle feed pens were constructed adjacent to the feed area for both pen feeding and pasture research.

Legislature Gives Funds

The State Legislature appropriated funds in 1955, 1956, 1957 and 1958 for physical improvements on both the Yuma Valley and Yuma Mesa Stations. The new buildings and facilities are:

1. **An office - laboratory building completed in May 1956, containing seven offices, an entomology laboratory, a plant pathology laboratory and a horticulture laboratory on the new Yuma Valley Farm.**
2. **A superintendent's residence on the new Yuma Valley Farm.**
3. **A machine shop and storage building on the Yuma Valley Station and another on the Yuma Mesa Station.**
4. **An office- laboratory addition, completed May 1958, on the Yuma Valley Station. It contains six offices, a soils laboratory, plant laboratory, three storage rooms and a research library.**
5. **From 1955 through 1958, the remaining earth ditch irrigation system, totaling more than four miles, was converted to concrete-lined ditches.**
6. **Now under construction is an office - laboratory building on the Yuma Mesa Station which will be utilized by the departments of horticulture, plant pathology and animal science.**
7. **Both the Yuma Valley and Yuma Mesa Station were completely fenced.**

Good Federal-State Cooperation

A united front on agricultural research is now presented in the Yuma area. Development of facilities at the Yuma stations has made possible close cooperation between University of Arizona and U. S. Department of Agriculture research agencies. With completion of the new office-laboratory facilities on the Yuma Valley Station came a USDA entomologist to work on the spotted alfalfa aphid and the USDA soil and crop laboratory was moved from Vincent Air Force Base to the new facilities on the University farm, bringing an outstanding research group to work beside the state personnel.

At present the Yuma Station professional staff consists of two entomologists, three plant pathologists, two soil scientists, an agricultural engineer, three horticulturists, three agronomists, an animal science staff man, and a station superintendent.

With the fine new facilities, plus adequate good land for research plots and a capable and growing research staff, the Yuma Experiment Stations of the University of Arizona College of Agriculture, cooperating with the USDA Agricultural Research Service, will meet this important area's agricultural problems more effectively than ever before.

AT RIGHT is a picture taken in the new laboratory at the Yuma Valley Station. Stanley Mitchell, at left, a USDA laboratory chemist, is shown working on a soil analysis with Dr. Henry Schreiber, USDA, in charge of the Yuma Station's USDA soils work.

nding at Yuma

Many Citrus Problems Get Aid of Science

Leland Burkhart
Horticulture Department

R. B. Streets
Plant Pathology Department

Citrus expansion on the Yuma Mesa is proceeding rapidly. Half of the present acreage is in lemons and the remainder in oranges, grapefruit, tangerines, limes, and tangelos. New plantings are chiefly Valencia oranges.

Young Lemon Orchards

Most of the lemon acreage in the area is made up of young trees. Experiments are currently in progress at the University's Yuma Mesa Experiment Station involving young bearing lemon trees using different rates of nitrogen applications, phosphate and manure. Pruning has reduced lemon yields; however, picking and cultivation will be increasingly difficult in the unpruned blocks. A recently started young lemon planting, established in cooperation with the University's Agricultural Engineering Department, will test irrigation differentials, mulching, and different tree spacings.

Plots of young bearing Valencia orange trees were treated with, respectively, four levels (one, two, three, and four pounds) of nitrogen per tree per year. Last year yields from trees receiving two pounds were definitely greater than from those trees receiving one pound. Higher rates did not give greater yields. Irrigation differentials have recently been initiated.

Older Grapefruit Orchards

Older grapefruit orchards on the Yuma Mesa (30 to 40 years of age) have been showing evidence of decreasing yields and smaller size fruits. Research was started on fertilization of mature (trees 30 years old) grapefruit trees in early 1957. Treatments include three levels of nitrogen, phosphate, manure applications and combinations of all three fertilizers. Differentials in timing of applications are also being tested. Hedging of mature grapefruit trees (30 years old) was done in the spring of 1955. Some were hedged on two sides and others on all four sides.

Citrus nematode control treatments in older grapefruit orchards are being made in cooperation with USDA nematologists. A practical and effective control of the nematode, using a chemical applied in the irrigation water, has been devised. Studies will continue to refine and perfect methods of application to groves of various ages.

Control of citrus dry root rot and other rots has been under study at Yuma and in the Salt River Valley for a number of years and will continue. Recently the project was broadened to include virus diseases. With USDA cooperation, surveys and identifications of virus diseases have been made.

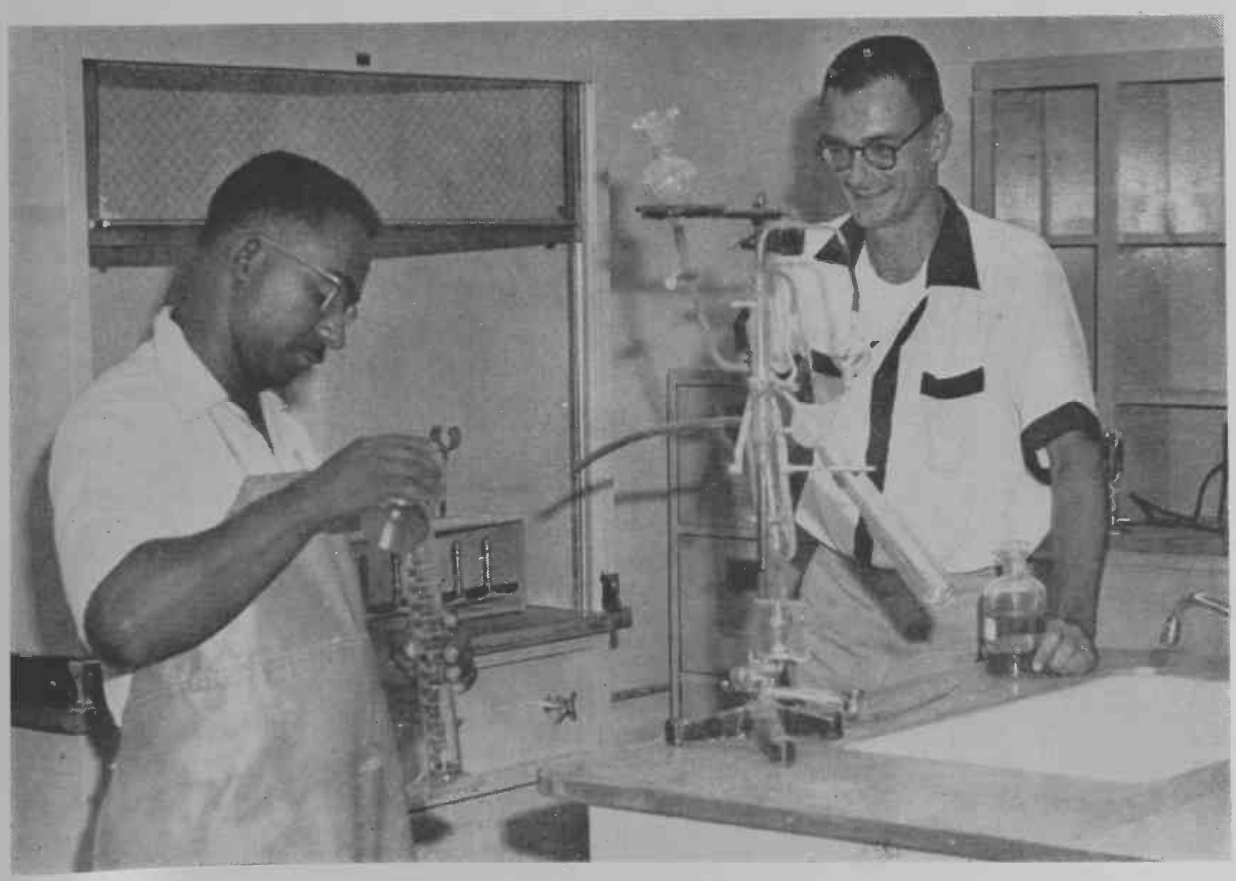
New Strains of Budwood

Superior strains and varieties of budwood, free from the Tristeza virus, have been introduced into Arizona under quarantine regulations through our budwood improvement program. The first distribution of budwood under this program was made in 1957. A rootstock testing program has been started, utilizing new strains of budwood.

An annual survey of some 3,500 citrus trees on the Yuma Mesa was begun in 1950 to determine the relative prevalence and severity of citrus diseases in the older plantings. A disease characterized by a copious exudation of gum at intervals from areas of necrotic wood deep in the trunk and branches was found in some older groves. Preliminary studies have been made and a thorough investigation of this disease as a factor in the decline of older grapefruit trees is planned.

A severe attack of brown rot gummosis on a year-old 10-acre block of young Valencias and on rough lemon shows the importance of developing a dependable control method for this disease in the field, since most of the new Yuma Mesa plantings are on the susceptible rough lemon rootstock.

In addition to the beneficial effects of cross pollination, we have learned that trunk girdling has recently increased fruit set on Algerian tangerines.



TURN TO next page to see views of current citrus research work now in progress at the Yuma Stations.

Citrus Work at Yuma Station

New and improved nucellar citrus budwood selection is being made by Dr. Ross Rodney, left, associate horticulturist, and Tom Hales, right, new research assistant, both of the University's Yuma Experiment Station staff.

THESE PICTURES were taken by Lewis Robison, able editor-cameraman of The Yuma County Farmer.

Newly-budded grapefruit trees for stubborn disease experiment are being inspected by Dr. Ross Allen, assistant plant pathologist, and James Alexander, new research assistant of the University of Arizona staff headquartered at Yuma.

Citrus Pests In Arizona Are Few But Need Control

Paul D. Gerhardt

Department of Entomology

In Arizona there are relatively few insect pests of citrus compared to the number found in other citrus growing areas of the United States. Although few in number, the insects we do have can cause considerable damage if not controlled.

The more important pests found on citrus in Arizona are the citrus thrips, *Scirtothrips citri* Moult., cottony-cushion scale, *Icerya purchasi* Mask., soft scale, *Coccus Hesperidium* Linn., citrus flat mite, *Brevipalpus lewisi* (McG.), and the Yuma mite, *Eotetranychus yumensis* (McG.). Other pests are occasionally present but seldom require insecticide treatments. These include the green peach aphid, *Myzus persicae* (Sulz.), the black citrus aphid, *Toxoptera aurantii* (Fonsc.), and leafhoppers, *Empoasca* sp.

Border Inspection Helps

The efforts of the border quarantine inspection stations have made it possible to keep some of the more destructive scale insects such as the California red scale, yellow scale, and black scale from entering and becoming established in Arizona. Small infestations of these pests have occasionally been found in Arizona but prompt control measures have destroyed them.

Among the useful insects found on citrus in Arizona are the lady beetle, known as the vedalia, *Rodolia cardinalis* (Muls.), (which feeds on the cottony-cushion scale), the common convergent lady beetle, and the delicate looking green lacewing, *Chrysopa californica* whose larvae feed on aphids and mites. Not seen very readily are the small hymenopterous parasites which also help to control scale insects.

Citrus Thrips

The principal damage is caused by the young (larvae) and adults feeding on the very small fruit. They are most abundant in the blooming period, during the first part of April. A small build-up occurs in July and a larger one in September. Thrips also injure tender young foliage, causing the leaves to become curled and distorted.

Insecticides should be applied when approximately three-fourths of the bloom has fallen. Applications of Dieldrin, DDT, Tartar emetic plus sugar or Sabadilla (Thriptox) will give control.

At the University of Arizona Citrus Station tests are being conducted with promising new insecticides which cannot yet be generally recommended for thrips control. Tests are also under way with the commonly used insecticides to determine if resistance is being developed by the thrips when repeated doses of the same insecticide are applied. Insecticide formulations, timing and methods of application are also being evaluated.

Cottony-cushion Scale

This insect is most noticeable by the presence of the white cottony adult females. Most of the damage is caused by the young scales, which are more inconspicuous but may kill large branches by their sap feeding. In addition, the cottony-cushion scales produce a secretion known as "honey dew." This material drips onto the leaves and fruit, favoring the development of a sooty mold fungus which often soils the fruit.

The vedalia beetle, when present in sufficient numbers, as in 1957, is effective in controlling the cottony-cushion scale. During 1956, however, there were fairly high populations of cottony-cushion scales in some groves which were not cleaned up by vedalia beetles.

Parathion, Malathion and Diazinon sprays have been tested for cottony-cushion scale controls. Diazinon and Parathion have given good control while Malathion was less effective. Because of the hazardous nature of Parathion it should not be used unless the infestation is extremely severe.

The above materials were applied as ground sprays to large grapefruit trees at not less than 10 gallons of spray mixture per tree.

Effects of Malathion residues on adult vedalia beetles have recently been investigated. All beetles exposed for four hours on treated leaf surfaces three days after application of the insecticide were killed. Sixty per cent were killed in similar exposures seven days after application. No beetles were killed 14 days after application.

Flat Mites

These mites usually cause damage to tangerines by feeding on the young green fruit. On ripe fruit severe injury appears as leathery brown patches where the surface cells have been killed. Severely attacked young fruit has a silvery gray appearance. Adult flat mites and eggs are found more heavily around the stem end of the fruit. Infestations may also be found generally on the fruit surface and along the mid ribs of the leaves.

Flat mites are not restricted to tangerines but build up more readily on them.

Control early in the spring can be obtained by dusting with sulfur or by using wettable sulfur in a spray. Recent investigations in Arizona with several of the newer miticides indicated that Chlorobenzilate at the rate of one pound of 25% wettable powder per 100 gallons of water was effective when applied with ground spray equipment. Kelthane, at the rate of one-half pound of 25% wettable powder per 100 gallons of water, was also effective.

Soft Scale

At present no sprays have been required to keep this insect under control. Usually, small hymenopterous parasites control this pest. Insecticides applied for control of other citrus insects also have some effect on soft scales.

New Home Economics Building

'Growing Room' Planned For Teaching, Research

Ruth C. Hall

School of Home Economics

Faculty members of the School of Home Economics at the University of Arizona are anxiously hovering over plans for the new building which they will occupy in September, 1959. Such a building has been needed for a long time and it is about to become a reality. Bids have been let for the building and construction will start soon. When the building is completed, home economics in Arizona will have "growing room" to move ahead into an expanded research and teaching program.

The ground floor of the new building will house laboratories in clothing, home furnishings and housing research. The building will be almost square and in the center, on the ground floor, there will be an outside patio with facilities for teaching patio cookery. Since the patio will be an informal area for outside living, large groups such as FHA, 4-H, homemakers groups, and teachers will find it a useful meeting place. Classes in family life probably will use the patio, too.

Plan Attractive Offices

On the second floor there will be offices for the administration of home economics and ten faculty offices. Some of the faculty offices will be around the patio, so that a view of the patio will be open to faculty members and their visitors.

Also on the second floor will be a large classroom for about 150 students and a smaller general classroom for approximately 60 students. A large area for related art, a laboratory for home economics education and child development, a reading room and another classroom for 30 students are provided on this floor.

Of unusual interest on the second floor is a bridge which will lead from the main entrance to the east and west wings of the building. This bridge will be immediately above the patio, providing a pleasant view of it.

Planned For Varied Use

Another attractive feature of the second floor will be a large seminar and living area divided by a folding door. When the seminar room is in use the folding door can remain closed. But when large groups are visiting the home economics building, the door can be opened to accommodate from 100 to 200 people. At the east end of the living area is a small kitchen which will be used to serve food to the large groups. The Home Economics Club and Alpha Omicron, the home economics honorary sorority, will put the living area to good use.

Much of the work in home economics research will be done in facilities on the third floor. Research laboratories for nutrition, metabolic work, food and textiles are included.

Large Foods Laboratories

Two large food laboratories are on the third floor. A raised food demonstration area is provided here as well as a dining room which will be used for classes in meal management and service. A laboratory for experimental foods also is on the third floor.

The household equipment laboratory will house large equipment like ranges, refrigerators, and freezers. Small electrical appliances, cutlery, pots and pans, and other small equipment will be used there. Besides instruction in household equipment, classes in housing, consumer buying, family economics and home management will be taught in the household equipment laboratory on the third floor.

A classroom for advanced textile work, another general classroom and six more faculty offices complete the third floor room arrangement.

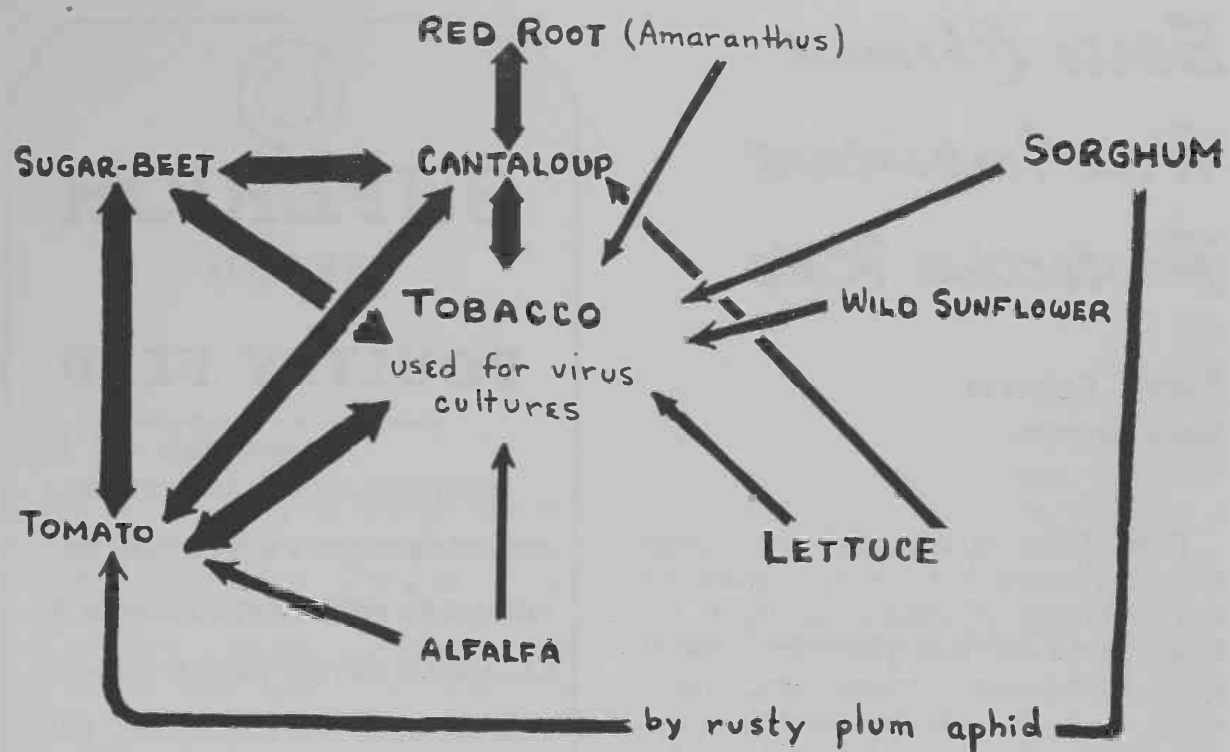
Such facilities as these for both research and instruction will make it possible for the staff of the School of Home Economics to offer the best possible work in this field.

CMV

Spells Headache For Plant Grower

Paul D. Keener

Department of Plant Pathology



Proper placement of crop fields in relation to one another, year after year, can be highly significant in controlling virus diseases. Viruses attack all sorts of plants including vegetable, field and forage crops as well as ornamental plants and weeds.

CMV is Widespread

Cucumber mosaic virus (hereafter referred to as CMV) can infect over 200 species of plants in many different families. Using CMV as an example, it is certain that many kinds of this virus exist which attack different crops with variable damage.

Sometimes CMV is so slight in a plant that evidence of attack is not observable, yet the final damage may be great. In order to detect the less evident kinds of CMV, investigators resort to varieties of tobacco. Viruses appear to become more concentrated in tobacco.

The accompanying diagram illustrates some of the most important relationships among strains of CMV attacking some of the most desirable crop plants. The possible relationships to weeds and other plants are shown. Successful inoculations (indicated by direction of the arrows) were made in the virus greenhouses on the campus of the University of Arizona, Tucson. Possible other combinations exist but only those which could be demonstrated experimentally on "guinea pig" or indicator plants are shown.

Two Viruses Affect Lettuce

The first evidence that lettuce (Great Lakes strain) can be naturally infected by CMV was obtained recently in tests on *Chenopodium amaranticolor* which is a "guinea pig" or indicator plant for CMV. Since CMV could be seed-borne, the problem in lettuce seed viruses becomes acute. About four to eight per cent of lettuce seed is usually infected with still another virus — lettuce mosaic.

Only recently was a virus recovered from watermelon fruits which causes veins in cantaloup leaves to become intensely yellow, then bronze-brown color. Symptoms appear in the older leaves. Many leaves, after the initial symptoms, sector much in the same manner as do cantaloups infected with so-called crown blight.

In tomato CMV causes typical "narrow leaf" (actually leaflets). The fruits become greatly distorted and lose their appeal to the housewife.

What About Ornamentals?

Many ornamental plants such as petunia may be attacked by CMV and thus serve as reservoirs for further spreads. Therefore careful planning must be observed when the ranch house yard is being landscaped.

Many weeds become infected by CMV. Wild sunflower (*Helianthus annua*), red-root (*Amaranthus retroflexus*) and ground-cherry (*Physalis* sp.) appear to be the most troublesome to the Arizona grower, particularly to the melon industry. Honeydews infected with mosaic viruses are usually near red-root plants showing symptoms of CMV.

Keep Susceptible Crops Apart

CMV has been recovered experimentally from many crop plants, ornamentals and weeds. Avoid close plantings of fields devoted to crops mutually susceptible to CMV. Examples of poor risks are tomatoes close to lettuce, cantaloups close to tomatoes or lettuce, cantaloups and other melons as well as tomatoes close to sugar beets. Avoid as many susceptible weeds as possible.

Above all, select ornamental plants for the ranch house yard with the idea of avoiding CMV-susceptible species, such as petunias and many others.

BELOW, reaction of Chenopodium amaranticolor to a strain of CMV recovered from Great Lakes variety of lettuce in an Arizona field.

State Chemist Has Important Protective Role

Floyd Roberts
State Chemist

One of the endeavors of the University of Arizona is to provide protection for consumers of commercial feeds, fertilizer materials, and pesticides (insecticides, fungicides, rodenticides, herbicides, etc.) through the enforcement of the Arizona Commercial Feed Law, Arizona Fertilizer Materials Act, and Arizona Pesticide Act, respectively.

These laws place responsibility for their enforcement and provide for a state chemist to administer them. The office of the state chemist, including laboratories, is located at the University of Arizona's Mesa Experiment Station.

Honest Labeling Important

Protection is afforded consumers by provisions in the laws requiring that certain specified information be printed on the labels to indicate composition of the materials, suitable directions for use, precautions regarding usage and handling, and other pertinent information. In general, the consumer is given a means to evaluate the nature and quality of the feed, fertilizer or pesticide which he purchases.

These laws are also intended to assure, in so far as possible, that the materials are as represented. While these laws are primarily for consumer protection, manufacturers and distributors are protected against unfair competition from unscrupulous operators who would pervade their industry.

Materials Must Be Registered

To control the manufacturer or distributor of feeds, fertilizer materials, and pesticides several provisions are applicable. It is required that these materials shall, first, be registered with the state chemist before offering them for sale in Arizona. Certificates of registration are not issued until it is determined that the proposed labels contain required information and that no false or misleading statements are made. Anyone violating provisions of these laws is guilty of a misdemeanor and punishable by a fine.

In the case of fertilizers found deficient in plant food, an added feature is the requirement that the manufacturer be assessed a penalty amounting to three times the value of the deficiency, payable to the consumer of the lot sampled. Action can be taken directly against any materials found on the market in any manner violating the law, through issuance of "stop sale" orders or through seizure to prevent further sale or distribution until appropriate corrections are made.

By far the greatest amount of effort in enforcing these consumer laws is applied in checking the feeds, fertilizer materials, and pesticides for compliance with respect to components. Inspectors from the office of state chemist go about the state the year around obtaining representative samples of these products.

The majority of stocks sampled are located at the point of delivery on the consumer's premises or, in the case of pesticides, at air strips where they have been delivered for application. The samples are turned in to the state chemist's office where they are analyzed by the staff chemists, in laboratories equipped specifically for this phase of enforcement.

Financed Through Fees

Enforcement costs are supported by the industries controlled through registration fees and inspection fees. Fees are charged for the registration of fertilizer materials and of pesticides. Inspection fees are collected on commercial feeds and on commercial fertilizers and agricultural minerals. The latter fees are based upon the tons of materials sold and are payable at the end of each quarter of the year, accompanied by required statements of tonnage sold during the quarter.

Approving labels involves determining that all required information has been provided. Under all three laws labels must bear the name and address of the manufacturer or person responsible for placing the material on the market, brand and name of the article and net weight or measure of the contents of each package.

On feeds there must also be shown the per cent of crude protein, crude fat, and crude fiber as well as a listing of all feed ingredients used in the finished feed. Mineral feeds and feeds containing drugs or antibiotics require additional considerations.

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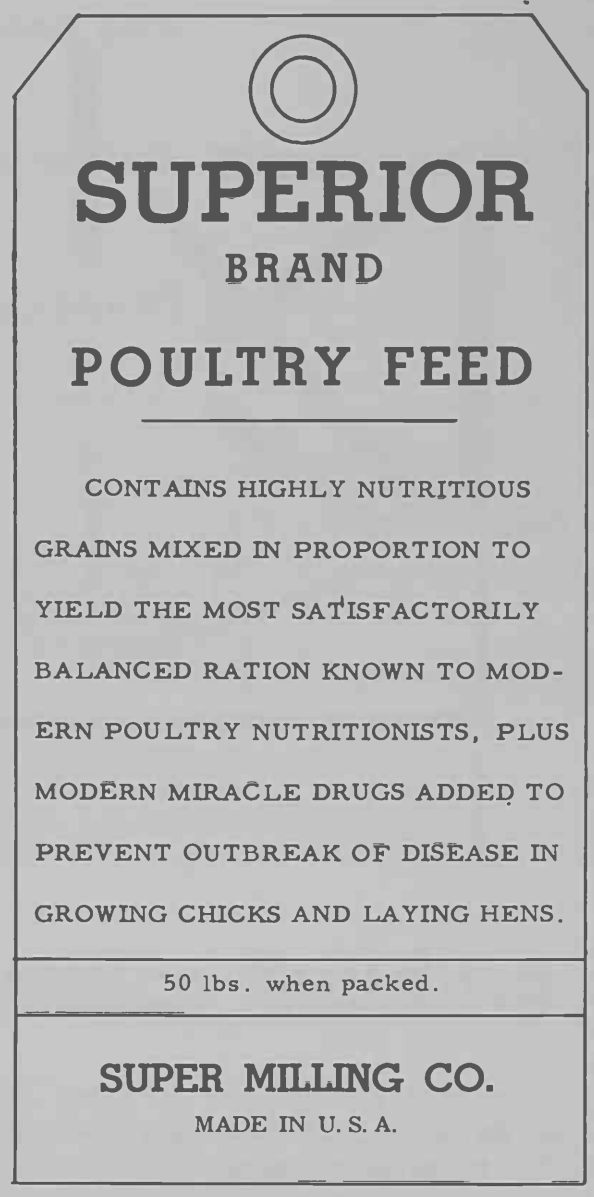
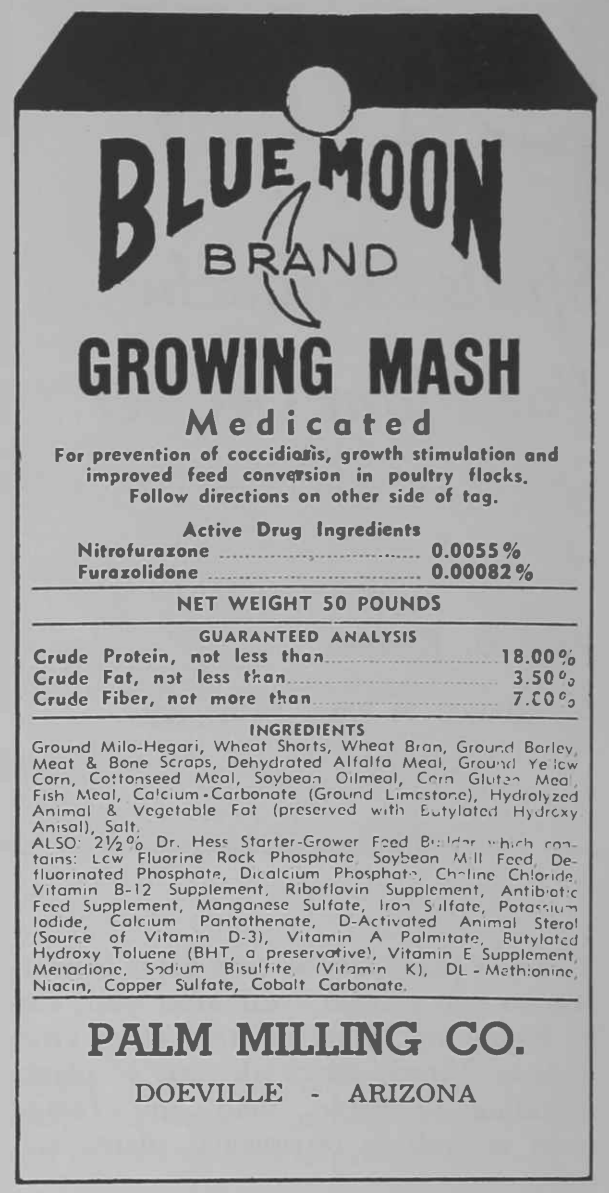


NOT ACCEPTABLE. This label, with vague generalities, might be in use were it not for the Arizona Commercial Feed Law. Actually, such a label as this tells the buyer nothing.



ACCEPTABLE LABEL, giving all information required by law. Consumers can evaluate to fair degree the nature and quality of this feed and can reasonably rely upon representations made.

Test Sprinkler Irrigation of Young Lemons

K. R. Frost
Department of Agricultural Engineering

Ross Rodney
Department of Horticulture

A sprinkler irrigation project on young lemon trees was started in March, 1958, on the Yuma Mesa Citrus Experimental Station by the Horticulture and Agricultural Engineering Departments of the University of Arizona. Irrigation studies are the primary objectives in the experiment although horticultural investigations are planned for the area. Tree plantings were made at regular spacing and in hedgerows to compare tree spacing influence on cultural practices, crop yields and irrigation applications.

Permanent underground lines are being used to reduce labor requirements for the sprinkler plots to a minimum. Sprinkler laterals are 300 feet long comprising two plots of one row, 150 feet in length, one each of regular and hedgerow plantings. A sprinkler head is located 18 inches from each tree and sprinkles a circle 10 feet in diameter.

Can Be Adjusted

The sprinkler nozzles will be modified to cover the complete ground surface as the trees grow larger. One and one-half inch laterals were installed to serve one row of trees, sufficient for larger sprinklers to be used later. The laterals installed could easily serve five rows by the use of six 100 foot hose-lines as used in commercial installations. Sprinkler irrigation plots are served by four laterals making a total of four hedgerow and four regular planting plots. Laterals are supplied water by a 3-inch main line. Rows are spaced 23 feet apart, trees in hedgerow 11 feet and regular spaced trees at 22 feet.

While the trees are young, irrigation applications will be made weekly. Four inches of water is now being applied to the flooded plots on the area indicated above. Sprinkler applications of three inches weekly cover less area for the regular planting than the flooded plots and are about equal to the flooded area for the hedgerow planting. Applications will be changed as indicated by soil-moisture studies and crop requirements.

Two of the installed laterals are flexible polyethylene and two are semi-rigid Kralastic. The cost of the materials was about the same, though cementing the connections for the latter was much faster than assembling the flexible lines with clamps and screws necessary for this type of material. All risers were threaded 3/4-inch polyethylene pipe to resist impacts at the surface that might otherwise break semi-rigid pipe and couplings. The furrows for the pipe were plowed out by a tractor to a depth of 12 inches.

Very Serviceable So Far

So far the materials have been very serviceable with no leaks occurring or repairs necessary. The main line is a 3-inch Kralastic pipe, large enough to serve present laterals and several additional ones that might be installed later. Each baffle type nozzle discharges 1 g.p.m. at 40 p.s.i., sufficient to apply 1 inch per hour to a 10-foot diameter circle.

Soil-moisture tensiometers are placed near the roots of the small trees on both flooded and sprinkled plots, and at depths to 4 feet, and at various distances from trees to determine moisture penetration and conditions before and after irrigation. It is expected that, if irrigations are made properly, considerable saving in water will result from the sprinkled plots compared to the flooded ones.

Information obtained from the experiment will include comparative data for the two irrigation methods and two planting methods which will involve a study of cultural practices, soil-moisture conditions, irrigation frequencies, water requirements, crop yields, irrigation labor cost and effect of mulching around trees.

Labels on commercial fertilizers must bear the grade designation, indicating the amount of total nitrogen, available phosphoric acid, and soluble potash. A chemical analysis must be given, stating the per cent of each constituent of agricultural value claimed to be in the material.

Pesticide Label More Involved

A much more complicated set of conditions applies to pesticide labels. An ingredient statement, usually consisting of the name and percentage of each active ingredient, together with the total percentage of inert or inactive ingredients in the formulation, is essential. There must be provided adequate instructions for use, to protect the public. Warning or caution statements must be provided regarding storage, handling and use of the pesticide, adequate to prevent injury to living man and other vertebrate animals. The great number of toxicants employed in these formulations and the wide variation in degree of toxicity greatly complicate the labeling requirements.

Activities of the office of state chemist are limited only by the amount of income derived. The office strives to apply its efforts toward the greatest benefits to the consuming public. As agriculture grows in Arizona, with attendant increase in consumption of feeds, fertilizers and pesticides, it is expected that the office will be able to increase activities so it will continue to serve the public adequately.

ABOVE are shown sprinklers supplied by underground plastic-pipe laterals operating on young hedgerow-planted lemons.

Here Are Tips to Assure

SUCCESSFUL WINTER LAWN

LIGHT AREAS reveal Brown Blight in winter ryegrass lawn.

Alice Boyle

Department of Plant Pathology

A lawn grass for Southern Arizona that will stay green the year round has been sought for many years. Since this search has not been successful, the recommended practice is to plant a permanent summer lawn such as Bermuda and then seed winter rye grass in the fall to give a green cover after frost has turned the summer lawn brown.

Because of the very conditions to which they are subjected, in order to fit them for their purpose, lawn plants are inclined to be more prone to disease than other plants. Wounding of leaf blades by cutting allows entrance of many parasitic fungi. Reduction of leaf surfaces by mowing decreases food manufacture which is carried on chiefly in the leaves. Reduction in leaf surface tends to weaken the plants, making them more susceptible to disease.

Good Seedbed Important

As is true at any time of year in the planting of any lawn, proper management of winter rye can do much to minimize disease. Good seedbed preparation is of utmost importance. There must be proper soil aeration so that oxygen to the roots of plants may be adequate; correct watering and proper drainage must be assured; proper rate of seeding and proper cutting height after the grass is established are important.

Because all growing plants must be fed, a knowledge of the kind of fertilizer to be used on a lawn and when to use it is essential. For information on the preparation for the planting of annual rye grass in Bermuda sod, see University of Arizona Extension Circular 135, "Lawns for Arizona."

Diseases of winter rye are few compared to those of summer lawn grasses but any one of the few may be extremely damaging.

Seed Rot and Damping-off

The two phases of this disease account almost entirely for poor stands when grass is planted from seed. The seed may rot just after the seed coat is broken. Shortly after emergence, seedlings may develop a water-soaked appearance or take on a darker green color. Finally the seedlings turn black, then shrivel as they turn brown.

Since the soil dwelling fungi responsible for this disease are encouraged by cool soils, the planting of winter lawns much after Oct. 15 should be avoided. The disease is also favored by high soil moisture. Even in early seeded lawns the disease may start and spread from low places, so it is important in preparation for planting to avoid low spots where water will stand. Use good seed. It pays. If late planting is unavoidable, seed treatment with Spergon helps to control the seed rot phase of the disease. Captan used as a soil drench checks damping-off if treatment is given promptly when symptoms appear.

Fusarium Blight

Probably the most destructive disease seen in both annual and perennial rye during our cooler months is caused by a fungus related, but not identical to, the Snow Mold Fungus, so destructive to turf in parts of the country where heavy snows occur. The disease is characterized by the presence of white, thread-like masses, the mycelium of the fungus, covering leaf blades and stems. In a few hours the fungus growth becomes powdery in appearance due to the production of masses of spores.

The fungus may kill grass in areas several feet in diameter. Although most often found in shaded areas in a lawn, it is not uncommon to find the disease in full sun if watering is done in the evening. Wet grass blades and low night temperatures make up the perfect environment for growth of the fungus and infection of the grass.

Calo Cure has effectively controlled this disease. Captan gives fair control if used when symptoms first appear. It is usually necessary to repeat the treatment several times at weekly intervals.

Brown Blight

Brown blight, also caused by a fungus, is a disease of both perennial and winter rye. Blighting starts at leaf tips. Numerous dark-brown, elongated spots may finally involve the entire leaf and leaf sheath. The leaves wither and turn brown. If not checked, the fungus may grow down into the crowns of plants destroying large, irregularly shaped areas. The disease is favored by cool temperatures and the presence of moisture on leaf blades for extended periods. Therefore, morning watering is advisable.

Acti-dione, an antibiotic spray, controls this disease. If damage to the crowns of plants has been severe, reseeding of some areas may be necessary.

Brown Patch

All grasses are susceptible to attack by the brown patch fungus. It is most likely to appear in winter lawns early in the fall or in early spring when nights are cool and days warm. The fungus that causes Brown Patch is commonly present in soils.

In Arizona, we seldom see the leaf blight phase of the disease — the fungus

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Why Not Try A New Palm In Your Patio?

J. S. Folkner

Department of Horticulture

The palm has been a widely accepted landscape tree in the desert areas of Arizona, yet this plant has not been used to its ultimate capacity.

Four varieties, the Mexican Fan palm (*Washingtonia robusta*), California Fan palm (*Washingtonia filifera*), and the two feather palms, the fruiting date (*Phoenix dactylifera*) and the ornamental date (*Phoenix cannariensis*) have been widely planted.

There are a number of other varieties perfectly adapted to Arizona conditions that by their growth habit are outstanding landscape specimens. A number of these, as well as the four listed above, are growing on the campus of the University of Arizona at Tucson.

Campus Is A Laboratory

The University over the years has, as each new building is completed, used in the landscape development of the buildings plants that are not commonly found in the Tucson area. The purpose is dual: first of all, outstanding landscaping and secondly, experimentation. The net result is a campus that in effect is a botanical garden of many rare species and a public proving ground of plant materials for the warmer areas of the state.

The dominant landscape theme of the University of Arizona campus is palms and red brick buildings. The palms consist mainly of the four varieties previously described. A number of other varieties have also been growing successfully for many years, such as the Queen palms. A striking tree is the Mexican blue fan palm, a slow growing, rare and exotic landscape specimen. The ultimate size of this tree is 40 feet. It is a native of lower California, is planted in southern California, and in Arizona an excellent planting exists at the Mormon Temple in Mesa.

Interesting Dwarf Palm

In addition, a very dwarf palm called the Mediterranean Fan palm may be grown, a hardy species and a single trunk variety. Several others of this genus are well adapted to Arizona conditions.

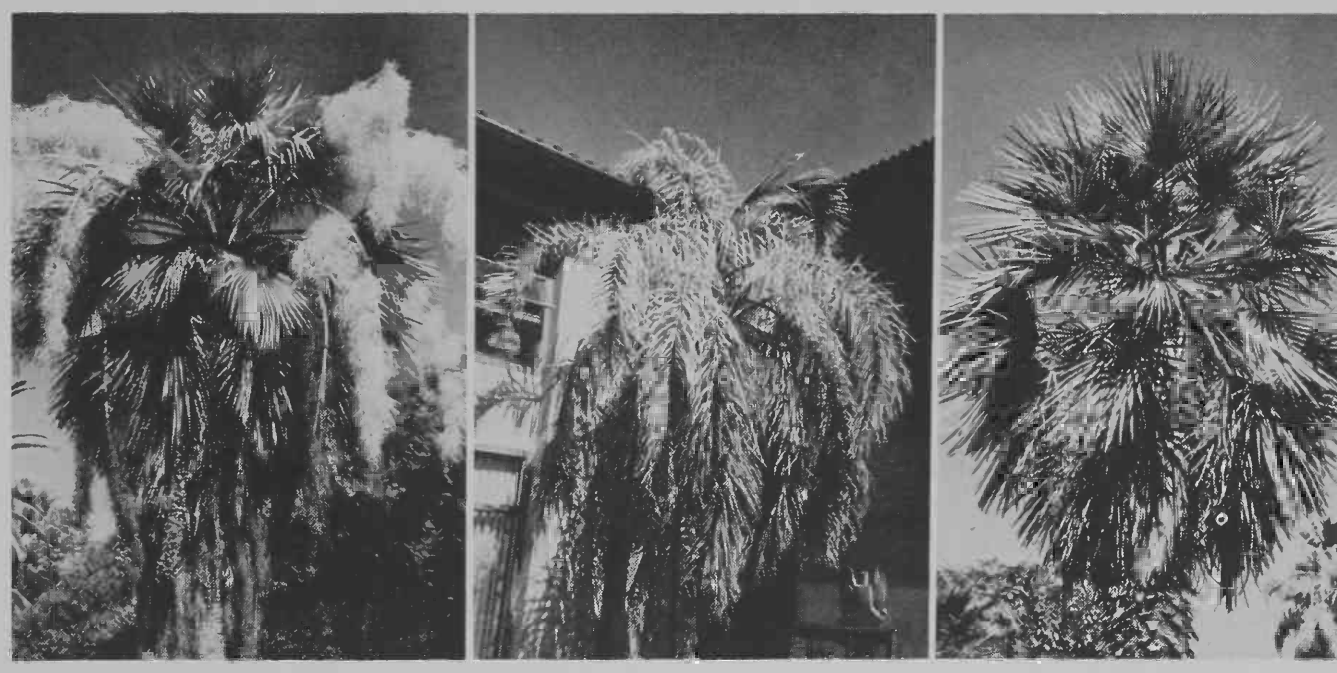
The Sabal palm or Pametto palm, native to Texas and the gulf states, is a fan type but had not been planted to any extent in Arizona previously because of the public's unfamiliarity with the species. A mature specimen has been growing for many years at the University of Arizona.

Should Be Carefully Placed

These are key accent plants and should be so placed in the landscape that their full use in relation to the architecture of structures is realized. The palm, generally speaking, is a plant that will withstand many extremes of temperature, moisture, and soil conditions. It is an exception to most plants in that it prefers to be transplanted during periods of hot weather rather than cool. Palms of all sizes transplant readily.

All palms are almost singularly free of insect problems and diseases in Arizona. In addition to their beauty, this freedom from disease and insects adds to their value as landscape specimens.

LEFT TO RIGHT, Mexican Blue Palm, Queen Palm and Mediterranean Palm.



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growing over grass blades giving a "smoky" appearance to the invaded grasses. The disease is important as a root and crown-rot. Large, roughly circular areas may be entirely killed.

High soil nitrogen results in severe brown patch damage. The addition of small amounts of nitrogen fertilizer during the growing season is preferable to a heavy application at one time.

Water In Morning

Late afternoon and evening watering is particularly objectionable in the case of this disease. Since the sclerotia from which the fungus grows to attack the grass plants are on or near the soil surface, drying of the soil surface as quickly as possible after watering is a must. Frequent, light sprinklings should be avoided. To best prevent this and the other diseases mentioned above, a lawn area should be soaked to a depth of four to six inches and watered again only when the first sign of wilting appears. The frequency of watering will depend on soil type. Should Brown Patch appear in spite of the use of correct cultural practices a Calo Cure-Tersan mixture should be used. One ounce each in 10 gallons of water to 1,000 square feet, gives almost perfect control.

Since no single fungicide has been found that will control all diseases in lawns, it is important that the fungus causing the disease be identified. If specimens plus information about growing conditions, care given and any other pertinent information are sent to the University of Arizona's Department of Plant Pathology, the cause of the disease can usually be determined and control advice given.

Scientists Seek, Collect, Study, Improve, Increase

Better Grasses for the Southwest

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Grasses have performed an important role in the economy of the Southwest since about 1500 when the area was first grazed by domestic livestock. Until very recently no attempt was ever made to improve the native grasses.

There are, however, great possibilities of improving the forage species by the use of plant breeding techniques and a program of this sort has been begun. This project is cooperative between the USDA Agricultural Research Service, and the University of Arizona.

Black Grama Desirable

Major emphasis will be devoted to the improvement of range species. One of those being considered is black grama, a native to the region. This grass possesses many desirable range grass characteristics such as seedling vigor and establishment, palatability, high nutritive value, digestibility, wide area of adaptation and forage production.

Unfortunately the use of black grama in range reseeding is hampered by the lack of seed. In most years it produces little or no seed under range conditions. Studies are being made to learn the factors responsible for poor seed set. Results obtained in 1957 indicate that black grama can be made to produce seed consistently under controlled cultural conditions. Comparable results in 1958 will give additional information on the factors responsible for seed production by this valuable range grass.

Several thousand black grama plants are being planted this year from seed collected from a wide variety of Southwestern locations in 1957. The plants raised from this seed will be observed and the best of them selected for further study.

Boer Lovegrass Drouth-Tolerant

An introduced grass, Boer lovegrass, has many good characteristics and appears promising from the standpoint of further improvement. Mature plants have shown superior drouth tolerance. They are sufficiently cold tolerant for most areas of the Southwest. The plants, which are palatable throughout the year, green up early in the spring and remain green until late fall.

They are adapted to a wide variety of soil conditions and produce valuable forage in Arizona from about 3000 to 6000 feet elevation. Temperatures at these higher elevations may drop to as low as five degrees below zero.

Seed yields of this grass are sufficient for economic commercial production. However, seedlings are subject to drouth, which makes it difficult to obtain satisfactory stands under range conditions. Improvement of seedling vigor and seedling drouth tolerance would make this grass very desirable for reseeding many areas of the Southwest. Studies on these limiting characters are being made.

Other Lovegrasses Studied

In addition to black grama and Boer lovegrass, several other grasses are being studied for range use. Some of these are: Lehmann lovegrass, weeping lovegrass, plains lovegrass, Bicolor lovegrass, plains bristlegrass, several species of bluestems and panic grasses.

Blue panic is the only grass being investigated for improvement as an irrigated forage grass. This species has a very wide range of conditions, yet produces outstanding yields under irrigation. Different strains may have to be developed for maximum forage production under these diverse conditions.

Several accessions of blue panic are being tested and an individual plant nursery will be established to permit more critical evaluation for both range and irrigated conditions. Research is also under way to evaluate irrigated blue panic for forage yield under various applications of nitrogen, phosphorus and potash, and under various amounts of soil moisture.

Cochise County
Mon., Tues., and
Wed., 6:55 a.m.—KAWT, Douglas

Coconino County
Tues. and Thurs., 8:10 a.m.—
KCLS, Flagstaff

Graham County
Sat., 10:00 a.m.—KGLU, Safford

Greenlee County
Sat., 10:30 a.m.—KCLF, Clifton
Thurs., 9:30 a.m.—KCLF, Clifton

Maricopa County
Mon. thru Sat., 5:55 a.m.—
KRUX, Phoenix
Sun., 8:45 a.m.—KOY, Phoenix

Pinal County
Mon. thru Fri., 6:45 a.m. & 9:20 a.m.
Also Sat., 7:30 a.m.—
KCKY, Coolidge-Casa Grande
Mon. thru Fri., 6:55 a.m. & 9:30 a.m.
Also Sat., 12:30 p.m.—
KPIN, Casa Grande

Yavapai County
Mon., Wed., and Fri.,
6:10 p.m.—KYCA, Prescott
Mon., Tues., and Fri.,
12:15 p.m.—KNOT, Prescott

Yuma County
Mon. thru Fri., 6:30 a.m.—
KYUM, Yuma

El Programa Mexicana
A weekly farm and home program broadcast in Spanish by Stations KEVT, Tucson; KVOY, Yuma; XEXW, Nogales; and XEFH at Agua Prieta.

Television
"Arizona Agriculture," each Saturday afternoon over KGUN, Tucson, and KTVK, Phoenix. Consult your newspaper for correct hour.